

**The Roles of Pharmacists in Disaster Health
Management in Natural and Anthropogenic Disasters**

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ABSTRACT

Climate change is causing an increase in the frequency and intensity of weather-related natural disasters affecting the lives of over four billion people. The impact on communities is increasing, not only because of the increased frequency and severity of weather events, but also because of the changing exposure and vulnerability of communities due to the ageing population and the rise in the prevalence of chronic disease. Chronic disease exacerbations and interruptions to patients' continuity of medication care are the leading cause of death following disasters – mostly due to the inability to access basic healthcare services. Building resilient communities and healthcare systems is the key to counteracting this vulnerability to disasters.

Disaster risk reduction is being recognised as an important step in alleviating the effect on people, with 187 countries signing the Sendai Framework for Disaster Risk Reduction. The aim of the Sendai framework is to reduce the impact of disasters on loss of life, health, and livelihood within communities and countries. The Sendai Framework highlights the imperative need to reduce the health impacts of disasters on communities without further delay by building resilience in healthcare systems.

Healthcare during disasters is provided predominately by emergency services and hospitals. However, their focus is primarily on the influx of acutely injured victims. Emergency services and hospitals in the aftermath of a disaster generally do not have the resources and capacity to accommodate those with chronic diseases not requiring emergency care but still needing access to basic medical services. Disasters are highly stressful environments and often result in the affected community being unable to access basic healthcare services in a timely manner – a fundamental human right. Pharmacists have the potential to fill this service gap; however, their role within a disaster health team is currently undefined.

This research project aimed to identify where in the disaster management cycle - prevention, preparedness, response, and recovery (PPRR) - pharmacists may play a role, and what their roles and responsibilities could be using an all-hazard approach

including both natural and anthropogenic disasters. This research sought to obtain an understanding of the acceptance of pharmacists' roles in disasters amongst the wider disaster health community. The key objectives for this research project were:

- 1) identify the opinions of the international and Australian disaster health communities on pharmacists' roles in disasters and where pharmacists' roles fit across the PRR cycle
- 2) identify any barriers and facilitators to pharmacists being more involved
- 3) obtain consensus from key opinion leaders on the roles and responsibilities pharmacists could undertake in disasters and where these identified roles fit within the PRR phases.

The research project consisted of four individual studies – a pharmacy legislation review, surveys, interviews, and a Delphi study. The first study involved a review of the pharmacy legislation which enables pharmacists to assist in disasters. This review included five countries and compared the number of disasters each country had experienced in the last 10 years with the presence of disaster-specific pharmacy legislation. The odds of a country with a higher number of disasters having disaster specific emergency supply legislation increased by 1.78 times compared with countries which had experienced fewer disasters in the last five years (OR=1.78, $p < 0.01$ (95%CI: 1.58 - 2.01)). There was also an association found between the disaster-specific pharmacy relocation/mobile pharmacy legislation and the number of disasters a country has experienced in the last five years. As the number of disasters increased, the odds of having disaster-specific pharmacy relocation/mobile pharmacy legislation increases by 1.05 times ($p = 0.01$ (95%CI: 1.01 – 1.09)).

To begin to answer the first research question on the opinions of the disaster health communities, surveys were undertaken with two populations – an international disaster conference and an Australian disaster community. The results of the international survey yielded a response rate of 56.8% and the Australian survey yielded a response rate of 21.7%. The majority of both surveyed populations were in strong agreement pharmacists had a role in disasters aside from the established role in logistics and supply chain management (96.8% (122/126) and 89.5% (85/95)), and the role was within pharmacists' current scope of practice (87.9% (109/124) and

79.4% (77/97)). Eight of 11 roles received an agree or strongly agree rating by the majority of the participants. The international participants were more likely to report that pharmacists had a role in disasters in addition to logistics compared with the Australian participants. The pharmacist's role in cardiopulmonary resuscitation (CPR) and assisting in first response distribution between the two survey populations was significantly different (International= 44.1% (52/118), Australian= 28.1% (27/96)). The other nine roles showed no significant difference in distribution between the two survey populations. The opinion ratings expressed by both survey populations showed an overwhelming support for pharmacists undertaking more roles in disasters in addition to the established logistics and supply chain management.

To continue to determine the opinions of the disaster health community on pharmacists' roles in disasters and to identify the barriers and enablers, interviews were conducted with 28 key stakeholders. The data were analysed via manual coding and the text-analytic software Leximancer® to produce five major themes. These themes were 'disaster management', 'community', 'government', 'pharmacy', and 'barriers and facilitators'. The 'disaster management' theme encompassed the unique challenges disasters present and how quickly disasters can turn into public health emergencies. This theme highlighted that pharmacists' roles span across the entire disaster PRR cycle and demonstrated that pharmacists are at the operational junction across multiple practice areas. The 'community' theme included business continuity plans (BCP) and demonstrated the importance of having pharmacists in the community during disasters. The 'government' theme considered the ethico-legal and moral concerns of expanding pharmacists' roles in disasters and highlighted the need for government involvement. The 'pharmacy' theme discussed the context of pharmacists' current involvement in disasters and their recent advances. This theme argued that pharmacy's purpose in disasters is continuity of care and highlighted the benefits of further inclusion of pharmacists' in disasters. The final theme encompassed barriers and facilitators. The barriers mentioned were professional turf concerns and attitudes of other health professions, lack of awareness, pharmacists' perceptions of themselves, legislation, and remuneration. The facilitators identified by the disaster health stakeholders were including pharmacy in mass gathering

medicine, insurance reform, pharmacists working under remote orders, pharmacists providing public health messages, and participating in post-disaster 'after action' reports.

The third research question was addressed with a Delphi study, consisting of three rounds of surveys. The surveys included qualitative and Likert scale questions. There were 15 key opinion leaders involved in all three rounds. Out of 46 roles presented to the experts, 43 roles reached consensus and were accepted as pharmacists' roles in disasters. These roles extend beyond the traditional pharmacists' role of logistics in disasters, utilising more of a pharmacist's clinical expertise and skills. The roles agreed upon by the panel span across the disaster PRR cycle and the practice areas – patient care, public health, governance and logistics.

The pharmacy profession successfully transcends the individual practice boundaries in daily practice across the wide breadth of healthcare services pharmacists provide, working collaborative to provide patient care, public health services, logistics, and governance. However, when a disaster arises, this level of multidisciplinary partnership is generally lost, and pharmacists are allocated to disaster teams as logisticians. This research project aimed to determine the opinions of the wider disaster health community on the roles of pharmacists in disasters. The disaster health community and key opinion leaders believe there is a need and value of having pharmacists undertake more active clinical roles across the PRR cycle. However, it was identified there are barriers and enablers for pharmacists to be able to undertake these identified roles.

Pharmacists have the expertise and skills to assist across the multiple platforms in disasters, being able to successfully navigate the individual nuances of each individual practice areas (patient care, public health, governance, and logistics). It is time pharmacists are accepted and acknowledged for their ability to bring a unique skillset and knowledge to disaster management, placing them at the operational junction of these practice areas. Three areas were identified by this research project requiring further exploration:

- 1) utilising pharmacy students and dispensary technicians to backfill pharmacists' roles in disasters, freeing up pharmacists to undertake more clinical tasks.
- 2) investigate pharmacist training and competency requirements, to ensure pharmacists are fully equipped and prepared to respond in disasters.
- 3) collect evidence to determine if the statement of pharmacists undertaking more clinical roles in disasters can increase patient safety is true.

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LIST OF ABBREVIATIONS

ADF	Australian Defence Force
AHPRA	Australian Health Practitioner Regulation Agency
AIDR	Australian Institute for Disaster Resilience
AJHP	American Journal of Health-System Pharmacy
AUSMATs	Australian Medical Assistance Teams
BCP or BCPs	Business Continuity Plan(s)
BGLs	Blood Glucose Levels
CAQDAS	Computer Assisted Qualitative Data Analysis Software
CBRN	Chemical, Biological, Radiological, and Nuclear
CEDM	Centre for Emergency and Disaster Management
CPAP	Continuous Positive Airway Pressure
CPD	Continuing Professional Development
CPR	Cardio-Pulmonary Resuscitation
CRED	Centre for Research on the Epidemiology of Disasters
CSO	Community Service Obligation
DMATs	Disaster Medical Assistance Teams
ED or EDs	Emergency Department(s)
EM-DAT	The Emergency Events Database
EMT	Emergency Medical Technicians
FEMA	Federal Emergency Management Agency
FIP	International Pharmaceutical Federation
GEE	Generalised Estimating Equation
GP or GPs	General Practitioner(s)
Hb1Ac	Glycated haemoglobin
IGEM	Inspector-General for Emergency Management
MSF	Médecins Sans Frontières
NABP	National Association of Boards of Pharmacy
NCD	Non-Communicable Diseases
NGOs	Non-Government Organisations
NPS	National Pharmaceutical Stockpiles

NSW	New South Wales
NZ	New Zealand
PBS	Pharmaceutical Benefit Scheme
PHC	Primary Health Care
POD	Point-of-Dispensing
PPRR	Prevention, Preparedness, Response and Recovery
PTSD	Post-Traumatic Stress Disorder
QLD	Queensland
QUT	Queensland University of Technology
SARS	Severe Acute Respiratory Syndrome
UK	United Kingdom
UN	United Nations
UNISDR	United Nations Office for Disaster Risk Reduction
US	United States
WADEM	World Association for Disaster and Emergency Medicine
WHO	World Health Organisation

STATEMENT OF ORIGINAL AUTHORSHIP

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature: [QUT Verified Signature](#)

Date: May 2019

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Watson, K.E., Singleton, J.A., Tippett, V., Nissen, L. The verdict is in: Pharmacists do have a role in disasters and it's not just logistics. In World Association of Disaster and Emergency Medicine Congress (WADEM) 7-10th May 2019, Brisbane Australia.

– **Oral Presentation**

Porter, K.E., Singleton, J.A., Tippett, V., Nissen, L. The Role of Pharmacists in Disasters Since the Beginning: A Systematic Review. In International Pharmaceutical Federation (FIP) Congress 2-6th September 2018, Glasgow UK

Porter, K.E., Singleton, J.A., Tippett, V., Nissen, L. Where Do Pharmacists Fit in the Disaster Health Management Puzzle? In International Pharmaceutical Federation (FIP) Congress 2-6th September 2018, Glasgow UK

Porter, K.E., Singleton, J.A., Tippett, V., Nissen, L. Pharmacists in Disasters –Australia's Opinion. In International Pharmaceutical Federation (FIP) Congress 2-6th September 2018, Glasgow UK

Porter, K.E., Singleton, J.A., Tippett, V., Nissen, L. The Role of Australian Pharmacists in Natural and Man-made Disasters – Can We Do More? In International Life Long Learning in Pharmacy Conference (LLL) 6-9th July 2018, Brisbane, Australia

Porter, K.E., Singleton, J.A., Tippett, V., Nissen, L. Do Pharmacists Fit in the Disaster Health Management Team Puzzle? In Australasian Pharmaceutical Science Association (APSA) and Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists (ASCEPT) conference 5-8th December 2017, Brisbane, Australia.

Porter, K.E., Nissen, L., Tippett, V., Singleton, J. Ready, Willing, And Able: The Role of Pharmacists in Natural and Man-Made Disasters - Can We Do More? In World Association of Disaster and Emergency Medicine Congress (WADEM) 25-28th April 2017, Toronto, Canada. – **Oral Presentation**

Chapter 1: Introduction

This chapter outlines the background in Section 1.1 and provides in Section 1.2 the scope of the research project. Section 1.3 outlines a list of the definitions and terms used in this dissertation.

1.1 Background

This research was motivated by observations of how humanitarian aid organisations did not include pharmacists in medical relief efforts during crises/disasters. In some instances, pharmacists were able to provide an inventory management role. Literature in this field demonstrates that pharmacists generally only have one accepted role in disasters – logistics and supply chain management.¹ Multi-disciplinary, patient-centred care which many westernised healthcare systems strive to achieve is not carried through into disaster health management. Pharmacists are rarely given the opportunity to utilise their clinical expertise and interact with patients during disasters. Hence, these observations lead to the development of the following research question, “What are the roles and responsibilities pharmacists could undertake in disaster health management throughout the PRR cycle in natural and anthropogenic disasters?”

1.2 Scope and Definitions

1.2.1 Scope

The scope of this research encompasses an all-hazard approach including all types of disasters - natural and anthropogenic in nature.

The pharmacy profession consists of more than just the pharmacist. The premises or building, medications, dispensary technicians, pharmacy assistants, administration staff and other stakeholders are all involved in the pharmacy profession or industry. The scope of this dissertation is limited to the roles and responsibilities of the pharmacist and does not extend to the broader pharmacy profession. Pharmacists as healthcare professionals can work as a separate entity to

the building and medications. The profession works as a functioning unit or business, with all the staff and stakeholders involved, focusing on the access to medications from a specific approved location. During a disaster or emergency, the roles and responsibilities for each of the levels of staff and stakeholders within the pharmacy profession or industry differ depending on the level of qualifications of the staff members and the context of the pharmacy (community, hospital, government or industry).² The qualifications and education of pharmacists can differ between countries and there is no universally accepted definition of a pharmacist. Pharmacists are not restricted to operating within the pharmacy building and can provide healthcare services with or without medications. Being qualified healthcare professionals, pharmacists can work in a multitude of settings – community, hospital, general practitioner (GP) clinics, outpatient clinics, defence forces, non-governmental organisations (NGOs), government, World Health organisation (WHO) and United Nations (UN). Focusing on pharmacists and not the broader pharmacy profession allowed for the exploration of pharmacists' roles and responsibilities in these different contexts and backgrounds. Looking beyond the pharmacy as a building and the usual professional contexts of community, hospital, government, or industry. The economic and insurance implications of pharmacists' roles in disasters are beyond the scope of this dissertation but warrant further investigation.

1.2.2 Definitions

To provide context to this research, some disaster terms are now defined.

1.2.2.1 Hazard

The Sendai framework, developed by the (UN) at the World Conference on Disaster Reduction in 2015, adopted this definition for a hazard:

".... A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation."³ (p.18)

This definition is quite broad and allows for the inclusion of all types of hazards. The UN General Assembly separates hazards into three categories:³

- 1) Natural hazards linked with natural phenomena (i.e. earthquakes, floods)

- 2) Anthropogenic hazards are “induced entirely or predominantly by human activities and choices”.³ (p.18)
- 3) Socio-natural hazards, a combination of the first two (i.e. climate change, environmental degradation)

A natural hazard is more narrowly defined by the Centre for Research on the Epidemiology of Disasters (CRED) as any extreme event that occurs naturally on earth.⁴ The UN Office for Disaster Risk Reduction (UNISDR) and CRED separate natural hazards into categories (Table 1).^{3,4}

Table 1: Hazard categories as accepted by UNISDR and CRED^{3,4}

Biological	Pathogenic Vector-borne diseases Bioactive substances
Geophysical	Earthquakes Volcanic eruptions Geophysical movements
Hydrological	Floods Landslides Waves
Meteorological	Cyclones/Hurricanes/Typhoons Storms Extreme Temperatures
Climatological	Droughts Wildfires/Bushfires
Technological	Infrastructure failure Nuclear radiation Transport accidents Chemical spills

*CRED= Centre for Research on the Epidemiology of Disasters, UNISDR= United Nations Office for Disaster Risk Reduction

1.2.2.2 Disasters

Hazards become disasters when they impact a country and exceed its ability to withstand the event without obtaining outside intervention.³ Disasters can be categorised by their cause, duration, reach, effect on community, number of casualties or by the level of response required.^{5,6} Broadly disasters are classed as natural disasters (e.g. extreme weather-related events) or anthropogenic disasters (e.g. acts of terrorism or bioterrorism) depending on the causative nature of the hazard.⁷ The term anthropogenic was first coined by Eugene Stoermer, however, Paul

Crutzen is credited with the popular use of the term to describe the human-dominated changes to the world.^{8,9}

There is no global consensus on the definition of disasters but all definitions have similar characteristics – sudden onset, unpredictable nature, destructive, generative of human suffering, and typically exceeds the affected community's coping capability.^{7,10} The Emergency Events Database (EM-DAT) developed by CRED only classifies a hazard as a disaster if it has met one of the following criteria:¹¹

- 1) has killed 10 or more people
- 2) affected 100 or more people
- 3) been declared a state emergency
- 4) a call for international assistance has been made

The UN's Sendai Framework has the inclusive view that disaster risk arises when hazards interact with the vulnerabilities of a community - whether physical, social, economic, or environmental.¹² Therefore for the purposes of this research, the definition of disaster as adopted by the Sendai Framework and the UN General Assembly in 2016 will be used. A disaster is defined as:³

“A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.”³ (p.13)

The term 'emergency' can be used interchangeably with the term 'disaster' and incorporates biological, technological and health disasters as endorsed by the Sendai Framework terminology report.³ The distinction is made in the report between small-scale and large-scale disasters.³ Small-scale disasters are described as those affecting a local community and requiring outside assistance whilst large-scale disasters are described as those affecting a society and requiring national or international assistance.³

In terms of health, a disaster is suggested to occur when there is a misbalance between the health needs of a community and the resources available to meet those needs.¹³

1.2.2.3 Disaster Affected

The term ‘affected’ as a result of a disaster was defined in the intergovernmental terminology report adopted by Sendai Framework, as persons either directly or indirectly affected by an event – sustaining illness, health consequence, injury, or who were displaced, evacuated, or relocated.³ Persons indirectly affected by a disaster include those affected by disruptions to basic services, affected by changes to critical infrastructure, or who experience psychological and adverse health outcomes.³

1.2.2.4 Disaster Management

‘Disaster management’ and ‘Emergency management’ are terms used interchangeably and have been adopted by the UN General Assembly in 2016 as part of the Sendai Framework, as *“the organisation, planning and application of measures preparing for, responding to and recovering from disasters”*.^{3 (p.14)} The goal of disaster health management is described by Zhong et al.

“to reduce the impact of disasters on human health and wellbeing by providing urgent health interventions and ongoing healthcare during and after disasters”.^{14 (p.1)}

Disaster management encompasses many different operations and professions outside of the health industry, however this dissertation is limited to the health-related operations and professions.

1.2.2.5 Disaster Health Management

Disaster health management refers specifically to the health aspects of a disaster within the four PPRR phases of disaster management. The terminology disaster health management has emerged from disaster medicine.¹³ This is in recognition of the multidisciplinary nature of modern healthcare and the management of health problems is no longer the sole responsibility of the medical profession in disasters.^{13,15} There is a need to evaluate the readiness of communities to cope with the expected stress and adverse health outcomes of impending

disasters.^{10,15,16} As this research is concerned with the health aspects of disasters, disaster health management will be used in the context of disaster management.

1.2.2.6 Public Health

In 1920, a definition of public health was developed by C. Winslow, the founder of public health, and was expressed as:

“The science and art of preventing disease, prolonging life and promoting physical health and efficiency through organised community efforts for the sanitation of the environment, the control of communicable infections, the education of the individual in personal hygiene, the organisation of medical and nursing services for the early diagnosis and treatment of disease, and the development of the social machinery which will ensure to every individual a standard of living adequate for the maintenance of health; organising these benefits in such a fashion as to enable every citizen to realise his birth right of health and longevity.”¹⁷ (p.30)

This definition has been reiterated in more recent literature and is still the public health definition used today.^{18,19}

1.2.3 Summary

Hazards are naturally occurring phenomena but become disasters when they impact on the functioning of society. Having outlined the context of the research, Chapter 2 will provide a narrative literature review of pharmacists’ roles in both natural and anthropogenic disasters and where pharmacists fit in disaster health management teams. A separate systematic review is being prepared by the researcher to evaluate the level of evidence present in the literature with regards to pharmacists’ roles in disasters.

Chapter 2: Literature Review

Chapter 2 comprises a detailed narrative literature review of the research topic. Section 2.1 discusses the effects of climate change on natural hazards. Section 2.2 looks at the public health consequences of disasters. Sections 2.3 - 2.5 explore the theoretical underpinning of disaster management. Section 2.3 explore systems thinking as an approach, Section 2.4 explores chaos theory, and Section 2.5 considers which theory might be the most appropriate in disaster management. Section 2.6 discusses the current stakeholders in disaster health management whilst Section 2.7 reviews current roles of pharmacists in disasters. Section 2.8 outlines disaster pharmacy models found in the literature. Section 2.9 provides a summary of the literature review chapter and Section 2.10 highlights the significance of the research. Section 2.11 states the research aims and objectives.

2.1 Climate Change and Natural Hazards

Natural hazards such as floods, storms (including cyclones, hurricanes, typhoons and storm surges), droughts, extreme temperatures, bushfires, earthquakes, tsunamis, and landslides, have always existed and are a natural part of the climate system.^{20,21} Natural hazards have the potential to become catastrophic disasters when combined with the exposure and vulnerability of communities.²⁰⁻²²

Weather-related disasters are understood to be increasing in frequency and intensity.^{20,21,23-25} It is acknowledged by 97% of climate scientists that the accumulative effects of global warming are caused by anthropogenic activities.²⁶⁻²⁸ As a result of this human-caused global warming, extreme hot and cold events are increasing in frequency and duration.²⁸⁻³⁰ The climate models for predicting the impact of global warming are only able to estimate the potential impact, as climate change is highly unpredictable and the initial effects of global warming are only just beginning to emerge. These climate models suggest the earth's surface temperature will increase by 1.4°C – 5.8°C above pre-industrial era temperatures by the year 2100.²⁹ There is believed to be a critical threshold of 2°C above pre-industrial

temperatures where the effects of global warming and climate change will be felt worldwide. The 2°C critical threshold is suggested to be the ‘tipping point’ where irreversible large-scale release of carbon dioxide from the thawing of the permafrost will affect the entire planet, melting of the Greenland ice sheet will occur, and the Amazon rainforest will be destroyed.³¹⁻³³ It would appear that climate scientists have not overestimated these models. The earth’s surface temperature passed the halfway mark of 1°C during the hottest year on record in 2015 with a global mean average of 1.02°C above pre-industrial temperatures. This occurred 35 years earlier than predicted.³³ In 2015, temperatures in parts of the northern hemisphere were above the 2°C critical threshold.³⁴ Partly contributing to these results was a strong El Niño effect.³¹ Temperatures can increase naturally by 0.5°C during El Niño cycles.³⁵ The changing El Niño Southern Oscillation has been known to increase the probability of weather-related natural disasters, although this does not discount the influences of climate change on the increases on extreme weather-related events.

The anthropogenic cause of climate change and global warming generates a feedback loop whereby global warming can cause an increase in the probability of extreme weather-related events.³⁶ For example, heatwaves lead to a rise in the demand for air-conditioning and cooling technologies.³⁶ This in turn leads to surges in the combustion of fossil fuels, further contributing to the carbon footprint and global warming.³⁶ As a consequence, there is an amplified risk of extreme weather-related events.³⁶ These feedback loops are increasingly concerning as there is the potential for a cascading scale effect – a single weather-related event causing another disaster to occur.^{24,37}

Due to the effects of global warming and climate change, the impact of disasters on communities from natural hazards (floods, storms, droughts, extreme temperatures, bushfires, earthquakes, tsunamis, and landslides) are swelling in severity.^{20,21,23-25}

2.1.1 Disaster Trends

Communities previously have relied on local resources and single organisations to respond and recover from a disaster. However, disasters are becoming complex, overwhelming single organisations.²⁵ To effectively meet the needs of disaster-affected communities, organisations need to collaborate their response and recovery efforts.²⁵

Disaster trends for the period 1960 - 2017 was obtained from the CRED EM-DAT database and are illustrated in Figure 1, Figure 2 and Figure 3.³⁸ Each graph demonstrates an overall upward trend in the number of disasters experienced globally since 1960.³⁸ Whilst, geophysical disasters are remaining consistent and constant over time, weather-related disasters (hydrological and meteorological disasters) are soaring (Figure 1 and Figure 2).³⁹ The effects of climate change on disasters with global warming, changing rainfall patterns, alterations in seasonal trends, and the melting of the polar ice-caps have only started emerging. These symptoms of climate change and the anthropogenic carbon footprint are beginning to impact on the frequency, severity, and intensity of weather-related disasters. Thus, the impacts from these disasters are only just beginning to be understood and these weather-related disasters are projected to rise.^{26,27,32,40} However, irrespective of this projected rise, there is a definite intensification in the severity of disasters and their impacts on communities with disasters often transcending geographical boundaries and affecting communities globally.^{22,41}

Asia is emerging as the most disaster-prone continent, followed by the Americas and Africa (Figure 3). In 2017, Asia represented the most vulnerable continent for storms and floods with over 70% of the global population of disaster-affected community and 58% of the total deaths for 2017.⁴¹ The disaster trends depicted in these figures only represent the natural disasters that have occurred since 1960, and do not include anthropogenic disasters.

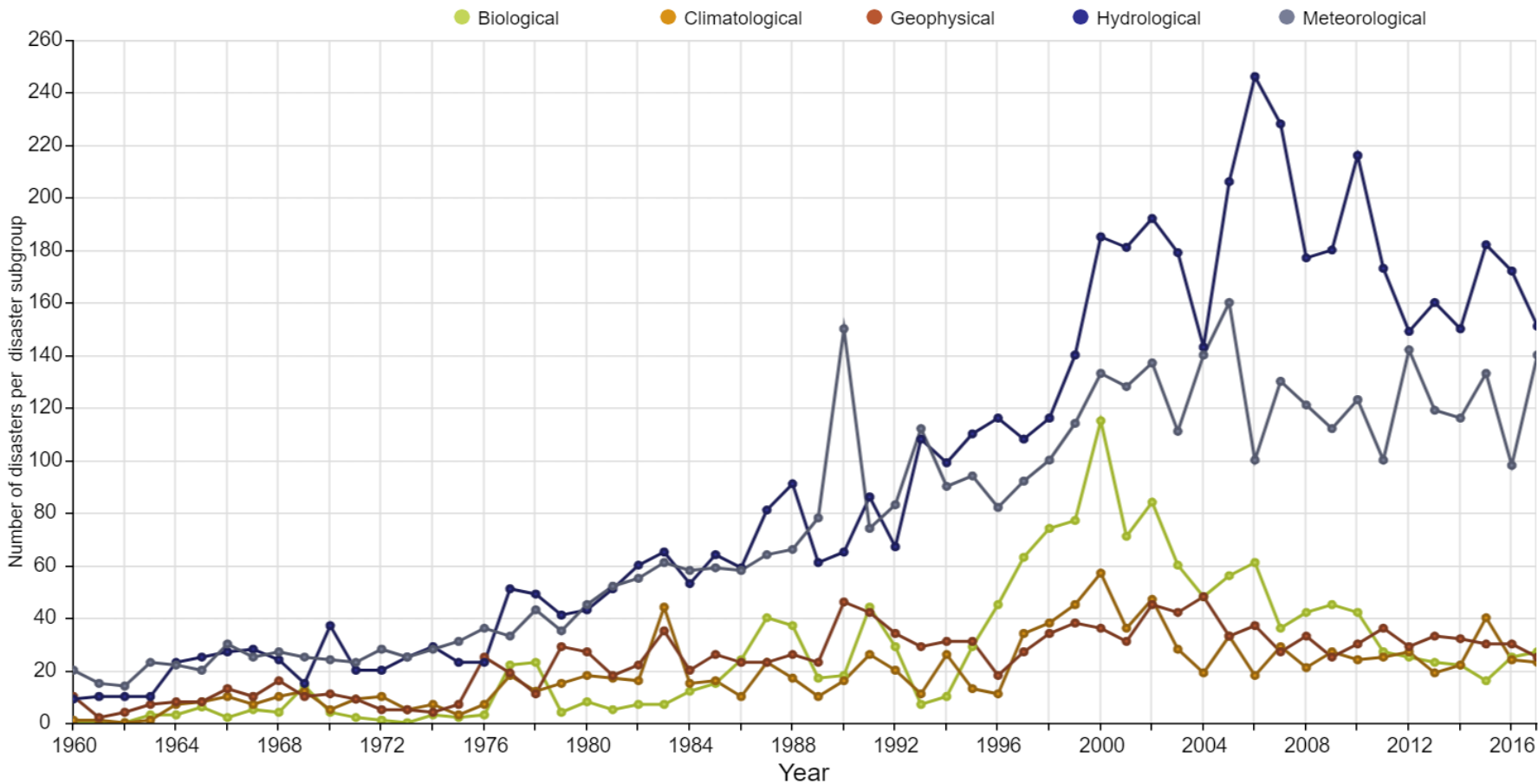


Figure 1: Disaster trend graph obtained from CRED EM-DAT database³⁸ for the period 1960-2017. Each colour represents a different disaster hazard category. Geophysical (earthquakes) and climatological (drought) hazards have remained mostly consistent over time, whereas, hydrological (floods), and meteorological (storms) hazards have increased since the 1960s. Biological (epidemics) hazards have begun to decrease since the beginning of the 21st century.

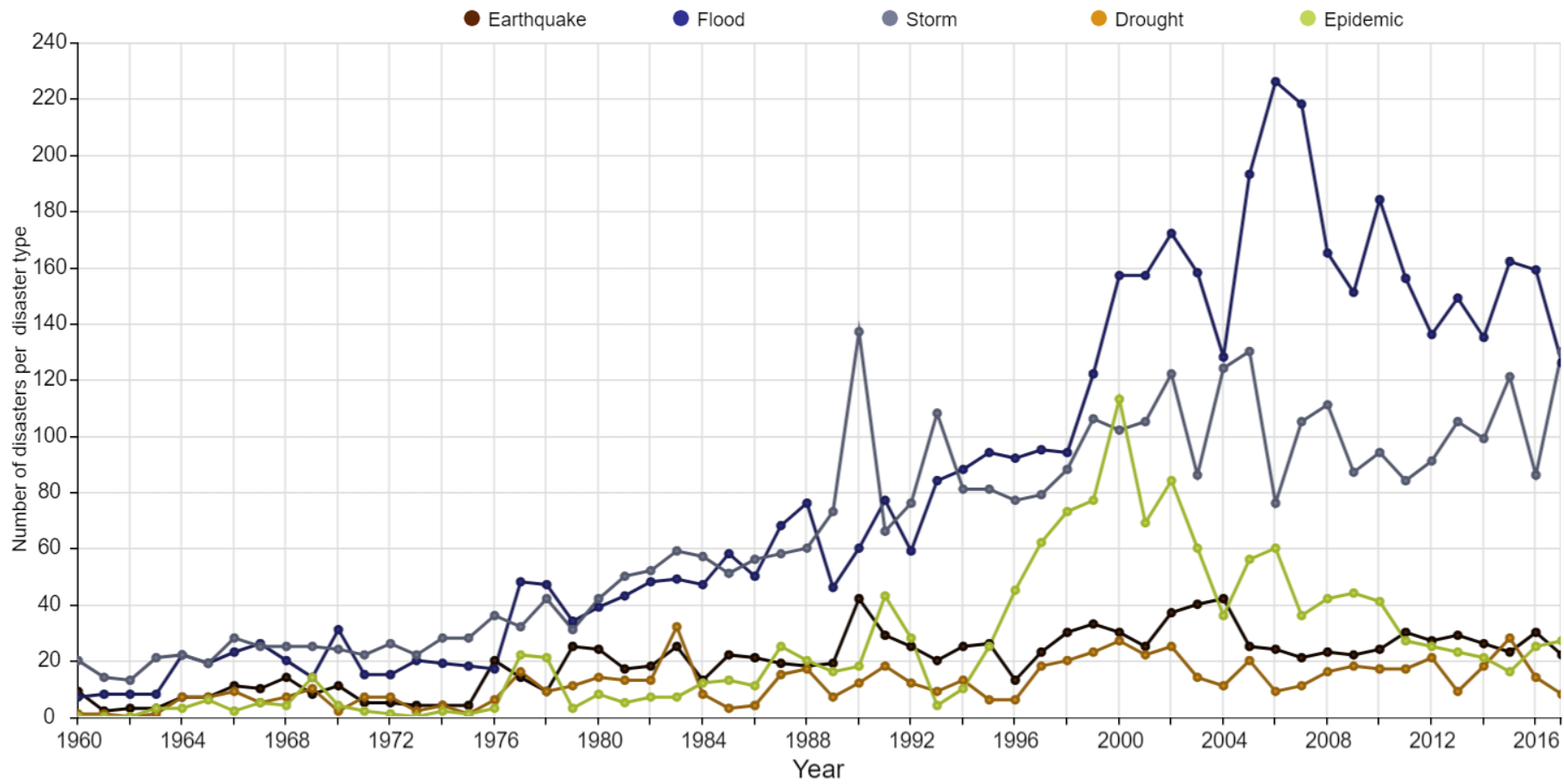


Figure 2: Disaster trend obtained from CRED EM-DAT database³⁸ for the period 1960-2017. Each colour represents a different disaster hazard. Drought and earthquake have remained consistent over time. Epidemics have a downward trend with the beginning of the 21st century. Whereas, floods and storms are on an upward trend.

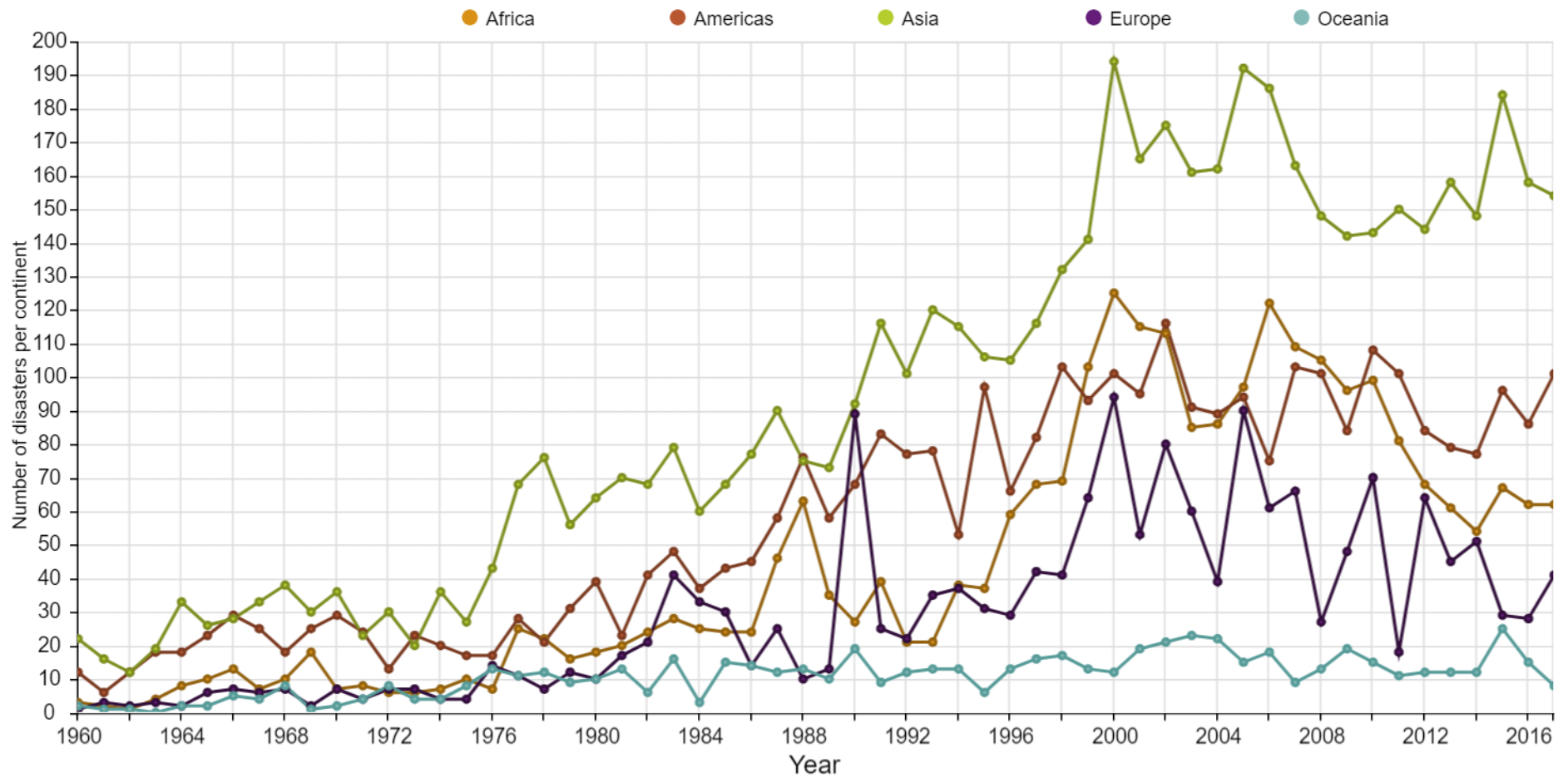


Figure 3: Disaster trend obtained from CRED EM-DAT database³⁸ for the period 1960-2017. All continents have experienced an increased in disasters over time with Asia (green) having experienced the steepest upward trend.

There is no evidence that ‘acts of terrorism’ or bioterrorism events are increasing. However, there is a public perception that anthropogenic disasters are escalating due to the extensive media coverage of attacks occurring globally.^{42,43} With anthropogenic disasters attributable to human actions, specifically nuclear terrorism, there is a stronger sense of their preventability compared to the unpredictability of natural disasters.^{44,45}

The CRED figures (Figure 1, Figure 2 and Figure 3) demonstrate the number of disasters that have occurred to date since 1960, however, they do not identify the true impact these events have on communities. The ‘World Disasters Report 2018’ highlighted that there are many people in communities being adversely affected in disasters who have been previously overlooked.⁴⁶

The level of impact a disaster can have on a community varies depending on the locality, severity, and scale of the disaster and the amount of preparation, resilience, and economic capacity of the community.^{39,47} Disasters whether natural or anthropogenic, can be mitigated by preventative measures undertaken by communities, such as building resilience into the infrastructure and building adaptive capacity into community services.^{4,48} These preventative measures must also be undertaken by public health organisations as climate change has significant health implications.²⁸

2.1.2 Health Consequences of Climate Change

In 2009 ‘The Lancet’ reported, “*climate change is the biggest global health threat of the 21st century*”.^{28 (p.1693)} Health is affected by climate change either directly through a weather-related disaster, or indirectly through food insecurity, poor sanitation, contaminated water supply, changing patterns of diseases, and through the displacement of human settlements.^{28,49-51} Climate change is believed to be expanding the health inequality gap, and will have its most devastating effect on nations that have contributed least to its cause, with the Asia-Pacific region significantly affected.^{28,52}

Paradoxically, delivering health care services can itself have long-term negative effects on human health as public healthcare organisations have extremely large

carbon footprints.⁵³ Therefore, public health organisations and health professionals also need to consider mitigation strategies in their delivery of health care.⁵³ Mitigation is the reduction of the causal activity, stabilising greenhouse gas emissions and reducing the carbon footprint.^{20,29,54} Strategies to reduce the carbon footprint within healthcare organisations are – waste handling (reducing, reusing and recycling), reducing packaging waste, growing hospital food rather than shipping in, encouraging employees to use public transport or car-pooling, using hospital crockery instead of disposal cutlery, and printing double-sided instead of single sided.^{53,55} Mitigation strategies to reduce greenhouse gas emissions, encourages less reliance on vehicles and promotes an active lifestyle including walking or cycling.⁵⁴ This has health co-benefits in counteracting the obesity trend developing globally and reducing the vulnerability of social isolation.⁵⁴ The health benefits of reversing climate change's effects can be seen with strategies such as improving air quality, which leads to improved health outcomes in individuals with cardiovascular and respiratory illnesses.⁵⁴

Smith et al.,³⁰ suggests human behaviour needs to change drastically in order for communities to have the capacity to adapt to the increase in potential weather-related disasters.³⁰ They suggest taking measures such as reducing meat consumption, increasing access to reproductive healthcare, and reducing the current burden of disease.³⁰

2.2 Public Health Consequences of Disasters

Between 1995-2015, there have been 6,457 weather-related disasters accounting for 90% of all disasters and affecting the lives of over four billion people globally.⁴ The impact of disasters on communities is on the rise, not only from the increasing potential risk of natural hazards, but also due to the amplified exposure and vulnerability of communities. Population growth has led to population-dense cities with new communities emerging in hazardous areas avoided in previous decades by urban planners.^{52,56} The public health effects of disasters can be directly or indirectly related to the disaster event.³⁹ Health impacts from disasters can range from minor ailments to death and adversely affects those most vulnerable to

disasters.³⁹ Different types of disasters and their health impacts will now be examined in turn.

2.2.1 Volcanic Eruptions, Landslides, Earthquakes, and Tsunamis

Earthquakes and volcanic eruptions are natural hazards that have the potential to become a disaster for communities built on, or near the fault lines of tectonic plates.⁵⁷ Volcanic eruptions occur when magma rises from the Earth's core and can involve tremors, ash clouds, gas emissions, lava flowing like rivers, and reactions with water.⁵⁷ The major health concerns of volcanic eruptions are caused by the rapid movement of lava and pyroclastic flow (comprised of very hot ash, lava fragments, and gases) cascading down the side of a volcano towards communities.⁵⁷ The main injuries include burns, asphyxiation, severe wounds, respiratory problems, and/or death.⁵⁷

The most common health impacts from earthquakes and landslides are acute traumas, crush injuries, cuts and bruises, debris entrapment, and electrocution.⁵⁷ This type of immediate need is best handled by emergency services – military, firefighters, and paramedics - who are well trained to locate and rescue survivors.⁵⁸ Earthquakes cause significant destruction to homes and buildings including health infrastructure. With this significant infrastructure loss, the majority of those who are affected by the earthquake, end up being temporarily housed in evacuation centres. Several disaster-affected, displaced individuals arrive at evacuation centres, without their prescriptions or medications.⁵⁹ A community's vulnerability to an earthquake can be dependent on the amplitude of the seismic waves, timing of the earthquake, and resilience of the community.⁵⁷ It is postulated that more people would be injured following an earthquake in the middle of the night than during the day, as people would be caught unaware in their sleep and could be slower to appropriately respond.⁵⁷ There are two types of scales used to measure the amplitude of an earthquake – the Richter scale and the Mercalli scale. The difference between these is that the Mercalli scale takes into account the country's vulnerability and resilience to overcome the impact of the earthquake.⁵⁷ The Richter scale is a mathematical calculation assessing the damage caused. Thus, the same amplitude earthquake

would be scaled differently between a western country and a third world country according to the Mercalli scale but scaled the same on the Richter scale.

Adverse health outcomes for those with pre-existing illnesses following an earthquake can be reported for months to years after the event.⁶⁰ The glycaemic control of patients with diabetes was studied before and after a major earthquake in Japan.⁶¹ The authors discovered that psychological stress was an independent contributor to worsening glycaemic control for patients with diabetes.⁶¹ It was also noted that interruption to medication use contributed to a decline in glycaemic control along with other factors (diet, exercise and stress).⁶¹ Following an earthquake there is a spike in chronic cardiac conditions resulting in acute coronary syndrome or acute myocardial infarction episodes as well as increased rate of hospitalisations for patients with ischemic heart disease over the subsequent five years.⁶⁰ Undersea earthquakes resulting in tsunamis also can have catastrophic effects.

Tsunamis are typically the result of earthquakes at tectonic plate boundaries or volcanic eruptions occurring under the sea.⁵⁷ Tsunamis are a series of ocean waves that send surges of water, sometimes reaching over 30 metres in height and at speeds of up to 800 km/hour, onto land.⁶² When the ocean floor at a plate boundary rises or falls suddenly, it displaces the water above it and launches the rolling waves towards the shore, becoming a tsunami. These walls of water (flash floods) can cause widespread destruction in communities near the epicentre of the earthquake when they reach shore.⁵⁷ Volcanic tsunamis are typically greater in magnitude than those caused by a tectonic plate shift.⁵⁷ The biggest disaster management factor of tsunamis and volcanic eruptions are mass evacuations of the affected areas. The health risks of tsunamis are similar to those of other flood type disasters.

2.2.2 Floods

Climate change has seen an increase in extreme weather-related events. Floods and storms have accounted for over 50% of the weather-related disasters from 1995 – 2015, killing 242,000 people and affecting 2.3 billion people globally.⁴ Since 1995, floods have been recorded as the most frequent weather-related disaster,^{4,30,63,64} with numbers increasing from 127 to 171 over the period 2005-2014.⁴ Further, the pattern of flooding has begun to change with more frequent flash flooding, river

flooding, and coastal flooding than in previous decades.⁴ In the last twenty years, there has been an increased risk of flooding due to climate change.^{4,65} The ever-present need for easy access to natural resources has seen cities built on coastal lines and near rivers, making them vulnerable to flooding.^{52,57,64} These communities built in low-lying areas on coasts and rivers are susceptible to floods, storm surges, and tropical cyclones.⁵⁷

Floods can affect individuals' health directly by drowning, hypothermia, infections, injuries, carbon monoxide poisoning, respiratory diseases, water contamination, animal bites, or disease outbreaks.^{30,50,54,57,64} Such an event can also affect individuals' health indirectly through mental health problems, displacement, malnutrition caused by food insecurity, or by collapse of health services and infrastructure, or loss of health workers.^{50,57} Indirect health effects are harder to quantify, and more difficult to link to the flood event due to delayed presentation.^{29,50,64,65} Long term health effects of disasters need further research but tend to focus on chronic diseases, disability, relocation of the community, and psychosocial impacts.⁶⁶

2.2.3 Cyclones, Hurricanes and Typhoons

Storms (including hurricanes, cyclones, typhoons, and storm surges) can often precipitate a flood. Storms affect higher-income countries more often than lower-income countries.⁴ However, lower income countries lose many more lives as a result of a storm.⁴ In these lower income countries the mortality rate from storms was 89% for the period 1995-2014.⁴ However, only 26% of the storms occurred in these lower-income countries.⁴ In the last twenty years, storms have caused 40% of all deaths due to a natural disaster globally.⁴ Vulnerability to a storm event is heavily dependent on locality, level of preparedness, existence of pre-warning systems, and the resilience of the community.

The health impacts of storm events are similar to other types of events and include acute injuries, disease outbreaks, and chronic disease exacerbations from lack of access to health services and medications. Those who were displaced into evacuation centres in the aftermath of Hurricane Katrina in the United States (US), were treated by deployed foreign medical teams. However, the medical needs of the

displaced evacuees were unable to be met adequately by the foreign medical teams' pharmaceutical medication caches and consequently, patients were reliant on local pharmacies for medication supplies.⁶⁷ Following Cyclone Yasi in 2011 in Northern Queensland, patients who required life-saving dialysis were evacuated out of the disaster zone, many leaving without their prescriptions, medications, identification, or patient medical records.⁶⁸ Continuity of medical care for patients who are evacuated due to a disaster like a cyclone or hurricane is essential to prevent disease exacerbations.⁵⁷ Medications form a large component of medical care and in the case of Hurricane Katrina, pharmacists and pharmacies were essential in the disaster response.^{67,69-74}

2.2.4 Droughts and Famine

Compared to floods and storms which are the two most frequent type of weather-related natural disasters, droughts only account for 5% of the natural disasters that occurred globally between 1995-2015.⁴ However, droughts affected over one billion people during this period (> 25% of the total people affected by all the natural disasters globally between 1995-2015).⁴ The continent of Africa was significantly affected by drought and famine - more so than any other continent.⁴ Famine is usually the result of a drought, however, not every drought will lead to a famine.⁵⁷ Although a famine can be the result of a natural disaster, there can be other contributing factors related to economic, political, and food distribution activities suggesting famine is commonly an anthropogenic disaster.⁵⁷

Droughts are becoming more frequent with the changes in rainfall patterns brought on by climate change.⁴ The main health impacts of drought and famine are malnutrition and communicable diseases.⁵⁷ Also, there tends to be decreased health services available in drought impacted areas.⁵⁷ With the financial pressures of drought conditions, patients with chronic diseases may opt to temporarily not treat their conditions leading to potential exacerbation and disease progression.⁷⁵ This was evident in the recent drought affecting 80% of Australia in 2018, with farmers questioning whether or not they could afford to spend \$40 on their chronic disease medication in light of all their other expenses.⁷⁵ Droughts are typically brought on by the warming climate and drier seasons.

2.2.5 Extreme Heat and Bushfires

Another natural disaster that occurs as a result of the warming climate are extreme heat events and bushfires. Weather-related heat disasters (such as heatwaves, extreme temperature events and bushfires) have been linked to an increased risk of illness and death.⁷⁶⁻⁸⁴ There is no universally accepted definition of a heatwave but is generally accepted as temperatures which exceed the local average temperature for three days or more.⁸⁵ The extent of the impact of a heatwave on morbidity and mortality depends on the definition used for a heatwave.⁸² Direct adverse health outcomes include heat stroke, heat exhaustion, heat syncope, heat cramps, and dehydration.^{30,79,81,86-91} Indirect adverse health outcomes are due to the exacerbation of pre-existing chronic diseases.⁹¹⁻⁹⁴ Extreme heat has led to overcrowding of emergency departments (EDs) on hot days in a study conducted in Brisbane, Australia.⁹⁵ Individuals cope and respond to heat-related events in different ways; their ability to appropriately react can be altered by acclimatisation, medications, and co-morbidities.^{91,94,96-98}

Heat-related events not only affect human physiology but also the productivity of the community, especially in the Australian climate.⁹⁹ Heat effects may also impact city dwellers more than rural dwellers due to the urbanisation of communities and the development of tall-scale cities creating the urban 'heat island effect'.^{29,52} Urban areas tend to be hotter compared with rural areas due to land modifications as a result of human activities.^{29,52} This 'heat island effect' leads to exacerbation of the already pronounced adverse health outcomes of heat-related events.^{29,52} The increased intensity and frequency of extreme heat events as a result of climate change has also increased the number of fire danger days with a resultant increase in the frequency and intensity of bushfires.

With the increase in extreme heat events and drier seasons, bushfires are becoming a more frequent threat as the smallest spark can start a wildfire.^{4,100} The health effects of bushfires are similar to other disasters but can last well after the bushfire threat has past, due to the lingering air pollution.³⁰ Bushfires can cause potential exacerbation of chronic and mental illnesses as well as acute respiratory distress, cardiovascular complications, injuries and/or death.⁸⁴ People living in areas

affected by bushfires are usually evacuated in great haste and those with chronic diseases will often leave without their prescriptions or medications.⁵⁹

2.2.6 Pandemics and Disease Outbreaks

The warming of the climate has contributed to the spread of diseases into new populations causing epidemics and pandemics. Climate change is changing the pattern of vector-borne diseases with vectors breeding and migrating into new geographical areas.⁵⁷ Natural disasters can precede a disease outbreak, epidemic, or pandemic due to the introduction of new pathogens into the disaster-affected area.⁵⁷ Communities can be more susceptible to a disease outbreak following a disaster if their vaccination rates are low, causing a lack of herd immunity, and also when the transfer from human to human of the disease is high.⁵⁷ Influenza is a well-known example of a potential pandemic. However, the WHO in 2018, stated healthcare organisations need to be prepared for Disease 'X'.¹⁰¹ This emphasises that the next disease which may become an epidemic or pandemic could be anything.¹⁰¹ There are four phases to the escalation of a disease outbreak:⁵⁷

- 1) sporadic (isolated cases),
- 2) endemic (disease contained in a community),
- 3) epidemic (widespread outbreak in a community), and
- 4) pandemic (widespread nationally or internationally).

It is often unclear whether the cause of an epidemic event was the result of climatic changes in environmental conditions or the result of a failure in preventive measures by community healthcare services.¹⁰²

Some countries including the United Kingdom (UK) have identified a pandemic outbreak as their most immediate threat in relation to disasters.¹⁰³ Depending on the disease outbreak, the health impacts can vary from minor ailments to death. The H₁N₁ pandemic in 2009 significantly impacted health services globally.¹⁰⁴ In Australia, EDs were experiencing up to three times the number of patients usually expected, with staff reporting issues related to staff absences and increased workloads.¹⁰⁴ The health impacts of a pandemic could vary depending on the vulnerability of a community and the vulnerability of individuals within that community.

2.2.7 Anthropogenic Disasters

Another type of disaster which preys on the vulnerability of individuals and communities are anthropogenic disasters. Anthropogenic disasters have a human element and are often believed to be preventable.¹⁰⁵ They include transport accidents, mass gathering incidents, industrial accidents, and terrorist-related disasters.¹⁰⁵ The health impacts of these anthropogenic events vary widely from minor first aid related injuries at mass gathering events, to life-threatening exposure to chemical, biological, radiological and nuclear (CBRN) weapons. Chemical and biological weapons may only be identified through the identification of symptomatic people by healthcare professionals.¹⁰⁵ Rapid identification of the agent and dispersal of antidotes and vaccines is essential in the treatment and prophylaxis of these weapons.¹⁰⁵⁻¹⁰⁷

With appropriate preparedness measures, reduced impact on the healthcare system can be achieved by providing onsite healthcare services for minor conditions.¹⁰⁵ However, any onsite healthcare service can be quickly overwhelmed if a simple mass gathering event turns into a major terrorist-related incident.¹⁰⁵ Taking an all-hazard approach to preparedness in disaster plans allows for the design of responses for any actuality and the appropriate triaging up of that response and the allocation of resources to occur quickly.¹⁰⁵

2.2.8 Vulnerable Populations

Disaster research has identified women, children, and those who are mentally ill, socially isolated, have reduced mobility, or have pre-existing chronic diseases are at greater risk of experiencing adverse health outcomes during disasters.^{29,30,108} Older individuals and those with disabilities are labelled as *“those left out of the loop: the people we unintentionally exclude”* in the ‘World Disaster Report 2018’.⁴⁶ Neglecting to account for these special populations and providing access to humanitarian assistance is not only failing to recognise their basic human rights but also further increases the vulnerability of these populations.⁴⁶

In 2017, there were one billion people in the world living with some form of disability.⁴⁶ The proportion of those with disabilities was highest in countries considered environmentally vulnerable.⁴⁶ The people most likely to be in need of

humanitarian aid during a disaster, are perceived to be the least able to access or be aware of the aid.⁴⁶ The special needs of older people and people with disabilities, including medications for their chronic diseases are often not prioritised in disasters.⁴⁶

2.2.8.1 Older Individuals

In 2017, 8% of the world's population were over the age of 60.⁴⁶ By the year 2100, this is expected to increase to 22% of the projected world's population.⁴⁶ Fernandez et al.¹⁰⁹ stated that ageing alone does not increase an elderly person's vulnerability. To be more vulnerable, an elderly person needs to have some form of physical, social, cognitive, economic, or psychological circumstance that inhibits their ability to respond to a disaster.¹⁰⁹ Older people can be quite vulnerable to disasters, due to their reduced mobility, social isolation, discrimination, and their increased likelihood of chronic conditions.⁴⁶

The elderly are more vulnerable to all types of weather-related events as they may have limited mobility to promptly evacuate, and typically have one or more chronic diseases requiring ongoing medications which may be unattainable in a disaster.¹⁰⁹⁻¹¹¹ The elderly population can also be more vulnerable to heat-related disasters as their thermoregulatory system is impaired due to their reduced capacity to increase cardiac output as a cooling mechanism.¹¹⁰ They have a general dehydrated state due to a decreased thirst complex and their glomerular filtration rate can be reduced making it difficult to conserve water and sodium.¹¹⁰

2.2.8.2 Individuals with Chronic Diseases

The Australian National Health Survey in 2007-2008 revealed one third of the Australian population reported as having at least one chronic disease.¹¹²⁻¹¹⁴ Globally, it is postulated that as many as one in five people have multiple chronic diseases and with the ageing population and obesity trends, this is expected to escalate.¹¹⁵ Mokdad et al. found *"lack of access to routine healthcare is the leading cause of mortality following disasters."*^{108 (p.1)} The interruption to essential services significantly hinders an affected community's ability to recover after a disaster.¹¹⁶ Chronic diseases are the leading cause of mortality following disasters and contribute substantially to the burden on available healthcare resources.¹¹³⁻¹¹⁵

Individuals with chronic diseases can develop complications during disasters and represent the most prevalent adversely affected group.^{57,117} Disaster health research has identified diabetes, cancer, chronic respiratory diseases (chronic obstructive pulmonary disease and asthma), cardiovascular disease, and kidney disease as the five most common chronic diseases that are exacerbated during weather-related disasters.¹¹⁸⁻¹²² Some individuals (e.g. those who have had an organ transplant or who are immunocompromised) are also at increased risk of contracting a communicable disease in a disaster.¹¹⁸

Patients with chronic conditions require a multitude of healthcare professionals and medications to effectively manage their conditions and prevent disease progression. To optimally manage their conditions, some patients with chronic diseases require specific medical equipment (e.g. nebulisers, oxygen machines, continuous positive airway pressure (CPAP) machines, dialysis machines, insulin pumps, blood glucose level (BGLs) monitors, and blood pressure monitors), others require care involving in-home services, and some of their treatments must be given on a strict schedule.^{109,118,122} Individuals with chronic diseases rely heavily on these essential healthcare services. However, during disasters these services are not always available. Primary and secondary healthcare systems can collapse,¹²³ and tertiary healthcare systems (e.g. hospitals) become overcrowded and follow emergency protocols focused on acutely injured disaster victims.¹⁰⁹ All patients with chronic disease can experience complications if not adequately managed which includes continued access to medications.¹¹⁸

2.2.8.2.1 Individuals with Kidney Disease

Patients with chronic kidney disease are prescribed numerous medications, and some require dialysis multiple times a week.¹²⁴ These patients cannot go without dialysis or their medications for very long. Dialysis requires continuous power, clean water, equipment and trained personnel to treat patients.¹²⁵ These resources may not be readily available during a disaster.⁶⁸ Patients with chronic kidney disease must keep to a strict diet of low protein, potassium, sodium, and phosphate and are placed on fluid restrictions.^{68,117,126} Access to this may not be available during a disaster.

Patients with kidney disease are not the only patient group who can be adversely affected in a disaster.

2.2.8.2.2 Individuals with Diabetes Mellitus

Diabetes mellitus affects approximately 422 million people around the world.¹²⁷ The incidence of diabetes is increasing globally, no longer predominately affecting western countries.¹²⁷ Diabetes is a chronic disease requiring constant monitoring and diet control to prevent complications and disease progression.¹¹⁸ Diabetes can be challenging with patients taking multiple medications and needing to test their BGLs regularly. Research has shown glycaemic control and glycated haemoglobin (HbA1c) levels (the clinical parameters for diabetes control) become elevated following disasters increasing patients' risk of developing complications.^{61,117,128} Patients with diabetes need to consume a modified, controlled amount of carbohydrates and sugars in their diet, and eat regularly to sustain their insulin and sugar balance.^{118,129} Appropriate food and lifesaving insulin medication may not be readily available during or following a disaster, and the potential adverse health outcomes can be life-threatening.¹¹⁸

2.2.8.2.3 Individuals with Post-Traumatic Stress Disorder

Post-disaster health trends have seen an uptake in smoking, alcohol consumption, poor diets, and poor sleeping habits due to the high stress, and can be associated with post-traumatic stress disorder (PTSD).^{60,130} These habits are risk factors for cardiovascular-related diseases as well as other chronic diseases such as diabetes.^{60,130} PTSD has been recently linked to an increase in newly diagnosed Type 2 Diabetes.¹³⁰ This link between PTSD and Type 2 Diabetes could be the result of individuals with PTSD being treated with second generation antipsychotics, the side effects which include metabolic syndrome and diabetes.¹³⁰ It could also be the result of poor lifestyle habits undertaken following a disaster which are generally associated with PTSD.¹³⁰

2.2.8.2.4 Chronic Disease Specific Diet Modifications

In many disaster situations, food drops and evacuation centres do not have tailored packages for those requiring a specific, tailored diet.^{118,131} With so many

people in a community affected by a disaster, governments and humanitarian aid organisations attempt to help the larger majority of people and this is achieved by giving generalised assistance (i.e. looking at the community's needs as a whole).¹³¹ The concerning factor with providing standardised care in the wake of a disaster is the rise in chronic diseases occurring globally and the specialised needs of these patient groups.

2.2.9 Continuity of Medication Management

During times of crisis, the healthcare system changes its focus and priorities, going into a 'state of emergency' management. Personnel and resources are realigned to accommodate the influx of disaster-related injuries. Disaster studies have reported that emergency services and hospitals are inundated with a surge of patients following a disaster, but few of the presenting individuals actually require acute emergency care.^{69-71,132} Most simply lack an alternative to address their non-acute medical concerns.^{69-71,132} This causes a significant overcrowding of hospitals and EDs that are already struggling to allocate the limited healthcare resources available to them. Health systems are already experiencing pressures due to the increasing burden of disease from the ageing population and population growth.^{71,132,133} This overcrowding has the potential to significantly impact the number of medication prescribing and administration errors.⁷³ In the wake of a disaster, doctors and nurses are having to treat a large surge of patients requiring different levels of care.¹³³ This results in less time being given to each patient with staff often caring for multiple patients at one time.¹³³ A simulated exercise carried out in the US of a plague epidemic, identified the hospitals involved were beyond capacity within 24 hours, some receiving 10 times their normal volume of patients.¹³⁴

A systematic review conducted in 2014, discovered medication refills from lost or destroyed medications places a huge burden on the healthcare teams responding to emergencies.⁵⁹ The study found evacuees require not only life-saving and essential medications following a disaster event but also other medical-related items.⁵⁹ These include glasses, hearing aids, insulin pens and needles, walkers, canes and wheelchairs, CPAP machines, oxygen machines, nebulisers, nutritional supplements

for tube feeding, dentures, and dosage administration aids.⁵⁹ Many of these items can be supplied by most community pharmacies.

The principal observation from disaster health literature is that chronic disease patients affected by disasters struggle to obtain supply of their chronic disease medications – many of which are lifesaving and even a single dose cannot be missed.^{59,118,121,129} The interruption to their medication management can be attributed to a number of reasons – no access to a pharmacy, no prescription, contaminated medications, no money to pay for medications, no identification, or unwilling to go to the overcrowded hospitals or venture out into the disaster-affected areas.^{121,129,135}

Many individuals who are evacuated leave their homes without their medications, they are lost, destroyed by contaminated water, or extreme heat.⁷³ For some, it can be a matter of financial burden - being unable to afford new supplies of their medications. This is more of a substantial problem in the US where medications are not subsidised by the government¹³⁶ compared with countries like Australia and the UK which have government-subsided medications available to their citizens. A study conducted in the US in 2013, highlighted that insurance companies believe it is pharmacists' responsibility to ensure patients have access to continuity of care in the event of a disaster.¹²⁰ However, these insurance companies were unwilling to discuss entering into an agreement which gave patients access to their chronic medications early to build a personal reserve in the event of a disaster.¹²⁰

A patients' loss of identification and medical records during disasters can also impact on continuity of their medication supply.^{59,125} Lack of records and identification means medication supply is reliant on repeat diagnosis from physicians or patients' recollection of their medications' names, doses, and strengths.^{68,118,121} Disaster research from evacuation centres in New Orleans, US in the wake of Hurricane Katrina, reported that 56.7% of patients requiring medical assistance needed prescriptions for chronic disease medications.⁶⁹ Individuals either fleeing, or who have been isolated by, a disaster, rarely are prepared and generally do not have on their person their identification, money, and medications.^{59,125} Therefore, an important aspect of disaster health management and future disaster planning, is

ensuring continuity of care in this population.^{69,71,118,120,132,137} Medication management for chronic diseases is complex and involves multiple healthcare professionals and stakeholders. The health of these patients goes beyond the biology and behaviour which may have caused their illness to incorporate their entire wellbeing.¹³⁸ To ensure best possible health outcomes for these individuals as well as the rest of the community post-disaster, disaster health management scholars argue that a systems thinking approach may be needed.

Historically, disaster management has been coordinated by national and international organisations working independently of one another in an *ad-hoc* fashion with the philosophy of 'any assistance is better than none'.^{139,140} Now, however, natural disasters are extending beyond the boundaries of any one country, and the effects of a single disaster can be felt globally.^{25,141} This requires a coordinated approach from local, state, and national governments, NGOs, and communities to effectively manage an all-hazard approach to disasters.^{20,138,142-145} Disaster health management requires a multi-faceted outlook, with a need to look beyond the immediate problem to the flow-on effects of each possible outcome, especially in relation to the potential adverse health outcomes.^{146,147}

2.3 Command and Control Theory

Command and control theory has been a pillar of emergency response and war strategies.¹⁴⁸ It is the linear, vertical flow of commands down the chain and the control of information and feedback up the chain.¹⁴⁸⁻¹⁵⁰ Obedience and discipline is expected within the command and control management, as the commander has authority over the subordinates.¹⁴⁸⁻¹⁵⁰ The rationale for the command and control theory is because of the turbulent environment often found in war and crises, orders are able to be given and followed in a rapid, adaptive, and decisive manner.¹⁴⁸ It is suggested command and control is necessary for any system, society or living organism.¹⁴⁸

The military and governments have used command and control theory as their standard of management in planning and responding for a disaster (i.e. the US Marine Corp have indoctrinated this theory).¹⁴⁸ In 2018 the Victorian government in

Australia, recognised the need for expanding beyond the traditional command and control theory and have included community aspects in their command and control model.^{151,152} This allows the consideration of the decision consequences, community connection and communication aspects of emergency management.¹⁵¹ Disasters present environments which are uncertain, complex and result in variability which require operational decisions to be made in response to the crisis.¹⁵⁰ To effectively combat this environment commanders need timely and accurate information and to be flexible to the situation.¹⁵⁰ Deliberation of the consequences downstream of the decision making in disasters allows for the inclusion of the whole organisation's response as oppose to a single department's decision.

2.4 Systems Thinking Theory

A systems thinking approach considers an entity (e.g. a community) in light of its constituent parts (i.e. the people, the infrastructure, healthcare, ecosystems, businesses) but also as a constituent part of a larger entity (a group of communities i.e. a region or city). The system is viewed as a unit capable of adapting to 'environmental shocks' through performance monitoring of its constituent parts and providing communication *via* feedback loops.¹⁵³ Systems thinking was developed in the 20th century as a generalisation of ideas when discussing organisms in biology holistically.¹⁵⁴ Peter Checkland defined systems thinking as:

*"a concept which clearly derives very directly from our intuitive or casual knowledge of organisms: the concept of a whole entity which can adapt and survive, within limits, in a changing environment."*¹⁵⁴ (p.49)

This definition illustrates how systems thinking is referred to as 'the adaptive whole'.¹⁵⁴ Systems consist of smaller functioning systems within the system (e.g. departments in government, different levels of government and government as a whole) and needs to be adaptable to its ever changing environment.¹⁵⁴ This idea is commonly known as 'soft' systems thinking.¹⁵⁵ In contrast, the generation of systems to meet an objective is known as 'hard' systems thinking.¹⁵⁵ 'Hard' systems thinking is not within the scope of this dissertation, given that the health system is a complex

and mature system not ripe for re-engineering from the beginning in any sense relevant to this thesis.

A systems thinking approach allows for a bird's eye view of a problem or issue and allows decision makers to comprehend the potential downstream effects of each potential outcome before implementing changes. It moves away from the traditional, static, analytical problem-solving thought process and takes a more fluid and adaptive, big picture approach.¹⁴⁵ Systems thinking works on the solution to the problem indirectly, focusing upstream of the immediate 'fix' and accounting for all potential outcomes before implementing changes.¹⁴⁵ The fundamental basis of systems thinking is the understanding that there are a multitude of parts that make up any one system, and the system is not just a collection of parts but a functioning unit.¹⁴⁰ Systems thinking argues that the contribution from a team's effort does not equate to the sum of the contributions made from each individual, as the strength of the team cannot be broken down into its individual components.^{24,155} Dr Irene Akua Agyepong, from the Ministry of Health in Ghana stated in a WHO report on 'Systems Thinking for Health Systems Strengthening' in 2009

"A systems perspective can minimize the mess; many of today's problems are because of yesterday's solutions"^{145 (p.51)}

2.4.1 Disasters and Systems Thinking

The complexity of disaster health management, particularly with regards to patient groups with specialised care needs, lends itself to a systems thinking problem-solving approach. This can be said for the cascading effect of disasters. An example of this was the Fukushima disaster, with an earthquake causing a tsunami and flash flood that set off a nuclear event.²⁴ This disaster highlighted the effects resulting from poor disaster management and the need to apply systems thinking.^{24,156} The inability of the organisations (i.e. government, power plant operator, disaster planners) involved to analyse all the potential outcomes of policy changes led to a natural hazard causing the cascading effect.²⁴

Another example of the need for systems thinking in disaster management to prevent the tumbling consequence was evident in the management of Hurricane Katrina. At the time of this disaster, weather forecasting was advanced enough to

anticipate the impending natural hazard (known risk factor), but was unable to determine the ferocity of the hurricane (unknown risk factor).¹⁵⁷ However, the system failed because this knowledge was not effectively communicated to the community. Consequently, timely evacuations did not occur, which in hindsight, could have potentially reduced the impact of the disaster.¹⁵⁷ The disaster management of Hurricane Katrina has been heavily scrutinised to ensure lessons are learnt and the communication failures are not repeated in future disaster responses.¹⁵⁸ One of the major observations from Hurricane Katrina was the mismanagement and miscommunication through the traditional, linear, top-down, command and control channels which were slow in response and ineffective for this complex disaster.¹⁵⁸

Management of disasters, therefore, requires a holistic approach, as small changes upstream can have drastic flow-on effects downstream.^{146,157} In the context of disasters and health, a systems thinking approach requires active involvement from the community, and a collaborative relationship between different levels of governments, NGOs, emergency services, healthcare providers, and individuals.¹⁴⁰ Disasters are complex and involve many known and unknown risk factors affecting communities and individuals – physically, socially, mentally, economically, and environmentally.¹⁵⁹

To effect positive changes in disaster health management, a whole team effort is required as the contribution from a single organisation is not enough to bring about required policy changes.¹⁶⁰ The key to systems thinking and disaster health management is communication and collaboration between the multitude of organisations providing assistance during and after a disaster.^{157,161} This level of collaboration and sharing of knowledge has yet to be achieved as the individual organisations are believed to be unwilling to cooperate with each other at the risk of losing donors and stakeholders – the power of self-interest for many private and not-for-profit agencies is strong.¹⁴⁶ Currently, disaster management breaks down a disaster into its individual components and each organisation gets given its piece to work on. However, systems thinking suggests disasters and disaster management cannot be broken down into its parts as the ‘sum of its parts do not equal the whole

system'.^{140,143} Organisations currently working in disasters operate independently of one another with their own management systems and structures. With systems thinking these organisations would work as branches all stemming from the same tree, feeding from the same soil. Organisations need to be able to work harmoniously together to achieve the best outcomes for the disaster-affected community, speaking a common language and collectively providing services. Currently, organisations compete for resources and often overlap in the services they provide.

2.5 Chaos Theory

Systems thinking alone is not enough to manage complex disasters. Systems thinking is grounded in the organisational hierarchical leadership and management chain which can often be slow in responding to disasters. This has ignited research into the utilisation of chaos theory and its application in disaster management. Branching away from the organisational hierarchical leadership chain and allowing for informal disaster management leadership and management strategies to emerge. Chaos theory was developed in the 1960s from the work of Edward Lorenz.¹⁶²⁻¹⁶⁴ Its goal is to determine the higher-order patterns that emerge from what might initially be thought to be an intractably chaotic system.¹⁶³ There is believed to be a bifurcation point which marks the shift where order becomes chaos in any system.¹⁶⁵ The weather, for example, is chaotic but it is possible to identify predictabilities at a higher order of abstraction than immediate local recordings of rain and wind, to make predictions to varying degrees of confidence.¹⁶³ It is not within the scope of this dissertation to explore in detail all the learnings of chaos theory. However, what this theory does tell us is that 'out of chaos must come order'.

Chaos theory illustrates how systems can develop complex, unpredictably behaviour even though technically bound by simple rules.¹⁶⁴ The Stacey Matrix (Figure 4), was adapted from Ralph D. Stacey's 1992: "Complexity and Creativity in Organizations".¹⁶⁴ It demonstrates the differences in the level of agreement between stakeholders and the degree of certainty.¹⁶⁶ The degree of certainty or predictability of events depends on previous experiences.¹⁶⁶ 'Far from certainty' captures the unique, unpredictable, and sometimes unrepeatable nature of disasters.¹⁶⁶ Chaos

theory can lead to emergent behaviour and the development of self-organisation and behaviours.¹⁶⁴ Ralph Stacey stated,

“We cannot trace cause-and-effect links when a system is in the space for novelty [chaos], and therefore we cannot make long-term predictions.”¹⁶⁴ (p.68)

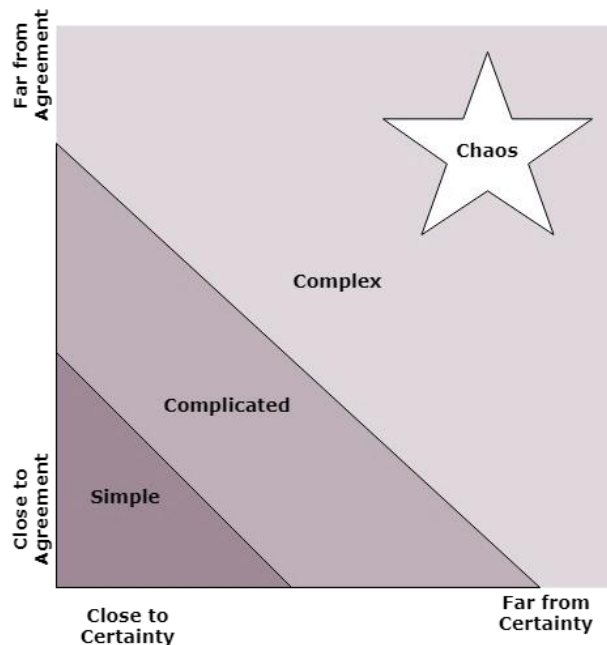


Figure 4: Recreated Stacey Matrix,¹⁶⁴ the further away from agreement and certainty the more complex and chaotic management decisions become.

2.5.1 Disasters and Chaos Theory

Disaster management and leadership decision making is relatively easy to accomplish for simple events where stakeholders can rely on past experiences but much more difficult to achieve for chaotic events (Figure 4). With a chaotic event, there is little agreement between stakeholders regarding management decisions as the event is typically an unpredictable, never-before experienced disaster. Disasters can be extremely chaotic with community services collapses, telecommunication collapses, infrastructure concerns, and medical emergencies. The traditional command and control disaster management model works best for simple localised disasters, where parts of the community services are still able to cope and function.¹⁶⁵ Organisations need to be prepared for the chaos and unknowns of complex disasters. This is evident with the latest report from the WHO on potential diseases to become pandemics.¹⁰¹ They identified one of the most likely pathogens to become an epidemic or pandemic is from an unknown disease - Disease 'X'.¹⁰¹ By acknowledging

there are unknowns and having all-hazard disaster plans in place, organisations and governments can begin to prepare for uncertainty and the unknown.

It is suggested disaster response is emergent in nature because it did not exist before the disaster occurred.¹⁶⁵ New organisations are emerging and pre-existing organisations are adapting to deliver disaster response services.¹⁶⁵ The unknowns or chaos of a system need to be accounted for or they have the potential to breakdown the system.¹⁶⁷ Often, the response which is delivered to a disaster-affected community is not the expected pre-planned disaster response because of these unpredictable factors (limited resources, lack of information, perceived unique disaster event).¹⁶⁵ Governments are most suited for the coordination of routine management where linear thinking works. However, when it comes to dealing with the chaos associated with disasters and crises, their expertise and linear thinking falls short.¹⁶⁷

Koehler et al.¹⁶⁵ suggest the development of 'surprise management theory' for managing disasters is currently the best approach in incorporating elements of chaos theory and applying to complex disasters. Surprise management theory was pioneered by Farazmand and is the theory of managing unknown and complex disasters.^{158,167} Surprise management theory consists of four principles and suggests the inclusion of other stakeholder's expertise in decision making to adequately manage the chaos of disasters.¹⁶⁷ The concept of surprise management does not come naturally to many and requires training and resources to be implemented effectively.¹⁵⁸ These four principles of surprise management theory are:¹⁶⁷

- 1) reject the expected and routine
- 2) by nature, be flexible, constantly changing and adapting
- 3) the behaviours consist of a nonlinear and unexplainable relationship which are chaotic or surprising
- 4) expertise and knowledge are essential from stakeholders who are experts in their field, as the skills and attitudes required are beyond the comprehension of those working in the routine environment (including government and administrations)

Chaos theory in disaster management allows for self-coordinated community organisations to respond to disasters.¹⁶⁸ Chaos theory was evident after the Queensland floods in Australia in 2011, when the community organised 'Mud Armies'.^{169,170} Individuals, coordinated through social media, grouped together on the streets around Brisbane, Queensland and armed with shovels and boots, helped clean up flood-affected homes.^{169,170} Chaos can be a catalyst for change and produce positive emergent behaviour to adequately respond effectively to a disaster situation.

2.6 Theory Applied in Disasters

Literature suggests the well-established command-and-control style of management is appropriate and adequate for organisations in disasters up until the bifurcation point is reached.^{158,165} This top-down management style is no longer effective once chaos ensues.^{158,165} The management of Hurricane Katrina in the US in 2005 was an example of when the usual emergency management strategies were not capable of handling the complexities presented by this chaotic disaster.¹⁵⁸ Systems thinking and chaos theory are similar in their desire to change the traditional command and control model to an inclusive one capable of fluidity and adaptive change when required. Where these two theories differ however, is that systems thinking is still embedded in the organisational, hierarchical, formal, leadership chain, whereas chaos theory allows for the development of emergent, informal leadership unique to the specific crisis.^{171,172}

Simple disasters are fairly localised and predictable allowing for the disaster management to follow the traditional command and control theory which is easily agreed upon. Bushfires are an example of a simple disaster where the traditional command and control decision making is effective. With bushfires, there is usually some degree of predictability in the fire direction based on wind and weather specifics as well as relying on past experiences of bushfires. A hurricane can be a simple disaster if it is categorised low grade as the directionality can be determined to a significant degree and they are not an unknown entity. However, there is a

bifurcation point where the level of management required reaches beyond that of the normal emergency capacity and chaos ensues.¹⁶⁵

Disasters are transcending boundaries (i.e. geographical, organisational, academic) making them complex in their impact on the communities, the organisations involved, and in the response required.^{24,138,141} Natural disasters are not only increasing with frequency and intensity but are impacting communities with unprecedented force,²⁴ suggesting even simple localised disasters are being underestimated for their associated risks. This advises taking a mixed approach of command and control, systems thinking, and chaos theory to adequately manage these complex and chaotic disasters. The question this poses for disaster management organisations is, ‘When does a disaster go beyond the bifurcation point and become complex enough to require a mixed approach over a simple command and control method?’ A schematic was developed to illustrate the differences between the traditional command and control theory, systems thinking and chaos theory for disaster management (Figure 5).^{24,143,145,146,169,171,172}

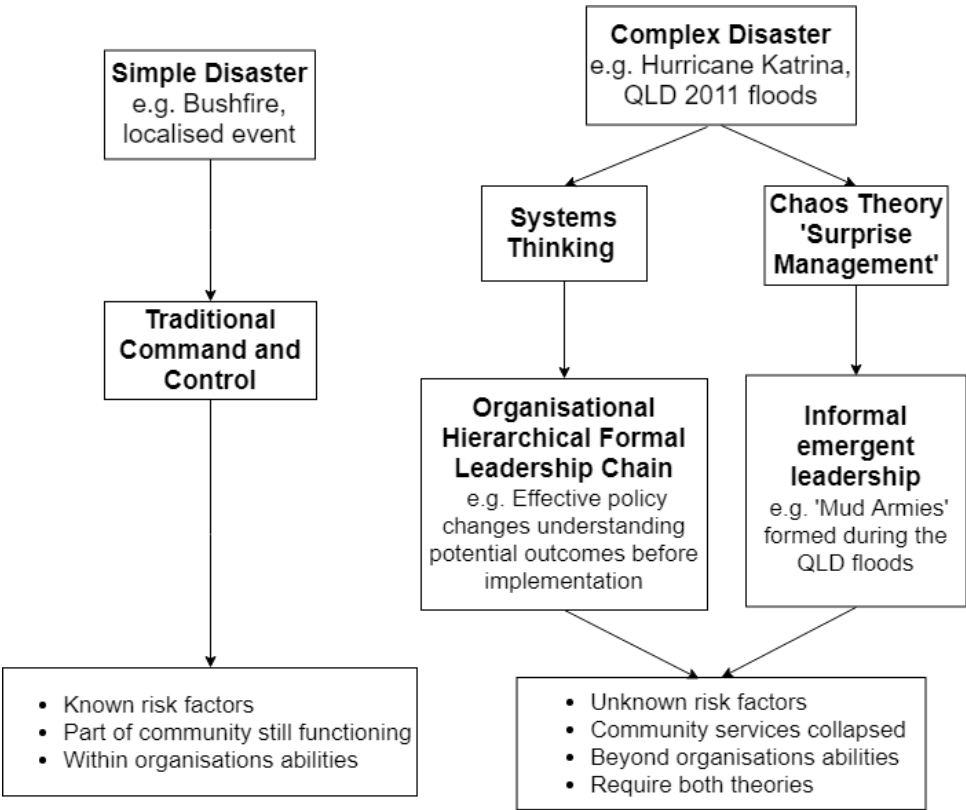


Figure 5: Schematic developed by the researcher based on literature of the difference between theories applied in simple and complex disasters.
*QLD – Queensland

The organisational hierarchical leadership style and the emerging informal management style need to work synergistically together to adequately handle the complexity of disasters and include elements of command and control. This combination could potentially change an individual's perspective on the disaster management, allowing for inclusion of previously overlooked stakeholders.^{24,146}

2.7 Stakeholders in Disasters

Using this combination of systems thinking and chaos theory to examine the problem of health consequences of disasters, it is possible to identify the need for the inclusion of the wider healthcare community in disaster health management.^{24,146} However, disaster management research has not reached the point of acknowledging which healthcare professionals other than the emergency services should be included and what roles they could play.¹⁴⁴ Whilst the emergency services are vital during a disaster event dealing with the acute injuries and traumas, often those who are adversely affected in a disaster experience exacerbations of chronic disease complications brought on by a lack of access to basic medical services, lack of access to medications being paramount.^{57,59,67,69,108} Thus, it has been postulated that the time has come to include other health professionals such as veterinarians, GPs, and pharmacists on disaster teams in the PRR cycle.^{69,119,173} However, to understand which new stakeholders need to be included in disaster management, those stakeholders currently operating in disasters first need to be identified.

2.7.1 Current Disaster Healthcare Management

There are many organisations at the local, state, national, and international levels that assist during disasters across the four PRR phases e.g. government, private-sector, military, NGOs, humanitarian aid organisations, and spontaneous volunteers.^{146,174} Effective disaster management requires a diverse skill set and involves all types of organisations working collaboratively.^{119,140,174} Cutter et al,⁴⁹ state that disaster management must start at the local level as disasters affect individuals in the community first before potentially cascading up to a national or international crisis. They argue there needs to be a sense of ownership of the management of the disaster at the local level i.e. an acceptance of responsibility for

the rebuilding of the community.⁴⁹ This is because the initial reaction following a disaster must be at the local level as it takes time to coordinate outside assistance.^{16,49} One way in which local action can be assured is through empowering health policy.

Health policy can significantly impact on the health implications in disasters, as it can empower or hinder health assistance provided by organisations and healthcare professionals.^{144,175} In recent times under public-private partnerships, some government departments and services have become privatised, thus introducing the private sector into disaster management.¹⁷⁶ As a result, there has been increasing interest in disaster management from the private sector.¹⁴⁴ One of the major areas of government privatisation is in healthcare, thereby introducing new players to aspects of disaster health management.¹⁴⁴ A government funded group consisting of private healthcare organisation employees are the Disaster Medical Assistance Teams (DMATs). DMATs consist of private civilians specialising in different areas of disaster health, who are deployed by the federal government to assist in a disaster response.¹⁷⁷

2.6.1.1 Disaster Medical Assistance Teams

The US has 44 DMAT consisting of physicians, nurses, physician's assistants, nurse practitioners, pharmacists, and technical and administration personnel.¹⁷⁷ These teams are fully self-sufficient and take along a pharmaceutical drug cache. Australian Medical Assistance Teams (AUSMATs) are the Australian equivalent of this US concept.

AUSMAT was developed as part of the national health emergency response arrangements, which was put together by the Australian government in 2011.¹⁵ As part of these arrangements, Australia took an all-inclusive approach to disaster management – linking national security to health and including climate change and natural disasters.¹⁵ AUSMATs are a civilian-based multi-disciplinary disaster health assistance team consisting of staff with varying skills – doctors, paramedics, nurses, logisticians, fire-fighters, environmental health staff, radiographers, and pharmacists.¹⁷⁸ These teams are able to be deployed internationally and are equipped to be self-reliant for up to three days within a disaster zone.^{15,178} AUSMATs

are trained to work effectively with the Australian Defence Force (ADF) as often both may be deployed and required to work together in disaster zones. It is unclear from the information available as to the specific roles and responsibilities of the pharmacists within these DMAT and AUSMATs. However, the degree to which a pharmacist's skills and knowledge are utilised depends on the mission and collaborative nature of these teams. These DMATs and AUSMATs work in collaboration with the defence force to provide healthcare services to communities affected by disasters.

2.6.1.2 Defence Force

The military have personnel and skills that range across all areas of disaster management and are utilised by other organisations in disaster efforts across the PRRR phases.¹⁷⁹ Military medical forces are highly skilled, trained for crisis situations, and excel at the triaging and treating of acute disaster-related injuries.⁵⁸ Pharmacists working within the Defence Forces are trained to provide essential pharmaceutical services in crisis situations, with the pharmacy facility capable of setting up anywhere and being operational within a short space of time.¹⁸⁰

The ADF has been involved in humanitarian aid missions since 1976 providing transport, safety and security in disaster zones thereby allowing humanitarian aid organisations to come into otherwise unsafe regions.¹⁷⁹ The presence of the ADF has been essential for bringing healthcare into areas of need. For example, after the Ebola virus outbreak in West Africa in 2015, many NGOs stopped operating in the area until there was a military presence, as the region was deemed unsafe for NGOs' volunteers and personnel.¹⁸¹ Having the protection of the military and providing a military-civil partnership in healthcare, increases the health resources and personnel available for assisting in disasters and humanitarian crises providing lifesaving healthcare to communities in need.

The largest area of humanitarian aid focus for Australia is the Asia-Pacific or Oceania region with AUSMAT being deployed to Samoa in 2009 following the Tsunami.¹⁵ Reaves et al. argued that the Oceania region is of particular concern as it is prone to an 'acute-on-chronic syndrome'.¹¹⁹ This term refers to the situation whereby a region experiences multiple, successive weather-related disasters, with no

time for adequate recovery in between disaster events.¹¹⁹ The US Department of Defence has in recent years shifted its attention from the Middle East, to the Oceania region and has been assisting in humanitarian aid efforts, sending US Military and Navy services into this region.¹¹⁹ The US military has in some areas replaced the governing infrastructure that had collapsed due to the community's inability to recover from the number of natural disasters it had experienced.¹¹⁹ The concern with this heavy reliance on outsourced humanitarian aid is the fate of the community when the aid is eventually removed, since the communities have lost their self-sufficiency and subsequent systems have been westernised.¹¹⁹ The agenda and priorities of military humanitarian aid can differ quite substantially from those of NGOs, placing civil health professionals in a supporting role to the military assistance and in some instances underutilising their abilities or discounting their assistance altogether.¹¹⁹

2.6.1.3 Non-Government Organisations

NGOs are a key player in disaster health management. The benefits of humanitarian aid organisations increasing the resilience of communities and assisting in the aftermath of disasters are irrefutable. The World Disaster Report 2018 suggested the gap is widening between the amount of aid international NGOs can provide and the need of communities.⁴⁶ The report suggested the amount of funds international NGOs are capable of raising to provide aid has climaxed, whereas, the level of need in disaster-affected communities has yet to peak.⁴⁶ However, there have been debates that humanitarian aid efforts could be contributing to a 'crowding out effect'.¹⁸² This results in local governments and communities in these areas reducing their disaster management efforts and conserving their money as outsourced assistance can be relied on to arrive following any disaster – commonly known as the 'Samaritan's dilemma'.¹⁸²

Humanitarian aid organisations are generally regarded as 'good Samaritans' in times of crisis delivering essential services with donated medications and the services of volunteer qualified healthcare professionals.¹⁸³ However, there is a suggestion that NGOs are not working collaboratively with local disaster health management. They are not communicating with the governing bodies leading to the undersupply and/or

oversupply of essential medications.^{146,184} NGOs have proven unwilling to share information and work harmoniously with other organisations.^{146,184} There is also a suggestion that NGOs appear to demonstrate a bias towards providing healthcare interventions that gain the most media coverage, ensuring they have positive tangible results to present to their stakeholders.^{146,184,185} Volunteers are the essence of NGOs and are relied upon heavily during disasters and times of crisis.¹⁸³

2.6.1.4 Volunteers

Volunteers provide extra resources and skills that are vital in the response and recovery phases of disaster health management. Health professionals including pharmacists are readily sought after by Médecins Sans Frontières (MSF). The roles and responsibilities of pharmacists tend to be logistical in nature focusing on the procurement and maintenance of supply of essential medications to MSF-active regions.¹⁸⁶ The strict criteria to become a member of many of these organisations has led to an increase in sporadic, spontaneous volunteering which has been referred to as ‘disaster tourism’.

2.6.1.4.1 Disaster Tourism

Spontaneous volunteering or ‘disaster tourism’ involves individuals choosing to simply show up in a disaster zone and offer their assistance.⁵⁷ This has been seen as quite problematic when the proper qualification checks and protocols are bypassed.¹⁸⁷ Spontaneous volunteers are also usually not self-sufficient, becoming a drain on the limited resources available for the disaster victims.¹⁸⁷ It is speculated spontaneous volunteers choose not to join an NGO as they are unable or unwilling to commit to the time requirements of the 6-12-month blocks of service usually asked of them by humanitarian aid organisations. Some of these spontaneous volunteers are ‘adrenalin seekers’, wanting to be amidst the action rather than being there expressly to help in the disaster-affected community. ‘Extreme tourism’ is the term often used to describe such adrenalin seekers.¹⁸⁸

The research on spontaneous volunteers is not all negative. The last decade has seen an increase in the documented efforts of spontaneous volunteers and their ability to improve community spirit following a disaster.^{131,169,170} Governments and emergency services have tended to find spontaneous volunteers a hindrance and

underutilise their collective skill and manpower.¹⁸⁹ In terms of healthcare professionals, the difficulty with spontaneous volunteers is verifying their licenses, credentials, and qualifications in times of crisis. Personnel who could be better allocated to relief efforts, are diverted to assess the credentials of the surge in well-meaning spontaneous volunteers to collect their information into databases.¹⁹⁰ It is essential to know, even in times of disasters, that healthcare is being provided by trained and qualified healthcare professionals. Zhong et al. suggested the number of organisations and individuals involved in disaster response and relief efforts is not grounded in scientific evidence, but rather, there is an ingrained mentality of ‘the more the merrier’.¹⁴ In fact, surplus of volunteers can be a drain on the limited resources set aside for the disaster-affected victims (food, shelter, water, sanitation, and healthcare services).¹⁴

2.6.1.5 Supply Chain

2.6.1.5.1 Donated Medications

This ‘the more the merrier’ also applies to the donation of resources to disaster-affected regions by well-meaning stakeholders and businesses involved in the supply chain. Businesses often do not consult the local managing teams as to the specific needs of the affected communities and thus, send items and resources which may be unwanted or inappropriate.^{183,191} A large problem with this to-date, has been in the area of donated medications.¹⁴

Donated medications are extremely useful if they meet the needs of the affected community. However, more often than not, they are inappropriate for the community’s needs, as the medications are not used in that country, are packaged in another language or are expired.¹⁹² These donations result in large amounts of unwanted medications with huge cost implications for the disaster-affected country regarding the safe and proper destruction and disposal of these unwanted medications.^{121,191} The WHO developed an ‘essential medicines list’ which is used as the drug formulary in many third world countries and forms the basis for the pharmaceutical drug cache used by for many foreign medical relief teams.¹⁹³ However, businesses are often not consulting the ‘essential medicines list’ when

donating medications in response to disaster. Some believe these companies donate their unwanted goods and medications for tax write-off purposes.⁵⁷

There is a thought that it should not be an issue to send expired medications to a disaster zone as surely any assistance is better than none.^{194,195} However, the WHO and the receiving countries do not share this belief.¹⁹² The WHO has developed guidelines on the donation of medications.¹⁹² According to these guidelines, donated medications need¹⁹²

- to have a remaining shelf-life of at least one year in the receiving country,
- be needed by the receiving country and on their national formulary,
- meet quality standards,
- be labelled in a language understood by the receiving country,
- be shipped with a packing list, and
- should not be sent without prior approval from the receiving country.

Many of these countries would prefer cash donations so they can purchase the medications they require, which are in-date and in the language spoken by their people.^{191,192} It is the responsibility of the country or business donating the medicines to fund the appropriate disposal or return of any expired or unwanted donated medicines.¹⁹²

Businesses assist in ensuring communities have access to medications through their donations. Wholesalers which supply these businesses need to also have business continuity plans (BCP) plans and strategies in place to keep the supply chain functioning and to help find solutions for obtaining supply to community businesses when the normal channels are not operational. This includes the medication supply chain and in the case of Australia the wholesalers are under an obligation to ensure the supply of essential medications is continued in disasters.

2.6.1.5.2 Wholesalers

Pharmacies have two options to obtain medications in order to supply their community, wholesalers or directly from the manufacturing company. In Australia, community pharmacies and their wholesalers have a long-standing relationship to

ensure continuity in the medication supply chain. To ensure equity of access to Pharmaceutical Benefit Scheme (PBS) medications for all Australians regardless of their location, in 2006 the Australian Government introduced the 'Community Service Obligation (CSO) for Pharmaceutical Wholesalers' funding pool. This funding pool was to compensate participating pharmaceutical wholesalers for extra expenses in supplying 'the full range of PBS medicines to pharmacies across Australia, regardless of pharmacy location and the relative cost of supply' usually within 24 hours.¹⁹⁶ The second option of supply directly from large private pharmaceutical manufacturing companies, like Pfizer®, there is no such agreement which ensures the supply of their medications when the normal supply chains are disabled due to a disaster.¹³⁵ Where the CSO agreement will enlist the support of measures to attempt to maintain supply of essential medicines by any means and cost available working with a BCP. The direct supply from manufacturing companies, leaves the pharmacy and the community without essential medications for potentially weeks to months depending on when normal routes of operation resume.

2.8 Pharmacists in Disasters

When the healthcare system collapses during a disaster, individuals are in a state of shock and turn to the healthcare professionals they trust and are most easily accessible to them – their local pharmacists.^{133,197-199} Pincock et al. stated

"The pharmacist's role during disaster response is just as crucial as it is in the traditional sense. As the most accessible health care provider, the pharmacist plays an especially vital role when a disaster disrupts a community's health care system." ^{200(p.620)}

The duty of care and responsibilities of pharmacists during times of crisis are undefined and the skills and knowledge pharmacists are capable of contributing are underutilised.²⁰¹ The International Pharmaceutical Federation (FIP) produced a statement in 2006 outlining professional standards for the role of pharmacists in disaster management for natural and anthropogenic disasters and pandemics.¹⁶ The statement concluded there was a role for pharmacists in ensuring continued access to medications for disaster-affected individuals and opportunities for expanding roles

into 'first responder' responsibilities – triaging, vaccinating and providing first aid.¹⁶ In 2016, FIP released guidelines on roles in responding to natural disasters for the different levels of pharmacy personnel.² These guidelines outline the roles and responsibilities pharmacists could be undertaking at the government, industry, hospital, and community pharmacy level.² FIP suggested expanded pharmacists' roles could include: emergency prescribing, administering and prescribing vaccinations, providing first aid, managing chronic disease treatments, triaging and screening the 'walking wounded', treating minor ailments, dispensing, and counselling on medications.² The first set of standards was released by FIP over a decade ago but the progression of pharmacists roles in disasters has not significantly changed since the 1960s.^{1,202} The roles pharmacists fulfil during disasters are generally only reflected upon, acknowledging retrospectively the unique contributions of individual pharmacists or teams who went above and beyond in assisting their communities during disasters.^{71-74,111,203-205} These acknowledgements of the outstanding work pharmacists carry out in disaster situations have not led, however, to improved utilisation of pharmacists' skills throughout the disaster health management PRRR continuum.

Pharmacists are reported to be the most easily accessible healthcare professional, and are the third largest healthcare provider after doctors and nurses globally.^{133,198,199,206-208} They are regarded as the world's medication experts and have extensive knowledge of medications.^{198,209} In many circumstances when a disaster strikes a community, those affected by disasters seek the assistance of pharmacists first before potentially being referred on to a doctor or hospital.^{206,210} Pharmacists are on the frontline of continuity of care when in the aftermath of a disaster there is a potential collapse of the healthcare system and an assessment of operational services may be required.¹⁶ During disasters the community has the expectation that pharmacies will stay open late and supply medications and other pharmacy-related items (i.e. over-the-counter medications, glasses, nappies, oral rehydration therapy, sanitary products, and toiletries).¹³⁵ This community expectation is sometimes held even in the absence of a prescription, identification, or money until community services, including health services, return to operational. However, this expectation

by the community during a disaster does not align with the restrictions placed on pharmacists by legislation unless specific disaster legislation is enacted.²¹¹

The roles and responsibilities pharmacists might be required to fulfil during a disaster all depend on where the disaster occurs, what healthcare services have been affected, and what healthcare resources and professionals are available to assist. In a resource-rich hospital setting where there is access to multiple physicians and nurses, the role of the pharmacist is slightly clearer. The pharmacist is the medications expert assisting with medication regimens and protocols to prevent disease outbreaks and organising procurement to ensure adequate supply of medications for the expected surge of patients to the hospital. However, there are other roles pharmacists would be able to fulfil in the hospital setting during surges and overcrowding during a disaster – attending clinical ward rounds and seeing to the needs of the low-acuity patients. The US has begun including pharmacists in their interdisciplinary DMATs responding to natural and anthropogenic disasters.^{177,212} Pharmacists are beginning to emerge in the disaster health management literature, these have been published in the American Journal of Health-System Pharmacy (AJHP) highlighting pharmacy practice innovations in the US in disaster management.^{70,72,73,173,180,199,204,205,212-218} However, outside of these case studies there are few published evidence-based studies on the roles and responsibilities of pharmacists in disasters. One area where pharmacists have the potential to play an important role is pandemics and pandemic planning.

2.8.1 Pandemic Plans

A pandemic is defined by the WHO as the “*worldwide spread of a new disease.*”²¹⁹ A recent review of pandemic plans in Australia revealed that Australian states and territories failed to include pharmacists in their pandemic planning thereby reducing their capacity to effectively vaccinate communities in the event of a pandemic.²²⁰ This issue briefly discussed the ability to better prepare and respond to pandemics by including the already trained workforce of the pharmacy profession – especially pharmacists.²²⁰ The authors recommended a review of current legislation to allow better implementation of pharmacists’ roles in pandemics, inclusion of pharmacy organisations as stakeholders in pandemic planning and

engaging the healthcare student workforce during pandemics to backfill duties – freeing up qualified staff to complete the clinical roles necessary in a pandemic.²²⁰ It was identified in the issue brief that those with chronic diseases are at increased risk of adverse health events during a pandemic situation.²²⁰

Comparatively in the US, a vaccination prioritisation scheme document initially did not identify pharmacists as part of the vulnerable workforce requiring vaccination to continue their services in the community.^{221,222} The scheme was divided into five tiers and the final document added pharmacists on the second tier.²²¹ The first tier includes all frontline healthcare workers and comprises 24 million workers to be vaccinated.²²² The second tier includes pharmacists, border protection personnel, intelligence services, mortuary services, communications, utilities, critical government personnel, community services and consists of 15 million of the workforce.²²²

2.8.2 Case Studies

Five specific examples of where pharmacists were vital in a disaster response and assisted their communities are provided.

2.7.2.1 Anthrax Crisis

Pharmacists have been integrated into the US DMAT since 2001, as the threat of ‘acts of bioterrorism’ is believed to be imminent. The response to bioterrorism disasters requires the large-scale dispersal of antidotes and prophylaxis treatments.^{212,215,223-225} Pharmacists’ roles within DMATs are largely focused on procurement and logistics and maintaining the National Pharmaceutical Stockpile (NPS).^{106,177} The anthrax crisis in Washington D.C. in the US 2001, saw pharmacists take a leadership role in the screening process to determine treatment or prophylaxis choice based on other patient determinants such as pregnancy status, other medical conditions, ongoing medications and allergies.²⁰⁵ Some pharmacy organisations have suggested pharmacists should become more involved in bioterrorism preparation, remaining up-to-date with the current threats and management solutions.^{213,217} The Anthrax scare in 2001 has seen a role emerge for pharmacists within DMATs, and in bioterrorism prevention and preparedness.

2.7.2.2 Severe Acute Respiratory Syndrome

Pharmacists (community and hospital) were of great assistance during the Severe Acute Respiratory Syndrome (SARS) outbreak of 2003 which significantly affected parts of the world including Toronto and Ontario in Canada.^{226,227} The local hospitals quickly put together multidisciplinary SARS teams that included pharmacists to treat the affected patients and limit the potential spread of the virus.²²⁷ Pharmacists assisted in the screening of all presenting patients, provided medication expertise on best evidence-based treatment options to follow, and suggested dose adjustments to make.²²⁷ However due to the severity and contagious nature of the SARS virus, some hospitals and clinics were forced into quarantine, leaving patients with no tertiary healthcare service to turn to, relying on their local community pharmacies.²²⁶ This placed considerable stress on both patients and pharmacists, as patients were unable to comprehend how, with no other alternative medical service available, the pharmacist was unable to assist in diagnosing and prescribing due to legal constraints and pharmacists were at a loss as to how to best assist their patients.²²⁶

The other complexities of the 2003 SARS outbreak for community pharmacies as highlighted by Austin et al.²²⁶ was the simultaneous power outage. Disaster and emergency management plans were found to be stored electronically, medications stored in fridges became a significant issue, and younger, less experienced pharmacists were never taught how to run a pharmacy without computers.²²⁶ They interviewed pharmacists who worked during the SARS outbreak and discovered that younger pharmacists had opted to close their community pharmacies and refer all patients to the overcrowded or potentially closed hospitals instead of assisting their patients.²²⁶ During interviews, the community pharmacists expressed concerns regarding working without documented policies and procedures in place as they did not feel equipped to handle the challenging working conditions brought on by the SARS outbreak and power outage.²²⁶ Older, more experienced pharmacists were more willing to assist their patients in the absence of documented policies and procedures. They recalled the days of handwriting labels and manually checking drug interactions before the advent of computer software. They were able to think on

their feet in order to service their communities during the crisis.²²⁶ Austin et al. identified that newer graduates preferred to follow protocols and procedures strictly to the letter in their day-to-day practice. They were unwilling to rely on their own professional judgement and therefore struggled to adapt their practice to the changed working conditions brought about by the disaster.²²⁶

2.7.2.3 Hurricane Katrina

Hurricane Katrina was extremely destructive when it that struck the Gulf states of the US (Texas, Louisiana, Alabama, Mississippi, and Florida). It made landfall as a Category 4 (second highest category of the Saffir–Simpson storm scale) on August 29th, 2005.⁶⁹ In the midst of this hurricane, the affected US state of Alabama temporarily extended its ‘emergency supply’ rule allowing pharmacists to prescribe a 30-day emergency supply of chronic disease medications for disaster-affected patients without a prescription. Alabama State also permitted the use of out-of-state volunteer pharmacists to assist in the relief efforts.^{70,202}

In its aftermath, pharmacists assisted in the healthcare clinics set up in evacuation centres to reduce the strain on local hospitals. Hospitals had been inundated with disaster victims not requiring immediate, medical assistance.^{69,71} Many evacuees required replacement medications as they left their homes with only enough for 1-2 days’ supply, or in the case of evacuation to the Louisiana Superdome, patients with their medications packed in weekly pill boxes, had their medications confiscated and destroyed as part of the registration protocol.^{69,117,120,228} Pharmacists performed many duties in the wake of Hurricane Katrina and fulfilled new roles in the absence of other healthcare professionals.⁷² Some of the duties pharmacists performed following Hurricane Katrina included^{71-73,175,229}

- triaging services within evacuation centres (separating those patients needing to see a doctor from those who simply needed a prescription refill, and identifying and referring individuals to allied health professionals),
- taking medication histories,
- providing vaccinations,

- performing basic medical checks,
- mixing intravenous medications,
- providing consultations on wound infections,
- assisting with major traumas,
- assessing the safety of medications brought in against contamination, and
- pill identification.

2.7.2.4 Tasmanian Bushfires

Australian research found pharmacists were essential support to affected communities during the 2012/13 Tasmanian Bushfires.¹³⁵ The study identified a need for a review of Australian policy to recognise the primary healthcare role pharmacists' provide, especially in disasters.¹³⁵ Pharmacists in these communities were vital in assisting during and after the devastating bushfires. The people affected by the fires who were evacuated, left their homes without money, prescriptions, medications or identification. Community pharmacies provided the evacuees with emergency supplies of their ongoing chronic disease medications and other healthcare items to ensure continuity of care.¹³⁵ The pharmacies who provided assistance during the disaster were not reimbursed by the Australian government disaster recovery funds as they were deemed to not be an essential service and provided these services of their own goodwill.¹³⁵ Pharmacies in these situations are now being faced with the dilemma of balancing their duty of care to their patients in a time of need, against the financial implications to their business long-term of providing stock free-of-charge with no likelihood of compensation. For small, independent pharmacies there is a risk that their financial viability may be impacted.

2.7.2.5 Thunderstorm Asthma Event

Pharmacists also provided vital assistance during the thunderstorm asthma event which occurred on November 21st and 22nd in Melbourne, Australia in 2016. Thunderstorm asthma is a particular type of asthma triggered by an uncommon combination of high pollen (usually during late Spring to early Summer) and a specific type of thunderstorm.²³⁰ With this storm event, grass pollen grains are swept up into

clouds as the storm forms. These pollen grains subsequently absorb moisture causing them to burst open releasing large amounts of smaller allergen particles. One pollen grain can potentially release up to 700 of these smaller allergenic particles which are sufficiently small to penetrate human airways. People who suffer from allergic rhinitis (hay fever) and/or asthma are particularly susceptible to respiratory problems during these events.²³⁰

During this event, health services were inundated with people experiencing respiratory problems and unfortunately nine people lost their lives.²³¹ Hospital EDs were overcrowded with 9909 people who presented to public hospitals, 231 presented to private hospitals, and many others who self-presented to community pharmacies.²³¹ There were 2666 calls made to paramedics and ambulance services, of which 962 related to respiratory problems.²³¹ This thunderstorm asthma epidemic was referred to in the media as having an equivalent impact to a terrorist attack.²³² The Victorian state government issued a review into the thunderstorm asthma event and subsequent healthcare response, which was conducted by the Inspector-General for Emergency Management (IGEM) for the state. The IGEM review produced recommendations on ways the health systems could be better prepared to respond to an unknown event like the thunderstorm asthma epidemic.²³¹ Recommendation three from the IGEM review suggests public health systems need to learn to

“...work with primary care providers including appropriate community pharmacy representatives to consider and define the role community pharmacies play during emergencies and where appropriate, integrate community pharmacies into future planning for emergencies.”^{231 (p.5)}

The IGEM report suggests that health systems need to broaden their governance arrangements to include pharmacists and pharmacies.²³¹ This report highlights the significant role community pharmacists and pharmacies played in providing care to patients during this event. There were large numbers presenting to community pharmacies due to the wait times in the EDs at the hospitals.²³¹ Finding Six from the IGEM report states:

“IGEM finds that on 21– 22 November 2016 community pharmacies played a central role in meeting community needs during the thunderstorm asthma

event. Given their community focus and their geographic coverage, community pharmacies can provide valuable support to the management of health emergencies or emergencies with health impacts.^{231 (p.36)}

In sharing the responsibility for preparing and mitigating the health impacts of a disaster, the IGEM report proposes pharmacists and pharmacies belong as part of the health sector main stakeholder group.²³¹

Pharmacists' roles in disasters have been recorded in literature since the 1960s,^{1,70,72,180,197,202,216,221,233-235} although the progression into expanded roles utilising the whole skillset of the pharmacist has been slow to develop.¹ Several authors have attempted to categorise the roles of pharmacists in disasters based on different criteria. These are now discussed in more detail.

2.9 Disaster Pharmacy Models

The criteria scholars use to differentiate the roles pharmacists could undertake in disasters vary. Setlak categorised pharmacists roles based on providing assistance in a bioterrorism event.²³⁶ Pincock et al.²⁰⁰ categorised pharmacists' roles based on a disaster readiness model. Alkhalili et al.²³⁷ categorised pharmacy employee roles based on capabilities, and the FIP organisation categorised the pharmacy profession's roles based on the context of the pharmacy workforce (community, hospital, industry, or government).²

2.9.1 Bioterrorism

The roles of pharmacists during natural disasters are undefined and lack clarity. However, there is some clarity regarding pharmacists' responsibilities during anthropogenic disasters and acts of bioterrorism, with pharmacists playing key roles in the rapid dispensing of antidotes and prophylaxis treatments.^{212,215} Setlak listed potential roles that US health-system pharmacists could fulfil during disasters and separated these roles into four categories.²³⁶ These categories are

- response integration,
- patient management,
- pharmaceutical supply, and

- policy coordination.

Response integration refers to a first responder role for pharmacists – triaging alongside doctors and nurses, providing first aid, cardiopulmonary resuscitation (CPR) and assisting in areas where there are shortages of healthcare professionals.^{1,202,236}

Patient management refers to pharmacist roles in providing patient assessments in the aftermath of a disaster, prescribing and dispensing continuing chronic disease treatment medications, consulting on poisons and bioterrorism agents, and counselling patients including the wider community to reduce the escalation of fear and anxiety.^{1,202,236} Pharmaceutical supply falls within the traditional role of pharmacists focusing on the procurement and storage of medications along the supply chain.^{1,202,236} Policy coordination refers to the role pharmacists can play in assisting the development of drug algorithms and patient assessment tools used in the rapid dispersal of prophylaxis treatment following bioterrorism threats.^{1,202,236}

The role categorisation developed by Setlak has been extrapolated by other US investigators to extend to natural disasters as well as bioterrorism.^{1,202} Although theoretical, this model was not developed to include an all-hazard disaster approach. Another model which focused on pharmacists' roles and categorised them based on different contexts is the disaster readiness model.

2.9.2 Disaster Readiness Model

In 2011, Pincock et al.²⁰⁰ developed a disaster readiness model which categorises the roles of pharmacists in a disaster, based on the context of employment (ambulatory care, pharmacotherapy and critical care, logistics, pandemics/weapons of mass destruction, and management). Pharmacists' roles in a disaster are divided into two categories - clinical and other. The clinical category encompasses pharmacists undertaking roles in pharmacotherapy, ambulatory care, and critical care. Community pharmacists would come under the ambulatory care readiness category, providing care to those with minor ailments.

The ambulatory care readiness pharmacists could be found in different contexts such as evacuation centres, clinics, outreach, or hospitals.²⁰⁰ Ambulatory care readiness pharmacists would be involved in all stages of medications

management including prescribing, dispensing, counselling, vaccinating, providing a surveillance tool on patterns of diseases emerging in the community, and developing disaster plans for pharmacies. They also participate in CPR and advanced life support, collaborate with other health professions, and always ensure the safety of their pharmacy team and their patients.²⁰⁰

The pharmacotherapy and critical care pharmacists are tasked with the same duties as the ambulatory pharmacists with the addition of providing nutritional advice, assisting in patient transfers and discharge, and providing a knowledge base on medication management. Pharmacotherapy and critical care readiness pharmacists would most often be found in hospitals providing care to patients with moderate to potentially severe conditions.²⁰⁰

The pandemic and weapons of mass destruction pharmacists have similar roles to those in the clinical category but are focused more on vaccines both for treatment and prophylaxis and ensuring established protocols and guidelines are followed in managing those at risk of a biological agent.²⁰⁰ Public health education to reduce risk and exposure to agents is a role of these pharmacists, with personal and public safety being paramount.²⁰⁰ The authors suggested pharmacists need to take a holistic approach to their role:

“This means that greater emphasis must be placed on the current state of a patient’s living environment, access to balanced nutrition, and potential access to longer-term care, as well as the limitations of the health care system.”^{200 (p. 620)}

However, this disaster readiness model does not include pharmacists who work in different contexts outside of those discussed or pharmacists who may transcend across the boundaries working in multiple different contexts.

A review of literature on disaster models categorising the roles for the pharmacy profession in different contexts yielded two different models - Alkhalili et al. model on pharmacy employee capability and FIP’s model on pharmacy personnel roles in disaster response.

2.9.3 Level of Pharmacy Employee Capability

In a review by Alkhalili et al.,²³⁷ the authors acknowledged that the roles of pharmacy personnel changes over the course of an emergency and depending on the different levels of competency and qualifications. From this review, a framework was developed matching different roles and core capabilities assumed in a disaster to the differing levels of qualifications and competencies of pharmacy personnel.²³⁷ This model discusses the roles of pharmacy assistants and technicians performing low level clerical duties and responsibilities. Pharmacists had the highest number of roles to perform in a disaster and they varied in nature according to the pharmacist's level of competency.²³⁷ Pharmacists in management positions or in specialised areas had tasks with a narrower focus during emergencies.²³⁷

To determine the key activities required in a disaster, Alkhalili et al.²³⁷ developed five core capabilities which pharmacy personnel should strive to achieve and maintain in an emergency. These capabilities were described as

- 1) professional practice,
- 2) population health planning,
- 3) direct patient care,
- 4) legislation, and
- 5) communications.

The professional practice capability entails pharmacy taking a leadership role during the crisis and working collaboratively with other healthcare professions, whilst still ensuring the pharmacy remains operational or returns to operational as quickly as possible following an emergency. Population health planning capability involves being aware of the health of the community in which the pharmacy is located, developing risk mitigation plans to improve the health of the community, and developing plans for how the pharmacy will run in the event of an emergency.²³⁷ The direct patient care capability involves developing coordinated individual care plans and ensuring coordinated efforts of care are maintained. This includes the continuation of dispensing according to quality standards. The legislation capability refers to the need for pharmacy personnel need to understand the current legislation

in place for the region, be able to work within the legislative constraints during emergencies, and advocate for amendments to expand pharmacy action. The communications capability involves maintaining communication channels between internal pharmacy teams and external partners and other healthcare professions, as well as record keeping.²³⁷

Alkhalili et al.²³⁷ developed along with these capabilities for pharmacy personnel in disasters, specific pharmacy categories identifying which pharmacy personnel has the necessary skills and knowledge to meet these capabilities. These categories included pharmacy technicians, pharmacists, and a level of competency for pharmacy managers and specialist pharmacists (advanced scope pharmacists) within the pharmacy profession.²³⁷ However, this model does not detail the specific tasks pharmacy personnel would be required to undertake during a disaster, nor does it define the role of pharmacists during disasters. Although, it does provide a starting point to understanding the independent manner in which pharmacists work especially during emergencies, and the importance of keeping a pharmacy operational for the community.

2.9.4 FIP Pharmacy Personnel Model

The FIP guidelines discusses the roles for the pharmacy profession specific to their context of employment. The guidelines outline that there is a role for pharmacy in disasters in the government, industry, hospital, and community sectors with the roles differing depending on the context and the roles are divided into the four PPRR phases of a disaster.

Government, pharmacy industry and pharmacy associations have the responsibility to perform the risk analysis for the pharmacy profession in terms of disaster management.² It is government pharmacy's role to advocate and implement the amendment to legislation allowing for expanded scope for pharmacist roles in disasters. According to the FIP guidelines,² pharmacists' duties in a disaster include coordination of a country's NPS, pharmaceutical supply continuation, community outreach opportunities, and completing post-disaster after-action reports.² FIP states, communication is essential between the different key stakeholders and implementing emergency policies previously developed.²

Hospital and community pharmacies should perform their own risk analysis and practice emergency drills following emergency protocols. Hospital pharmacy personnel should advocate and implement any amended legislation to expand pharmacy's duties in a disaster. Maintaining records and supply of pharmaceuticals are top priorities in the response phase for hospital pharmacy personnel. It is imperative community pharmacies maintain health records and implement amended legislations allowing for expanded scope of practice in disasters. Managing the resources (both human and pharmaceuticals) is of high priority during disasters.² Following a disaster, hospital and community pharmacy personnel should participate in post-disaster after action reports reflecting on lessons learned.²

This model clearly sets out the tasks for pharmacy personnel in each pharmacy context during each of the different PRR phases. However, it fails to consider the clinical roles pharmacists can perform as separate entities away from the 'bricks and mortar' workplace context of pharmacies in which they are based i.e. it does not separate pharmacists from pharmacies or pharmacy context in which they work.

In this section, four different models were presented which described the role and responsibilities of pharmacists in disasters. Each provides a unique way of categorising and separating the roles of pharmacists in disasters. However, the objective of this research was to investigate roles pharmacists are capable of undertaking in a disaster and how these identified roles might evolve across the PRR cycle. Therefore, none of these disaster pharmacy models fit the research objective and a different model is proposed in Chapter 3.

2.10 Summary

The importance of pharmacists' roles in disasters has been highlighted in the five case studies and these four disaster pharmacy models presented. The anthrax scare in 2001, the SARS outbreak in 2003, Hurricane Katrina in 2005, the Tasmanian Bushfires in 2012/13, and the thunderstorm asthma event in 2016 all represent different circumstances where pharmacists were placed on the front-line of healthcare provision to disaster-affected communities. Pharmacists were found to be of assistance in each of these cases and the literature suggests pharmacists could be

included in more roles in disaster management. Currently, pharmacists' deployment in disaster situations is sporadic in nature and their roles and responsibilities are undefined. As one of the most accessible healthcare providers, their involvement can reduce the growing burden on public health services in disasters from an increasing ageing population and an increase in the number of individuals with chronic diseases. However, action to improve inclusion in disaster health management may need to come from the profession itself. As Professor Theodore G. Tong stated in a comment to AJHP,

"If pharmacists wait to be asked to participate in a community's emergency-response activities, it will never happen."^{72 (p.2209)}

In Australia, pharmacists' involvement in disaster health management is essentially absent from the literature and is the focus of this research project.

2.11 Significance

By highlighting the roles pharmacists are capable of undertaking in a disaster, this research project will contribute new knowledge to the field of disaster health management. Pharmacists have been undertaking roles in disasters since the 1960s, albeit their role has been primarily logistics in nature.¹ Since, the terror events of September 11, 2001 in the US, pharmacists have begun taking on more clinical roles in a disaster.¹⁹⁷ However, these roles are usually not coordinated through a collaborative approach in the preparedness phase of disaster management and ready to be enacted in the response phase. Rather, they have been the actions of individual teams or pharmacists undertaken in an *ad hoc* fashion.

This research project aimed to identify obtain the roles pharmacists are capable of undertaking within the PRR phases of a disaster. The findings will potentially aid policy makers in defining the role for pharmacists in disaster situations. Through the inclusion of pharmacists in disaster management policy planning and improved integration of pharmacists into disaster health management activities across the PRR cycle, there will be greater capacity for a country to achieve best possible outcomes in a disaster.

The significance of this research is grounded in the recent commitment made by 187 countries to reduce the impact disasters have on communities. In 2015, at the UN Third World Conference in Sendai Japan, Australia, along with 186 other countries, signed the Sendai Framework for Disaster Risk Reduction 2015-2030.²³⁸ These countries agreed to reduce the impact of disasters on the loss of life, livelihood, and health of communities and countries.¹² This research proposes that one of the ways to achieve the Sendai Framework's goals could be by the better integration of pharmacists into disaster teams and utilisation of their knowledge and skills.

2.11.1 Sendai Framework

The 187 signatory countries to the Sendai Framework agreed to report on actionable outcomes,¹² which follows on from the Hyogo Framework for Action 2005-2015, with a significant shift in focus from building resilience to risk management and preparedness.¹² There are seven goals and four priorities of the Sendai Framework.¹² The seven goals are:¹²

- 1) reduce disaster global mortality rate by 2030
- 2) reduce the number of disaster-affected people globally by 2030
- 3) decrease the disaster economic loss compared to the global gross domestic product by 2030
- 4) decrease the damage caused by disasters to critical infrastructure and its impact on disruption to basic services including healthcare facilities
- 5) increase the global uptake of disaster risk reduction in countries both in their national policies and at their local level
- 6) increase international commitment and support to developing countries and their strategies to meet the Sendai Framework actions
- 7) increase the utilisation of all-hazard early warning systems and the sharing of disaster risk assessments and information by 2030

The Sendai Framework suggests that for disaster risk reduction to be effective, disaster management should be inclusive and multi-sectorial.¹² It lists both community and healthcare professionals as stakeholders.¹² This framework has a

keen focus on protecting individuals' health and wellbeing and in doing so aims to protect individuals' human rights. The Sendai Framework forth global target articulates this:

“Substantially reduce disaster damage to critical infrastructure and disruption to basic services, among them health and education facilities, including through developing their resilience by 2030.”¹² (p.12)

Two of the seven global goals are to reduce the mortality rate and the number of disaster-affected people.¹² As identified in this literature review, pharmacists are the most accessible healthcare professionals and the third largest healthcare provider after doctors and nurses.^{133,198,199,206-208} Therefore, their inclusion in disaster management teams has the potential to help countries meet this Sendai Framework goal. Including them in all aspects of disaster management offers a wider network of healthcare facilities to provide the suggested basic healthcare services within an affected community. The four priorities of the Sendai Framework are:¹²

- 1) understanding disaster risk,
- 2) strengthening disaster risk governance to manage disaster risk,
- 3) investing in disaster risk reduction for resilience, and
- 4) enhancing disaster preparedness for effective response and to ‘Build Back Better’ in recovery, rehabilitation and reconstruction.

Priority three of the Sendai Framework relates to investing in disaster risk reduction for resilience.¹² To achieve this at the local and national level, there is a commitment to health resilience, *“promoting and enhancing the training capacities in the field of disaster medicine”*,¹² (p19) and having inclusive policies that facilitate access to basic healthcare services. The commitment to build health resilience includes:

“...People with life-threatening and chronic disease, due to their particular needs, should be included in the design of policies and plans to manage their risks before, during and after disasters, including having access to life-saving services.”¹² (p20)

Chronic disease prevalence is increasing along with the ageing population. Globally, almost 70% of deaths are attributed to non-communicable diseases (NCDs)

or chronic diseases.²³⁹ On a daily basis, pharmacists manage chronic diseases and patients' complex medication regimens to assist them with their chronic diseases. Pharmacists are vital in providing access to medications and provide healthcare services everyday with many pharmacies being open 24 hours and seven days a week. Pharmacists provide access to medications which is important in disasters when medications can be lost, destroyed, or forgotten. Pharmacists provide not only an additional healthcare workforce but can apply their expertise as medication experts. They have knowledge of which medications are essential to have in a disaster and they can recommend therapeutic substitutes from the available stores and suggest an appropriate therapeutic dose that will achieve the same therapeutic goals. Pharmacists also have the clinical skills to assist patients who come into community pharmacies with minor ailments prescribing over-the-counter medications. During disasters, they therefore, can free up doctors' time to treat more acute disaster emergencies. Pharmacists are able to provide these services to the community and treating patients when they have minor problems, is an essential service which has the potential to stop patients from potentially becoming major life-threatening cases and utilising more of the limited healthcare resources.

Priority four of the Sendai Framework focuses on enhancing disaster preparedness for effective response and recovery at the local and national level to achieve this:

"...To promote the resilience of new and existing infrastructure, including water, transportation and telecommunications infrastructure, educational facilities, hospitals and other health facilities, to ensure that they remain safe, effective and operational during and after disasters in order to provide life-saving and essential services."^{12 (p.21)}

This priority suggests there needs to be a strengthening of health facilities to remain operational to continue to provide essential and life-saving services. This includes medication continuity of care provided by pharmacists in pharmacies. There is also a commitment to train and strengthen the logistical capacity in emergencies, to ensure teams can provide the best response to meet demands.

The progression in international commitments to disaster reduction leading to the current Sendai Framework and how it fits with other UN strategies such as the Paris Agreement (an agreement within the UN Framework Convention on climate change) and the Sustainable Development Goals (described below) (Figure 6). The Paris agreement is the global commitment to a coordinated strategy for handling the global threat of climate change.²⁴⁰ The Sustainable Development Goals were a continuation of the Millennium Development Goals focusing on meeting the global needs of humanity and reducing poverty.^{241,242} The Sustainable Development Goals

“...address the global challenges we face, including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice. The Goals interconnect and in order to leave no one behind, it is important that we achieve each Goal and target by 2030.”²⁴¹

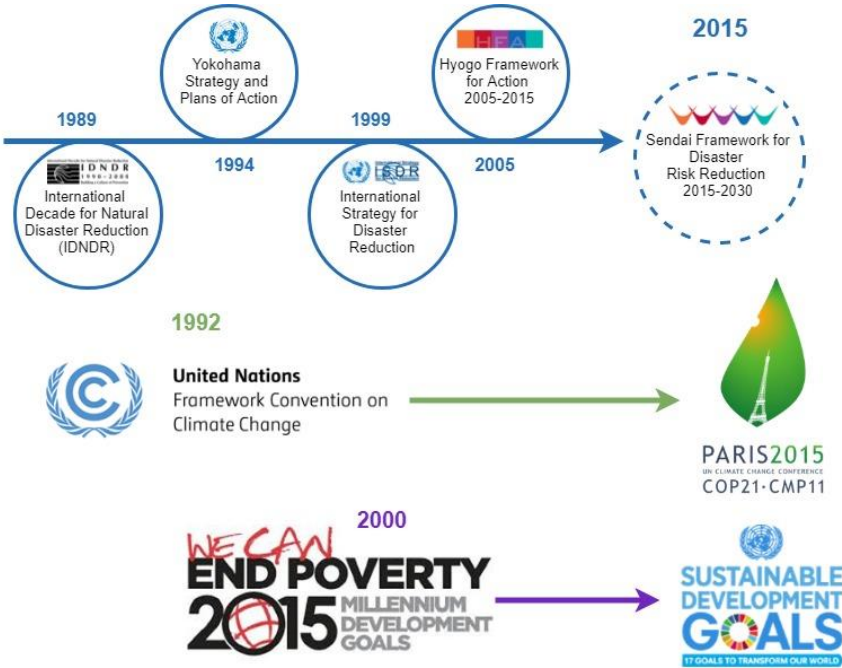


Figure 6: Twenty-five years commitment to international disaster risk reduction.¹ The three 2015 landmark agreements demonstrate the significant interlinked approach to disaster risk reduction on a global scale.

¹ Recreated from Launch of the 2015 Global Assessment Report on Disaster Risk Reduction by Andrew Maskrey, 2015, Geneva, Switzerland: UNISDR. Reproduced with permission.

In 2015, the UN signed onto three interlinked significant landmark agreements (Figure 6). There were 187 member states who signed the Sendai Framework,²³⁸ 195 nations initially signed onto the Paris agreement²⁴³ and 193 UN member states signed on to meet the Sustainable Development Goals.²⁴⁴ These three 2015 agreements, provide a multi-perspective look at the relationship of Disaster Risk Reduction across

the agreements. It can be determined if the approach taken to address Disaster Risk Reduction is sufficient or needs to adapt. These frameworks attempt to be inclusive of all stakeholders, provide better outreach at the local community level, and present measurable development outcomes.²⁴⁵ The Global Assessment Report of Disaster Risk Reduction in 2015 suggests²⁴⁶

“Sustainable development cannot be achieved unless disaster risk is reduced.”^{246 (p.v)}

2.12 Research Aim and Objectives

The aim of this research project was to explore the roles and responsibilities pharmacists could undertake in disaster health management across the PRR cycle using an all-hazard approach including both natural and anthropogenic disasters. It will attempt to define the potential roles pharmacists could undertake across the PRR phases by obtaining consensus from experts in the disaster health community.

This research will provide an understanding of the acceptance of pharmacists’ roles in disasters amongst the wider international disaster health community. The key objectives for this study were:

- 1) identify the opinions of the international and Australian disaster health communities on pharmacists’ roles in disasters and where pharmacists’ roles fit across the PRR cycle
- 2) identify any barriers and facilitators to pharmacists being more involved
- 3) obtain consensus from key opinion leaders on the roles and responsibilities of pharmacists could undertake in disasters and where these identified roles for pharmacists fit within the PRR phases.

Chapter 3: Research Design

Chapter Three discusses the theoretical framework underpinning this research project and thesis outline. Section 3.1 discusses the thesis outline and Section 3.2 the research design of this multiphase research project is presented. Section 3.3 proposes the theoretical framework using the PPRR cycle while in Section 3.4 the context of the study is explored.

3.1 Thesis Outline

There are nine chapters in this dissertation. Chapters 1 and 2 provide the background and literature review whilst Chapter 3 discusses the methodology used in this research and presents the theoretical framework. Chapters 4-7 present the findings from the individual studies conducted and Chapters 8 and 9 discuss the key findings and future directions of this research.

The first chapter provides an introduction and background to the research and discusses the scope of the research project. Chapter 2 presents a review of the literature on the role's pharmacists have undertaken in disasters. A systematic review was also conducted by the researcher and is under preparation for publication.

Chapter 3 comprises the thesis outline (Figure 7), the theoretical framework underpinning this research, and the context of this research project. The rationale behind using the disaster PPRR cycle as the theoretical framework is discussed.

Chapter 4 explores the differences in disaster pharmacy legislation between different countries and states. This study looks at the range of disaster pharmacy legislation which might be enacted by a country or state for a declared disaster. The number of disasters these locations have experienced in the last decade was also investigated. This was to determine if there was a relationship between the number of disasters a country or state has experienced and whether they had specific disaster pharmacy legislation in place.

Chapter 5 explores the opinions of international and Australian disaster health communities regarding the roles of pharmacists in disasters. The results of two surveys (one international and one Australian) were compared to determine if the Australia disaster health community's opinions of pharmacists' roles in disasters differed from those of the international community.

Chapter 6 provides an in-depth understanding of disaster health stakeholders' opinions on pharmacists' roles in disasters. Semi-structured interviews were conducted with key stakeholders (including pharmacists) from the international and Australian disaster health communities. Data analysis of the qualitative data generated involved two methods - manual coding utilising open and axial thematic coding, and the text analytics software Leximancer®.

In Chapter 7 the findings of a Delphi study are presented. The Delphi study involved obtaining consensus from experts in the disaster health communities. These experts were asked to rank their agreement with pharmacists being capable of undertaking several roles listed. The roles proposed to the expert panel were derived from the literature review conducted in Chapter 2 and the studies conducted in Chapters 5 and 6. The expert panel were asked to come to consensus on the roles they believe pharmacists are capable of undertaking in a disaster. The roles were categorised based on the theoretical framework of this research project, i.e. engaging the PRR model recognising the need for these roles to evolve with the changing needs of a disaster-affected community.

In Chapter 8, key findings from this research are discussed and common themes presented. A conceptual framework model is offered to summarise the findings of this research project. Chapter 9 suggests future directions for this research project, looking at ways for better integration of pharmacists into disaster health teams across the PRR cycle. Figure 7 illustrates the thesis outline of this research project.

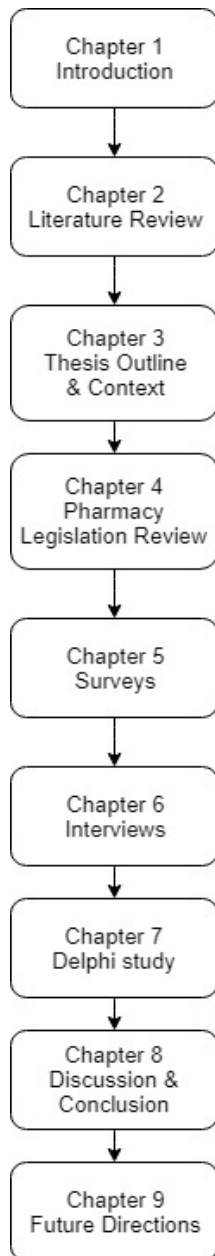


Figure 7: Thesis Outline

3.2 Research Design

The purpose of this study was to investigate the potential involvement of pharmacists in disaster health management and what roles and responsibilities they could have across the PRR cycle. A convergent parallel mixed methods design was used (Figure 8). Quantitative and qualitative data were collected concurrently and were analysed independently for interpretation of results and then synthesised to develop key findings.²⁴⁷

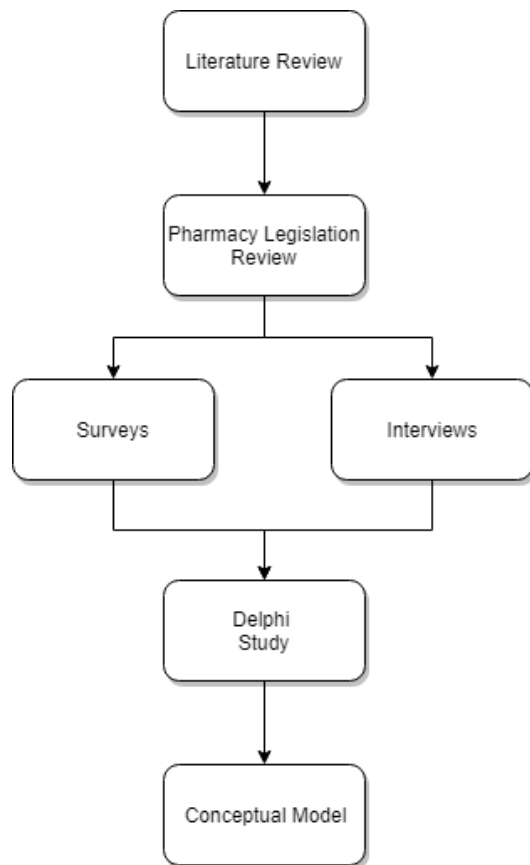


Figure 8: Order of the individual studies included in the research project

The rationale for using a mixed methods research design was to develop an in-depth understanding of the problem whilst maintaining the ability to generalise the results. This is not feasible with using either type of methodology on its own. Since disaster pharmacy is a relatively new research area, an exploratory approach was necessary incorporating the different perspectives of key stakeholders and opinion leaders.

The research project consisted of four individual studies – a pharmacy legislation review, surveys, interviews, and a Delphi study (Figure 8). The first study was a review of the emergency pharmacy legislation in different countries and states. The second study involved two surveys which incorporated pharmacist roles in disasters identified from the extensive literature review conducted in Chapter 2.

The third study involved conducting semi-structured interviews concurrently with the surveys. The questions were developed and influenced by the survey responses in Chapter 5 and the literature review in Chapter 2. Interviews were with international and Australian key stakeholders and pharmacists involved in disaster

health management. The final study was a Delphi study constructed from the data obtained in the earlier phases (Figure 8). Experts from the disaster management community participated in a Delphi study to obtain consensus on a list of roles pharmacists are capable of undertaking in a disaster.

3.3 Theoretical framework

Due to the changing health needs of affected populations over the course of a disaster, the roles of healthcare professionals must also change to meet those needs. As highlighted in Chapter 2, there is limited published research in peer-reviewed journals on pharmacists' roles in disasters. The FIP disaster pharmacy model, which categorises roles by PPRR, was the closest model currently published in literature which could fit the research objectives of this project.² However, the researcher did not wish to limit the categorisation of pharmacists' roles in disasters based on their pharmacy employment context as do previous disaster pharmacy models. Rather, they wished pharmacists to be considered in disaster health teams as stand-alone clinicians as opposed to confined to the bricks and mortar of the pharmacy workplace. The researcher recognises many pharmacists transcend multiple employment contexts and there are roles in which all pharmacists as qualified healthcare professionals are capable of undertaking in a disaster. The FIP model also included the wider pharmacy personnel, whereas this research project is limited to pharmacists.

With this research, the aim was to capture not only the roles which pharmacists are capable of undertaking within a pharmacy, but also those outside a pharmacy in a disaster. This is because a pharmacist's asset and skills are not tied to a building or even to a cache of medications. Pharmacists can perform roles (such as providing clinical advice) without medications or outside the bricks and mortar of a pharmacy. Therefore, with the scope of this research being limited to pharmacists and not the broader pharmacy profession, a different theoretical framework from that of the FIP model is proposed using the disaster management PPRR cycle. The literature review conducted in Chapter 2 highlights the roles pharmacists can fulfil in the response phase of a disaster especially with regards to the logistics supply chain. However, the

question of whether pharmacists have a role across the entire PPRR cycle and what the specific roles would be in each phase are addressed in this research project.

3.3.1 PPRR Model

A systematic review conducted in 2009, highlighted the most common research on disaster management focused on the phases of a disaster - PPRR.²⁴⁸ Lettieri et al.²⁴⁸ argued the main disaster management contributions made to date take an all-hazard approach in their theoretical frameworks as disaster-specific frameworks are not comprehensive enough.

“...hazard-related framework is simplistic and often neglects the theoretical deployment relevant interactions between different typologies of hazards.”²⁴⁸ (p.124)

Using an all-hazard approach allows for the development of a single disaster management strategy to account for any conceivable hazard and their mutual relationships to each other.²⁴⁸ This systematic review of the literature revealed there is a recognition of the different factors at play in disaster management and these evolve over the PPRR cycle.²⁴⁸ Therefore, as this research project is focused on understanding pharmacists' place in disaster management, the PPRR phases will be used as the theoretical framework aligning with previous disaster management research.²⁴⁸ This is to ensure the widest range of roles are included irrespective of the employment context of individual pharmacists. The research project was also limited to pharmacists as healthcare professionals and not the broader pharmacy profession as with the FIP model. During a disaster, with the collapse in community services and infrastructure, there is no guarantee a pharmacist will have access to their usual place of employment or medication supplies. However, they are still capable of offering their assistance utilising their knowledge and expertise in primary care, public health welfare, and medication management. As the role of pharmacists has yet to be defined in disasters, the researcher believed focusing solely on the pharmacist as a healthcare professional independent of the bricks and mortar workplace context and not the pharmacy profession, would provide greater clarity upon which to build future research on associated roles for the rest of the pharmacy team.

3.4 Context

Communities globally are emphasising the need for disaster resiliency to be woven into their society's structure to increase the ability to cope with future disasters.⁴⁸ Disaster health management is identified as essential across the entire PPRR continuum.^{16,174} The roles required of healthcare professionals evolve throughout each of the PPRR phases. The PPRR phases are often described as a continuous cycle in disaster management as it is an ongoing process.

3.4.1 PPRR Cycle

The PPRR cycle has been evident in literature since the 1970s and is used to describe the practice of emergency and disaster management.²⁴⁹ PPRR is often referred to as four individual 'phases' (Figure 9).^{249,250}



Figure 9: PPRR as four individual phases which occur as a continuous cycle.^{249,250}

The term 'phases' can imply there is a linear relationship between the phases and that they occur consecutively. In reality however, each phase is interlinked and occurs simultaneously – adapting and moulding to meet the requirements presented by the unique disaster.¹⁷⁴ When a linear relationship is assumed, the overlapping or simultaneous nature of the PPRR 'phases' can be lost in the interpretation. Another way PPRR can be depicted in the literature is shown in Figure 10.²⁴⁹ The tornado icon signifies a disaster and each of the phases is illustrated as being when they would occur in relation to the disaster event.

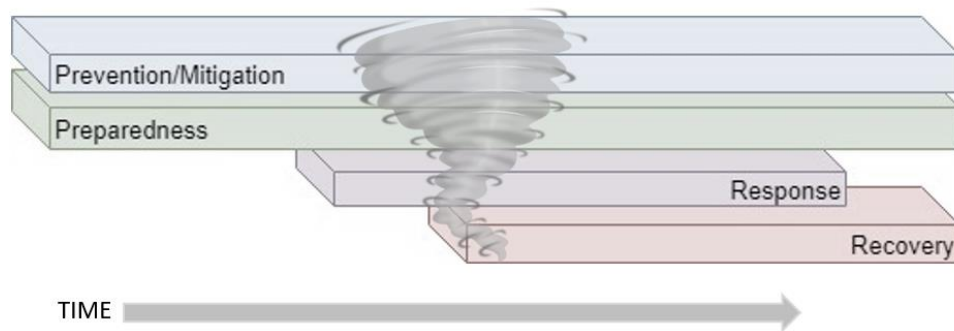


Figure 10: PPRR as a linear but overlapping process, where the phases are interlinked and occur simultaneously.²⁴⁹

This depiction of PPRR as a linear but overlapping process illustrates the simultaneous nature of the disaster management phases better than the earlier PPRR cycle image in Figure 9. Prevention and preparedness are long-term processes. These phases do not stop once a disaster strikes but their respective tasks and duties continue throughout a disaster event. The response phase is not just a reaction to the disaster but requires pre-empting the event where possible and putting in motion activities to ensure the response is effective. Similarly, recovery does not simply start at a defined end to the response phase. These phases are overlapping and occur simultaneously, to give the most appropriate, cohesive, and comprehensive, coordinated disaster management strategy. However, this image fails to capture the never-ending nature of disaster management. Currently, Figure 9 and Figure 10 are the two ways in which PPRR is described in the literature but both models are required to fully comprehend the cyclic, overlapping, and simultaneous nature of the disaster management process. Thus, for this research project, a new illustration of PPRR has been developed by the research team to illustrate all these important aspects – the cyclic, overlapping, and simultaneous nature of PPRR for disaster management (Figure 11).

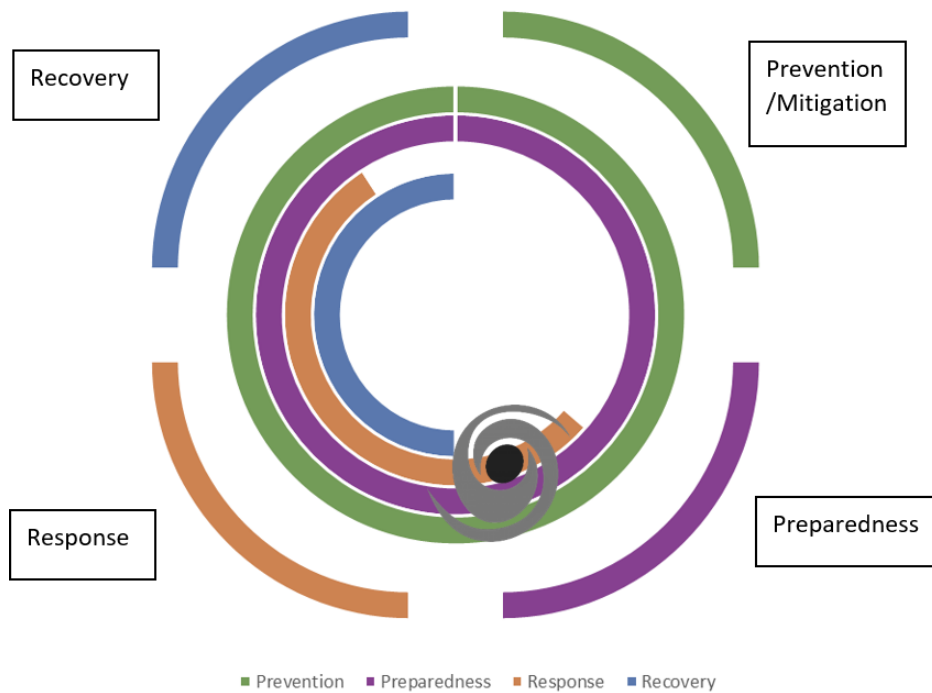


Figure 11: PRRR illustrated as cyclic, overlapping, and simultaneous in nature. Prevention/mitigation (green) and preparedness (purple) phases are a continuous process, whereas response (orange) and recovery (blue) are engaged when a disaster occurs. The hurricane symbol represents the disaster event with time running clockwise.

Each of the individual phases of the PRRR cycle will now be discussed in terms of disaster management strategies and then discussed collectively in relation to health and healthcare.

3.4.2 Prevention Phase

The prevention phase is focused on diminishing the impact and reducing the exposure of a community to a hazard.^{249,251} Primary prevention focuses on mitigating or reversing the effects of climate change,⁵⁴ whereas, secondary and tertiary prevention refer to adapting and accepting the effects of climate change. Strategies used in the prevention phase are not always linked directly as a specific disaster prevention strategy but are incorporated in broader policy initiatives undertaken by governments (e.g. flood mitigation strategies by building dams are also undertaken as a water source plan for communities).²⁵² Prevention or mitigation strategies not only reduce the potential impact of disasters on the health of the community but have also been shown to reduce the costs of response and recovery efforts.²⁵² Prevention and mitigation strategies are often found in the same phase and the terms used interchangeably.

Mitigation strategies are included in both the prevention and preparedness phases and involve planning to encompass the better utilisation of land, and the building of resilient infrastructure capable of withstanding the potential increase in weather-related disasters.¹⁷⁴ It also involves reducing the vulnerability of communities and individuals to all-hazard disasters, building resilience into communities and individuals.^{249,252}

3.4.3 Preparedness Phase

Disaster preparedness is an essential component of disaster management, as it is not always possible to prevent a disaster from occurring.²⁴⁹ The preparedness phase involves improving the resilience and adaptive capacity of businesses, services, and the community to minimise the impact a disaster event is capable of inflicting.^{249,251} It also includes the training, identification, and availability of assistance of both employed healthcare staff and volunteers.²⁵³ Preparing for a disaster involves increasing the resilience of a community through awareness and education regarding potential hazards.

It is a difficult task to convince government departments to spend their budgets on mitigation and preparedness strategies for disasters that may or may not occur during any one iteration of the electoral cycle. Government budgets are traditionally short-term for their elected period in office. Some parliamentary members reportedly take the attitude that, it is the future government's responsibility to deal with the disasters that occur whilst in power.¹¹⁶

3.4.4 Response Phase

The response phase (Figure 11) does not begin after a disaster event has occurred but should anticipate the event and appropriately respond.²⁴⁹ Typically the response phase activities are designed to address the short-term issues identified in a disaster e.g. the provision of shelters, search and rescue, medical care, preserving business operations, protecting properties, and performing risk assessments.²⁴⁹ The purpose of the response phase is to meet the needs and basic human rights of those adversely affected by a disaster.⁵⁷

Response receives most of the focus and funding from governments, NGOs, and the media as the results and evidence are immediately apparent. Funding allocated in disaster management is typically spent in responding to a disaster.¹¹⁶ This is because the funds can be easily justified and linked to the tangible needs of the disaster-affected community.¹¹⁶ The response can become quite dysfunctional with so many organisations arriving immediately following a disaster to respond on the unfounded basis that any assistance is better than none.^{10,25,146,185,254}

3.4.5 Recovery Phase

The recovery phase is considered the most complex of the four phases in disaster management and can often be misunderstood.²⁵⁵ The impacts from a disaster can last from days to decades depending on the level of resilience a community has developed in the preparedness phase.^{249,251} Lonne et al. stated in 2017,²⁵⁵

“Recovery begins with preparedness and continues until recovery transforms into ongoing community development.”²⁵⁵ (p.230)

Recovery activities undertaken in a community should aim not only to return the community back to a normal functioning capacity but to make the commitment to ‘build back better’.^{249,255} This involves adding resilience measures and reducing potential future impacts from hazards.^{249,255} The recovery phase also involves supporting the physical, emotional, social, and psychological wellbeing of the individuals affected by the disaster.²⁵¹ The behavioural and psychosocial support required following a disaster can last weeks, months, or years for both the responders and the disaster victims.

Being exposed to a traumatic event like a disaster can result in people developing mental health problems. However, only the minority of people exposed to a disaster will develop an ongoing mental illness.²⁵⁶ People in disasters are likely to experience increased levels of anxiety, stress, depression, and PTSD.²⁵⁶ These reactions are normal for a traumatising event and the majority of people affected by a disaster recover psychologically.²⁵⁶ Psychological First Aid is often given to provide support for people following a disaster or traumatic event and to identify signs of someone in a mental health crisis so that they might be referred onto the appropriate

healthcare services.²⁵⁷ Disasters can also be a catalyst for positive change with disaster victims and responders showing positive responses after a disaster.²⁵⁶

3.4.6 PPRR Cycle and Health

The health needs of individuals and the community change over the timespan of a disaster. Disasters often cannot be stopped from occurring but the impact on people's health can be minimised. Prevention in terms of healthcare is seen as mitigating the health impacts of a disaster.^{54,57} There are three levels of prevention - primary, secondary, and tertiary. Primary prevention refers to the prevention of the onset of the adverse health outcomes (e.g. taking prophylaxis measures to mitigate the impact through the use of vaccinations). Secondary and tertiary prevention refer to the early diagnosis of adverse health outcomes and the reduction of morbidity associated with the adverse health outcomes. This is described by Chan et al. in 2017,

“To avoid increasing the burden of clinical consults in disaster aftermath, the health needs of people with underlying chronic conditions (drugs, special diets) should be attended to avoid medical complications of their underlying conditions due to lack of management.”^{57 (p.18)}

It has also been suggested that healthcare providers cannot ignore mitigation and need to take a more proactive role in mitigation strategies due to the health benefits of reducing greenhouse gas emissions.²²³

The preparedness phase includes the necessary tasks to get the healthcare professional workforce ready for any potential disaster or emergency.⁵⁷ This would include departments, organisations, and businesses having disaster plans utilising an all-hazard approach for disasters likely in their communities. The response phase is when the tasks and duties discussed in the previous two phases – prevention and preparedness - are actioned.⁵⁷ Without proper preparedness, the response will be inappropriate. Recovery can be about returning to normal business but also extends beyond that to the behavioural and psychosocial support for the weeks, months, and years following an event.²⁵¹

Chapter 4: Disaster Pharmacy

Legislation

This chapter presents a review of pharmacy legislation which allows pharmacists to extend their scope of practice in disasters. Pharmacy legislation from five countries – Australian, New Zealand (NZ), UK, US, and Canada were reviewed. This review was the first study completed in this research project. Section 4.1 outlines the context and terminology used for pharmacy legislation. Section 4.2 provides the background and current literature on pharmacy legislation reviews. Section 4.3 outlines the aims and objectives of this study and Section 4.4 describes the methods used. Section 4.5 presents the results and Section 4.6 discusses the significance of the study's findings.

4.1 Context

Pharmacy legislation is regulated by governments within every country. However, the level of government at which the legislation is regulated differs depending on the country. Table 2 outlines the countries involved in the disaster pharmacy legislation review and the level of government the legislation is regulated. The UK and NZ regulate their pharmacy legislation at the federal or national level. Whereas, the US, Canada, and Australia regulates their pharmacy legislation at the state level. Only western countries were included in this disaster pharmacy legislation review as their legislation was obtainable online and written in English. Australia, UK, NZ, and Canada all have similar healthcare systems for easy comparisons of pharmacy services. The US seems to be the leading country in disaster pharmacy legislation.

Due to the differences in the terminology across the countries involved in the study and level of government in which the pharmacy legislation is regulated, for the purposes of this study the term 'country and state' will be used interchangeably to include country, state, territory, and province.

Table 2: Countries included in disaster pharmacy legislation review and the level of government at which regulation arises

Countries included in review	Level of government pharmacy legislation is regulated (n=)
United States of America (US)	States and territories (51)
Canada	Provinces and Territories (13)
Australia	States and Territories (8)
United Kingdom (UK)	National level (1)
New Zealand (NZ)	National level (1)

*Appendix A provides full list of countries and references

4.2 Introduction

The Sendai Framework for Disaster Risk Reduction (discussed in Section 2.11.1) aims to reduce the disruption to healthcare services during disasters.¹² Uninterrupted access to medications and medical advice is an essential service provided by pharmacists to the community. To ensure continuity of these services during disasters, disaster-specific legislation needs to be in place. There are three areas where pharmacy legislation could enable or hinder pharmacist’s ability to assist in the PRR phases of a disaster – emergency supply/refill, vaccination, and temporary relocation/mobile pharmacies.

Access to medications, health services, and medical resources can be compromised during disasters. However, pharmacies are usually one of the fastest community healthcare services to re-establish operations following a disaster.²⁵⁸ Following Hurricane Sandy in the US, 80% of the pharmacies were operational again within one week with pharmacists providing healthcare services.²⁵⁸

Not only are medications required in times of crises, but continued access to community health services such as dialysis, oxygen, chemotherapy, and radiation are also essential.⁵⁹ Some of the medical needs identified in this systematic review were chronic disease medications, medical records, medical devices (insulin pens, nebulisers, blood pressure monitors, CPAP machines, oxygen), nutritional supplements, glasses, aids (hearing, walking, chairs), denture adhesive, batteries,

incontinence briefs, and sanitary products.⁵⁹ The majority of these products can be purchased from pharmacies.

Pharmacists are therefore essential to a community’s access to medications and health supplies during disasters but need to be supported by legislation, in order to best support affected individuals. There is sometimes a disconnect between what legislation allows and what is needed to ensure continuity of care for disaster-affected individuals regarding pharmacy services.

Pharmacists are governed by the pharmacy regulatory agency as well as national pharmacy legislation and in some countries state legislation. In a disaster, pharmacists also can come under disaster management arrangements. In Australia, pharmacists’ activities are overseen by the Australian Health Practitioner Regulation Agency (AHPRA). There is national legislation²¹¹ as well as state based legislation²⁵⁹ which govern Australian pharmacists (Figure 12). Disaster management in Australia has a unique partnership and shared responsibility between local, state, and national governments, the private sector, businesses, industry, NGOs, community groups, volunteers, and the community.²⁶⁰ In the immediate aftermath of a disaster, disaster management heavily relies upon local and state resources for the first-line response.²⁶⁰

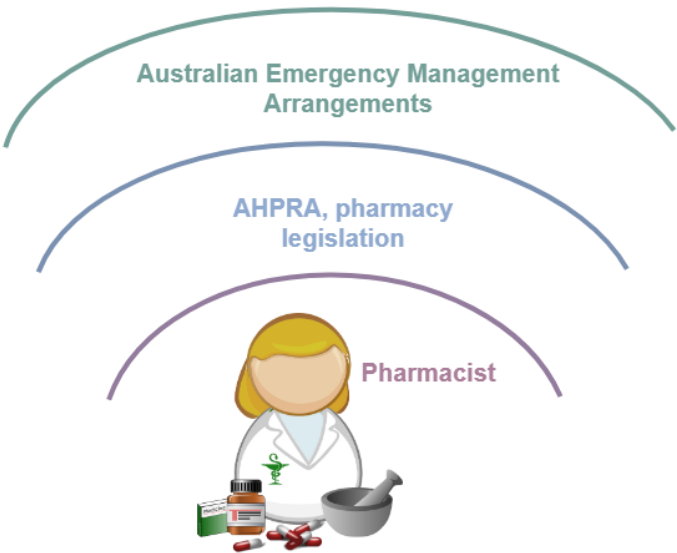


Figure 12: Schematic of legislation which governs Australian pharmacists in a disaster
*AHPRA - Australian Health Practitioner Regulation Agency

The three areas within pharmacy legislation (emergency supply, vaccinations, relocation/mobile pharmacies) available to support pharmacists in additional roles in disasters will be discussed in detail.

4.2.1 Emergency Supply Rule

Some countries allow pharmacies to assist in short term emergencies to ensure the continuity of medication supply by utilising a three-day emergency supply rule. In circumstances where not supplying a medication could lead to harm and the pharmacist is unable to contact the prescriber for authorisation, pharmacists are able to give a patient three-days' supply of their regular ongoing medication or a single dosing unit (i.e. insulin pens, inhalers, creams). This supply is paid for outside of any federally funded medication benefit scheme like the PBS in Australia. Therefore, the entire cost of the medication is funded by the patient with no government subsidy. The period of three days is to cover weekends and public holidays to allow patients time to arrange a physician's appointment for a new prescription.^{261,262} It is believed pharmacists providing an emergency supply of medication may aid patient adherence, as it reinforces to the patient the importance of the medication and regular dosing.²⁶¹

A clinical audit of community pharmacies in England found patients most often accessing the emergency supplies from pharmacies were the elderly population for long-term chronic disease medications.²⁶¹ The reasons given for needing the emergency supplies related to the inability to get an appointment to see their doctor to obtain a prescription especially over weekends and public holidays.²⁶¹ Pharmacists were seen as alleviating the burden on the healthcare system, including after-hours GPs and hospitals, by providing continuation of therapy for these patients.²⁶¹ However, this three-day emergency supply rule is not generally feasible in the event of a disaster as typically disaster events and the time it takes for the community services to resume can last longer than three days. In recognition of this, some states in the US have adopted legislation specific to state-declared disasters. This legislation allows for a longer emergency supply to be provided by pharmacists (some states and provinces allowing up to 30 days' supply).^{262,263} This provision therefore allows pharmacists to treat and manage chronic disease patients requiring medication refills

reducing the risk of acute complications. Enabling pharmacists to manage low-acuity patients frees up physicians' time to focus on high-acuity patients and reduces the pressure on overcrowded EDs.

4.2.2 Vaccinations

In 2016, the WHO listed over 26 infectious diseases which could be prevented with the effective use of a vaccine.²⁶⁴ Improved access to vaccination services and building on the public's trust are seen as ways to increase the uptake of vaccinations for preventable diseases.²⁶⁴ In many countries, pharmacists are able to administer vaccinations as part of their daily practice, thereby increasing the community's access to the service and raising the community's herd immunity. This provides convenient access for the general public, as they do not need an appointment to see a pharmacist. It has been reported that pharmacy-led vaccination services increases vaccination rates, especially in those who have previously not been vaccinated.²⁶⁵⁻²⁶⁷ Carers, healthcare professionals, and those within the workforce are the largest groups utilising pharmacies for their vaccinations.^{265,266}

In a state-declared emergency, different vaccinations may be required for affected patients (e.g. tetanus, pertussis, measles, and influenza vaccinations). In a pandemic or bioterrorism event, prophylactic or treatment vaccinations might be required for the mass populations (e.g. pandemic influenza vaccine, antidote). Including pharmacists in the point-of-dispensing (POD) teams as vaccinators significantly increased the number of people able to be vaccinated within 48 hours following a simulated bioterrorism threat in a hospital study using annual flu vaccinations.²⁶⁸ The expected target population the POD teams needed to vaccinate within 48 hours of the simulated threat could not be reached until pharmacists were added to the team as vaccinators, increasing the healthcare resources available.²⁶⁸ However, the ability for pharmacists to contribute in a disaster by assisting with mass vaccinations varies substantially depending on the country or state the pharmacist is registered to practice in. At the time of this research in Australia, pharmacists are allowed to vaccinate adults and only a limited number of intramuscular vaccines depending on the state legislation (e.g. pertussis, influenza, and the measles, mumps and rubella vaccine).^{269,270} In the US, some states allow for any vaccine to be

administered by pharmacists and some allow pharmacists to vaccinate children as young as three. In Canada (depending on the province), pharmacists can administer intramuscular vaccinations as well as subcutaneous vaccinations.²⁷¹

Pharmacy legislation regarding vaccination rules varies across countries and can be unclear. It raises the question, “Does the legislation which allows a pharmacist to administer a seasonal influenza vaccine extend to allow pharmacists administer a specific influenza vaccine during a pandemic?”²²⁰

4.2.3 Relocation and Mobile Pharmacies

In a disaster a pharmacy’s premises may be damaged and not be safe for operations. However, this does not mean the pharmacy staff cannot assist their communities. There are two options for pharmacists to continue operating their pharmacy:

- 1) suspend their licence and temporarily relocate their premises to a new facility usually for no longer than six months, or,
- 2) take mobile pharmacies into a disaster zone operating under the licence of a nearby premise.

Some countries, or states within countries (e.g. Australia), have legislation that allows for pharmacies to temporarily relocate (usually up to six months) to continue providing services until their premises are operational again (Appendix A). In contrast, others (e.g. US) have legislation focus on the operation of temporary mobile pharmacies (Appendix A). Both options need to meet certain legislative requirements and involves coordination between the pharmacist and the regulatory body.

Most of the published research to-date exploring pharmacists’ roles in disasters has been conducted in the US. Investment in disaster research and building health resiliency into communities became of increasing interest after the terrorist attacks in 2001.¹⁹⁷ There is currently no research in Australia reviewing pharmacy legislation relevant to disasters and disaster management.

4.2.4 US Findings

In 2014, a review was conducted of the pharmacy legislation in US states pertaining to the emergency supply rule. This review, concluded that for a response to be adequate in a disaster the emergency supply period needed to be greater than three days.²⁶² In 2014, more than 50% of US states did not have specific disaster emergency supply legislation in place.²⁶² Following the devastating events of the Gulf Coast storms in 2005, and the 9/11 terrorist attacks in 2001, the US National Association of Boards of Pharmacy (NABP) convened a task force to develop a pharmacy emergency preparedness and response plan guide for the US State Boards of Pharmacy.²⁷² The NABP Model Rules for Public Health Emergencies (Table 3) are suggestions on how the US State Board of Pharmacy can enact legislation to allow pharmacies to respond in the immediate and long-term recovery following a disaster. The long-term recovery could be as short as 30 days, 12 months, or longer.²⁷³ The NABP suggested pharmacies have policies and procedures in place for the storing and dispensing of medications during a disaster and reporting the occurrence of a disaster to the board within 10 days – similar to a BCP.²⁷³

A content analysis on the uptake by US NABP's suggested rules by states was performed in 2015.²⁶³ Out of 54 states, zero NABP rules were adopted by 20 states and one state had adopted all of the NABP rules.²⁶³ The most common two rules adopted by states were pharmacies should have a reporting procedure for disasters to the board within 10 days and the allowance of out of state pharmacists and pharmacy personnel to practise in the affected state during the disaster.²⁶³

Table 3: The six US national association of boards of pharmacy (NABP) rules for public health emergencies.²⁷³

1	Pharmacists may dispense emergency drugs following an emergency prescription drug order, provided where possible a prospective drug regimen review is obtained, and records are kept
2	a) Pharmacists may dispense an emergency refill of a prescription drug up to 30 days' supply, informing the patient it is without their physician's authorisation b) Pharmacists may initiate or modify a patient's drug therapy until they can be seen by their physician, utilising current evidence-based standards of care

	c) Pharmacists cannot incur any liability because of actions taken in (a) or (b) during a disaster event
3	Pharmacists, Dispensary Technicians, Pharmacy Interns or Wholesalers not licensed in the state experiencing a disaster but currently licensed in another state, may dispense in areas affected by the disaster if engaged in relief efforts
4	Pharmacies affected by the disaster or coming to assist relief efforts in a disaster, can apply to temporarily relocate to a temporary pharmacy or a mobile pharmacy located in the disaster-affected areas
5 ^a	Pharmacies directly impacted by disaster should record drug inventory losses, disposing of them correctly
6 ^a	Pharmacies should contact and notify the nearest Drug Enforcement Agency of any drug theft as a result of the disaster

^a Rule 5 and 6 were comments in the Emergency and Disaster Preparedness and Response Planning: A Guide for Boards of Pharmacy and have been included here as rules.²⁷³

In 2014, a survey was conducted, of US State Boards of Pharmacy on the uptake of NABP suggested rules into pharmacy disaster legislation.²⁰¹ Of the 18 boards which responded, 16 allowed for the temporary establishment of mobile/temporary pharmacies and nine allowed for emergency refill supplies to be dispensed more than once by a pharmacist.²⁰¹

4.2.5 Significance

To-date, reviews and content analyses have focused on the US and the state-based variances regarding emergency pharmacy legislation. This review was conducted because at the time there was little published literature on where advances in expanding pharmacists' roles in a disaster have occurred and which countries lag behind in preparing their pharmacy workforce for disasters.

There has also not been any published literature on the potential relationship between the number of disasters a country or state experiences and their level of preparedness. That is, if a state in a particular country experiences more disasters than another state, are they more likely to have disaster emergency pharmacy legislation?

4.3 Aim and Objectives

The aim of this study was to update and expand previous research on current emergency pharmacy legislation allowing expanded roles for pharmacists to assist in disasters. The first research objective was to address a gap in the research by comparing emergency pharmacy legislation in five countries - Australia, Canada, US, UK, and NZ. The second research objective was to investigate if there was a relationship between the number of disasters a state/territory/province or country has experienced in the last five and 10 years and whether they have emergency pharmacy legislation. The following research hypotheses were tested with the null hypothesis for each being there was no relationship or association between the variables.

- 1) H_1 = There is a relationship between a state/territory/province or country having state-declared specific emergency supply/refill legislation and the state/territory/province or country having other pharmacy emergency legislation
- 2) H_1 = There is an association between the number of disasters a state/territory/province or country experienced in the last 10 years and the presence of any disaster specific pharmacy legislation (emergency supply, vaccination or temporary relocation)
- 3) H_1 = There is an association between the number of disasters a state/territory/province or country experienced in the last 10 years and the presence of disaster specific pharmacy emergency supply/refill legislation
- 4) H_1 = There is an association between the number of disasters a state/territory/province or country experienced in the last five years and the presence of any disaster specific pharmacy legislation (emergency supply, vaccination or temporary relocation)
- 5) H_1 = There is an association between the number of disasters a state/territory/province or country experienced in the last five years

and the presence of disaster specific pharmacy emergency supply/refill legislation

4.4 Methods

4.4.1 Data Collection

4.4.1.1 Pharmacy Legislation

Pharmacy legislation in the US is state based, state and territory based in Australia, is provincially and territory based in Canada, and nationally based in the UK and NZ. The legal documents pertaining to pharmacy were reviewed for 51 states of the US (including District of Columbia), 13 provinces and territories of Canada, eight states and territories of Australia, UK, and NZ (Appendix A tabulates the specific legislation for these 74 legal documents from the five countries). Pharmacy legislation was reviewed for emergency supply/refill rules, both under normal circumstances (typically referred to as ‘three-day emergency supply’) and disaster-specific emergency supply rules (quantity greater than normally allowed). Data on disaster-specific legislation regarding vaccinations and temporary relocation or mobile pharmacies were also collected.

4.4.1.2 Disaster Frequency

A list of disasters for each of the states or countries was obtained from several sources to cross-reference with the relevant legislation for the period 2007-2017. The time period of 10 years was initially used to account for the fluctuations in partisan attention, spanning multiple political terms in each country. This allows for the lengthy time it takes to get legislation passed in the different parliamentary systems within the countries of interest. Data were collected on disasters in each country for the last five years as a comparison, to determine if there was a difference in a single political cycle (or two) depending on the country. Data was collected for both five years and ten-year periods to identify any changes with the increasing uptake of pharmacists into public health roles including disasters in the last few years.

The disaster data for the UK and NZ were obtained from the EM-DAT.³⁸ However, the CRED EM-DAT database could not be used for comparison across all the countries included in this study. This is as the database does not analyse disasters

at the state level, but rather, provides data on disasters at a country and continent level. Therefore, those countries with state-based legislation required a different disaster database source. Information on US state-declared disasters was obtained from a US database provided by the Federal Emergency Management Agency (FEMA) website.²⁷⁴ The list of disasters for each Canadian province was obtained from the Canadian government's Canadian Disaster Database.²⁷⁵ Information on Australian state disasters was obtained from the Australian Institute for Disaster Resilience (AIDR) Knowledge Hub DisasterMapper.²⁷⁶ As there is no universal definition of a disaster, each database uses a slightly different definition.²⁷⁷⁻²⁸⁰ The major difference in the disaster definitions that were used, was the FEMA database recorded major declared disasters. This involved a government representative or governor declaring the local area or state a disaster.

4.4.2 Data Analysis

The data obtained from the pharmacy legislation documents and the disaster databases were entered into the IBM® SPSS® Statistics software Version 25. Descriptive statistics were used to describe the data for the number of countries or states had state-declared, specific, disaster pharmacy legislation and the number of disasters each experienced in the last five and 10 years. The number of disasters a country or state experienced were separated into four categories based on the percentiles from the respective ranges of the datasets - five years and 10 years, providing ordinal data.

Pearson's chi-squared test of independence was performed to determine the relationship between disaster specific emergency supply legislation and other forms of disaster pharmacy legislation (normal everyday supply rule, vaccination, and temporary relocation/mobile pharmacies). This statistical test was also used in a 2x2 table to determine if a relationship existed between having the normal three-day emergency supply rule and other disaster specific pharmacy rules or the relationship between the different disaster pharmacy legislation. These variables were dichotomous – 'yes' the legislation existed or 'no' the legislation did not exist in that legal document. Where the assumptions of the Pearson's chi-squared test of

independence were not met with the expected cell count number, Fisher's exact test statistic was used to report.

A binary logistic regression test using a generalised estimating equation (GEE) was used to test the association between the number of disasters experienced by a country or state and whether that country or state had disaster-specific emergency supply legislation. The same GEE binary logistic regression test was used to test the association between the number of disasters experienced by a country or state and whether they had pharmacy disaster vaccination legislation and relocation/mobile pharmacies legislation, respectively. These GEE models described above were simulated in the IBM® SPSS® Statistics software Version 25 for the disaster variables - 10 years and five years, producing six different models.

4.4.3 Assumptions

With logistic regression there is an assumption of independence of variables. However, there may have been within-variable correlations due to the different levels of government which regulate pharmacy legislation. Therefore, a GEE model was used to cluster data for the states/provinces/territories within countries and to overcome this model violation. The smallest cluster was one and accounted for the countries with national legislation in the UK and NZ. The largest cluster was 51 accounting for the US which has different pharmacy legislation in each state. The assumptions of no outliers and dichotomous dependent variables were met.

4.5 Results

Appendix A provides the raw data collected for each state, province, territory and country.

4.5.1 Comparing Legislation by Countries

There were 74 data points in NZ, Canada, UK, Australia, and the US data. Table 4 depicts the frequency of discovering disaster specific pharmacy legislation within each of the data points based on country profile.

Table 4: Specific disaster pharmacy legislation for the five countries included in the study at the different state and national levels.

	Country											
	US (n=51)		Australia (n=8)		NZ (n=1)		UK (n=1)		Canada (n=13)		Total (n=74)	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Everyday emergency supply	17	34	0	8	0	1	0	1	2	11	19	55
Disaster specific emergency supply	34	17	7	1	0	1	0	1	2	11	43	31
Vaccination legislation specific to disasters	46	5	8	0	1	0	N/A		7	6	62	11
Temporary relocation or Mobile pharmacies	44	7	0	8	0	1	0	1	13	0	57	17

US – United States, NZ – New Zealand, UK – United Kingdom

The everyday ‘three-day emergency supply’ rule was found in 74.3% (55/74) of all the countries’ pharmacy legislation. Only 41.9% (31/74), of the country/state legislations had extended this ‘three-day emergency supply’ rule to disaster-specific circumstances by increasing the quantity of supply to cover the extended delay in resuming normal services. Disaster-specific vaccination rules were found in 14.9% (11/74) of the countries’ legislations. Disaster pharmacy temporary relocation/mobile pharmacy legislation was only found in 21.9% (16/73) of countries’ legislations.

Figure 13 illustrates the percentage of countries which had some form of disaster-specific pharmacy legislation (including either disaster-specific emergency supply, vaccination, or relocation/mobile pharmacies). The US had almost as many states with no disaster pharmacy legislation as states that have at least one piece of disaster pharmacy legislation. There are a few provinces in Canada which do not have disaster pharmacy legislation. Australia, NZ, and the UK all have at least one piece of disaster pharmacy legislation (Figure 13).

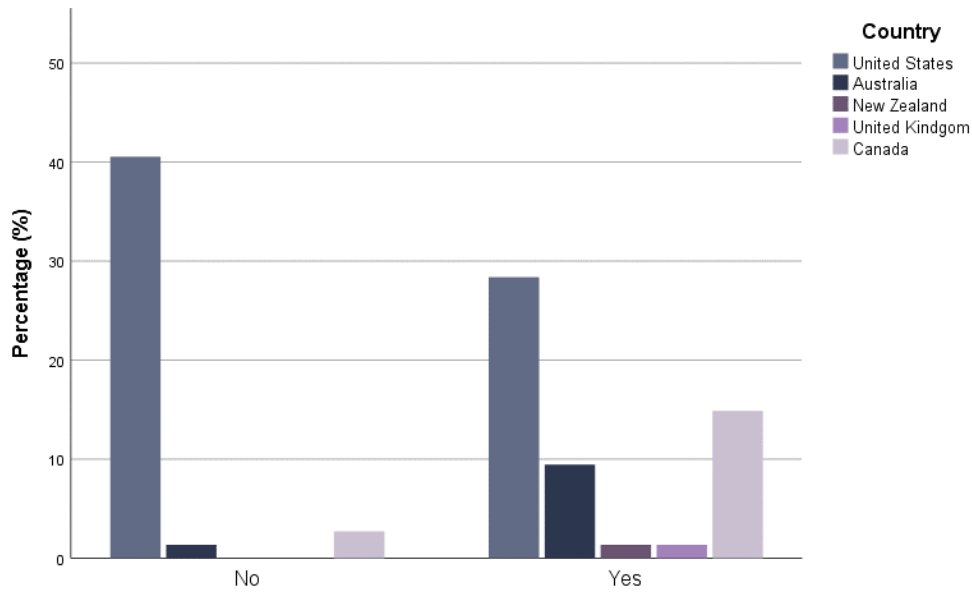


Figure 13: Does a country have any form of disaster specific pharmacy legislation (emergency supply, vaccination, or temporary relocation/mobile pharmacies)

Canada had the greatest uptake and Australia had the lowest uptake of the disaster-specific emergency supply rule, extending the number of days of medication supply allowed in disasters (Figure 14). The US and Canada have some states and provinces with and some without the disaster-specific legislation.

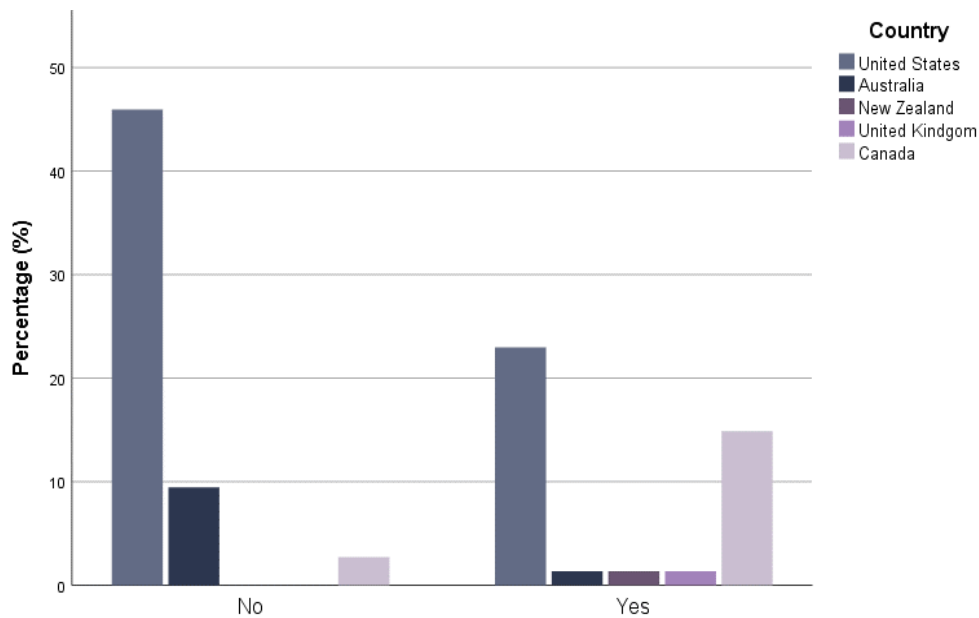


Figure 14: Does a country have disaster-specific pharmacy emergency medication supply legislation

There is a relationship between the presence of the extended disaster specific emergency supply legislation and everyday emergency supply legislation ($\chi^2_1 = 7.16$, $p = 0.007$). There was also a relationship between the presence of disaster specific

emergency supply legislation and disaster specific vaccination legislation (Fisher’s exact test $p= 0.04$). There was no relationship found between disaster emergency supply legislation and the relocation/mobile pharmacies legislation ($\chi^2_1 = 1.59, p= 0.21$).

4.5.2 Comparing Legislation and Disasters

The number of disasters experienced in the last 10 years (2007-2017) by each country included in the analysis (Figure 15) used the interquartile range to determine the disaster categories. Four of the five countries included in the analysis have had over 22 disasters within the last 10 years. Each country has experienced one or more disasters. This trend was replicated in the five-year analysis period (2013-2017) with the distribution of disasters in each country for the five-year period being similar to that of the 10-year dataset. Four of the five countries had experienced more than nine disasters between 2013-2017.

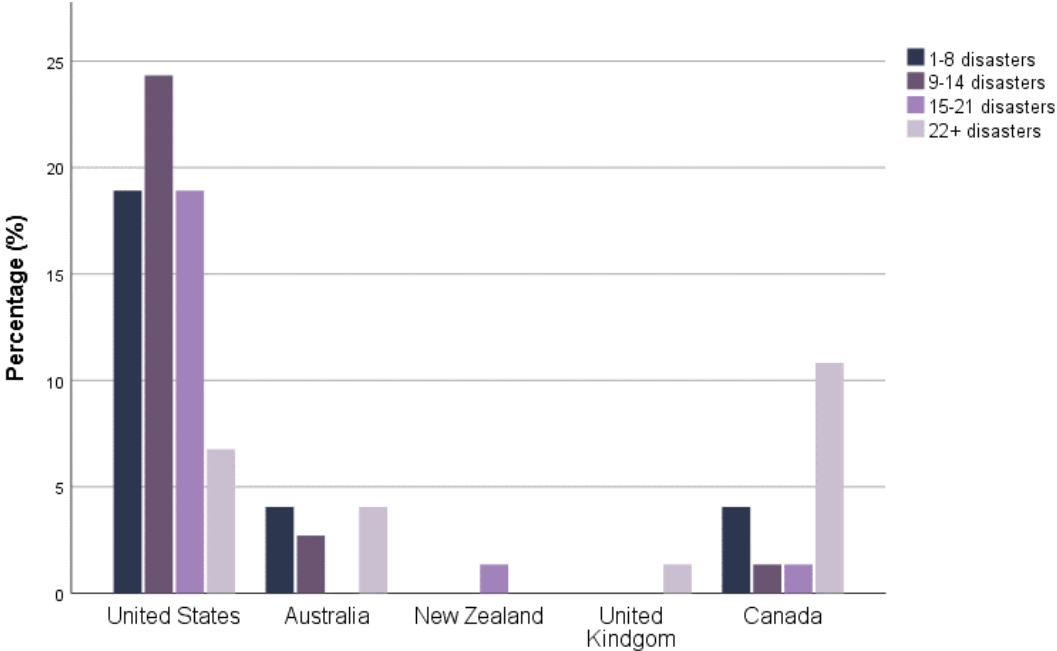


Figure 15: Number of disasters experienced in the last 10 years (2007 to 2017) by each of the five countries included in the study

Each disaster specific pharmacy legislation was tested for an association with the number of disasters experienced by the state or country in the last five years and in the last 10 years (Table 5) using a GEE binary logistics regression.

Table 5: Six GEE binary logistic regression models for disaster specific pharmacy legislation in five international countries

Model	Variables	B=	Standard Error	Wald chi-square (95% CI)	Degrees of Freedom (df)	P value	Exp(B) (95% CI)
*Model 1	10 years, Disaster specific emergency supply	0.46	0.17	7.48 (0.13 - 0.78)	1	<0.01	1.58 (1.14 - 2.19)
*Model 2	5 years, Disaster specific emergency supply	0.58	0.06	89.58 (0.46 - 0.70)	1	<0.01	1.78 (1.58 - 2.01)
Model 3	10 years, Disaster specific vaccination legislation	0.01	0.27	<0.01 (-0.51 - 0.53)	1	0.96	1.01 (0.60 - 1.70)
Model 4	5 years, Disaster specific vaccination legislation	-0.06	0.21	0.08 (-0.47 - 0.35)	1	0.78	0.94 (0.62 - 1.42)
Model 5	10 years, Disaster specific relocation/mobile pharmacy legislation	-0.01	0.11	0.59 (-0.03 - 0.01)	1	0.44	0.99 (0.97 - 1.01)
*Model 6	5 years, Disaster specific relocation/mobile pharmacy legislation	0.05	0.02	6.92 (0.01 - 0.09)	1	0.01	1.05 (1.01 - 1.09)

*Model 1, 2, and 6 are statistically significant at p value <0.05.

Model 1 and Model 2 propose there is an association between the previous 10 (2007-2017) and five years (2013-2017) of disasters respectively, experienced by a country and the presence of disaster specific emergency supply legislation (greater than the typical everyday 'three-day emergency supply'). These models suggest the odds of a country with a higher number of disasters in the last 10 years is 1.58 times more likely to have disaster specific emergency supply legislation than a country with a lower number of disasters for the same time period (OR=1.58, p<0.01 (95%CI: 1.14 - 2.19)). This was found to be the same case in the five years dataset, with the odds increasing by 1.78 times for countries with a higher number of disasters having

disaster specific emergency supply legislation than countries which had experienced fewer disasters in the last five years (OR=1.78, $p<0.01$ (95%CI: 1.58 - 2.01)).

Model 6 predicts there is an association between the number of disasters a country has experienced in the last five years (2013-2017) and the presence of disaster-specific pharmacy relocation/mobile pharmacy legislation. As the number of disasters increases the odds of having disaster specific pharmacy relocation/mobile pharmacy legislation increases by 1.05 times ($p=0.01$ (95%CI: 1.01 – 1.09)).

The other models (Model 3, Model 4, and Model 5) showed no significant association between the number of disasters experienced by a country and the presence of the respective disaster pharmacy legislation (Table 5).

4.6 Discussion

There is an expectation from communities that they are able to rely on pharmacies and pharmacists during disasters especially when hospitals are overcrowded, and community services are disrupted. Often, disaster-affected individuals will request general health items (i.e. nappies, oral rehydration, tampons, water, and toiletries) as well as medications as they have evacuated with nothing but the clothes on their backs – no identification, money, or prescriptions.⁵⁹ This places community pharmacies in a difficult position as they are often not compensated for providing these services free of charge to the disaster-affected community.¹³⁵

It is imperative that government legislation supports the roles of pharmacists to ensure the continuity of care and supply of medications in times of crisis. Depending on which country or state the disaster occurs in, the legal restrictions on pharmacists to render assistance to their community changes. Some countries allow pharmacists to supply an increased quantity of the everyday emergency supply or refill rule (commonly known in most places as the emergency three-day supply rule) of ongoing chronic disease medications.²⁶² However, in 2014, more than 50% of US states did not have disaster-specific emergency supply legislation in place.²⁶² This is still the case four years later with 66.67% still not having specific legislation.

This research demonstrated a relationship between everyday emergency supply legislation and other disaster pharmacy legislation. This is not surprising as

most countries or states with disaster-specific legislation have worded their legislation to be an extension of the existing legislation. This is typically the case for declared disasters with the 'three-day emergency supply' rule being extended to increased quantities. Following Hurricane Katrina in Alabama State, US, when the hurricane was labelled a state-declared disaster, pharmacists were then able to provide evacuees increased quantities of emergency medication supplies to help alleviate the burden on the healthcare system.^{70,202}

The inclusion of pharmacists in POD teams as vaccinators for mass dispersal of treatment and prophylaxis following a disaster event, significantly increases the health resources available enabling achievable outcomes in the quickest possible time.²⁶⁸ However, legislation allowing pharmacists to assist in providing disaster-specific vaccinations to the community in a disaster, pandemic or bioterrorism event to ensure timely access was only found in 14.9% of legislations reviewed. Many states and countries have recognised pharmacists' roles in providing vaccinations for the annual seasonal influenza vaccine and routine vaccines (i.e. pertussis, influenza, measles/mumps/rubella).^{265,267,270} However, the legislative wording is unclear as to whether it covers the extension for pharmacists vaccinating in a disaster (e.g. pandemic influenza or a bioterrorism event).²²⁰

This research demonstrated, the odds of a country or jurisdiction having disaster relocation/mobile pharmacy and disaster-specific emergency supply legislation in place increases as the number of disasters increases. However, this is likely to be only one of many contributing factors influencing the political decisions of when and what legislation is passed in relation to pharmacists' roles in disasters. Countries that were included in this study had to have pharmacy legislation that was accessible publicly online and written in English. This limited the number of countries that were able to be included in the analysis.

4.7 Conclusion

It is evident from this disaster pharmacy legislation review, that there are inconsistencies as to the level of assistance pharmacists can provide during times of crisis depending on their country and location of practice. It is not a question of whether pharmacists have the skills and capabilities to assist, but rather, what legislative barriers are holding them back from being able to contribute to the disaster healthcare team.

Chapter 5: Surveys with Disaster Health Stakeholders

This chapter presents the findings of a survey of international and Australian disaster health professionals which explored the roles of pharmacists in disasters. Section 5.1 introduces the study with the literature review in Chapter 2 forming the background. The questionnaire used in this survey was developed with the pharmacists' roles coming from the literature. Section 5.2 outlines the aims and objectives and Section 5.3 describes the methods used. Section 5.4 presents the results of the study and Section 5.5 discusses the significance of the findings and posits these within the literature. Section 5.6 presents key findings and conclusions.

5.1 Introduction

It is acknowledged there is a shortage of physicians and GPs to provide healthcare services to the community; they are under-resourced for the increasing demand placed on the healthcare system.^{281,282} Extending pharmacists roles can assist in alleviating this burden.^{281,282}

In 1981, physicians were surveyed on their opinion of pharmacists undertaking clinical roles.²⁸³ Younger physicians who worked more closely with clinical pharmacists could see the value in collaborative practice with pharmacists to optimise patient care.²⁸³ However, older physicians who typically wrote more prescriptions were not as receptive to pharmacists providing their expertise and input.²⁸³ The more prescriptions a physician wrote in a day the less likely they were to seek the advice of a pharmacist.²⁸³ The authors of this study hypothesised that these findings may have been because older physicians perceived the expansion of pharmacists' clinical roles as a threat to their autonomy.²⁸³ However, the physicians who utilised a clinical pharmacist's expertise and services were more receptive to collaboratively working with pharmacists.²⁸³ A more recent study in 2009, found family physicians believed it was a joint responsibility of physicians and pharmacists

to assist patients with medication adherence.²⁸⁴ However, physicians were found not to communicate with pharmacists on the matter.²⁸⁴

Physicians were found to be more likely to be in favour of pharmacists' roles in patient counselling, education, therapeutic drug monitoring, and providing their expertise on therapeutic substitutions as oppose to pharmacists' roles undertaking autonomous decision-making (e.g. prescribing).²⁸⁵ In a study of physicians' expectation of pharmacists conducted in 2002, it was discovered physicians are not sure what to expect of pharmacists but they do expect pharmacists to be knowledgeable and experts on medications.²⁸⁵ Younger physicians (less than 10 years since graduating) have higher expectations of pharmacists than physicians with more experience.²⁸⁵ Physicians are not strongly adverse to pharmacists being more directly involved in patient care with clinical roles, but were also not necessarily found to be strongly in favour either.²⁸⁵ A study conducted in 2006 found many community pharmacists were not participating as members of interprofessional teams.²⁸⁶ Pharmacists who identified themselves as interprofessional team members believed physicians were less protective of their 'turf' and valued their input.²⁸⁶ This was in comparison to pharmacists who were not members of interprofessional teams and were of the opinion physicians were protective of their 'turf'.²⁸⁶

In a review conducted in 2017, pharmacists perceptions of their own abilities to extend their roles into pharmacy practice were considered positive.²⁸⁷ They believe new roles could have benefits for the profession and patients.²⁸⁷ It was suggested better collaboration between healthcare professionals can increase the positive attitudes to overcome barriers to pharmacists' expanded roles,²⁸⁷ and this might extend to an expanded clinical role in disasters. A study of pharmacists' opinions of their level of involvement in emergency preparedness and response found pharmacists believed they played an important role in emergency response.²²⁹ Pharmacists also appear willing to assist their communities during disasters. The study's authors suggested a number of roles pharmacists could provide to assist in the emergency response:²²⁹

- supplying medications to patients,
- mobilising pharmacy services,

- providing emergency medication supplies,
- administering vaccinations,
- providing information to the community,
- partaking in community preparedness and planning, and
- providing patient education and counselling.

Currently in disaster management a pharmacist's role is primarily logistics-based and fails to utilise the full extent of a pharmacist's knowledge or skill set.^{106,177} However, pharmacists have begun undertaking these types of additional roles (mentioned above) in disasters in a sporadic *ad-hoc* nature when disasters affect their own communities.^{71-74,111,203-205} However, it is not known whether the disaster health community are willing to accept pharmacists in these roles as members on disaster health management teams.

Pharmacists provide essential services to the community, especially as they are the most easily accessible healthcare professional available.^{16,133,198,199} However, policy and legislation restrict the services pharmacists can provide.²⁸⁸ This is partly due to the fact pharmacists are often not recognised as a healthcare provider or practitioner.²⁸⁸ Without this healthcare provider or practitioner status in countries where pharmacists provide healthcare services, pharmacists currently have no reimbursement mechanism from local, state, or national governments. Giberson et al.²⁸⁸ suggested

"...pharmacists may be the only health professionals (who manage disease through medications and provide other patient care services) who are not recognized in national health policy as health care providers or practitioners."^{288 (p.8)}

This creates problems when they supply essential services, pharmacy-related supplies, and medications to members of the community who are unable to pay in a disaster.^{135,288}

5.2 Aim and Research Questions

This research study will begin to provide the evidence needed to address this question of where do pharmacists fit in relation to disaster management? It sought to address the lack of evidence on the utilisation of pharmacists in disaster events. This phase of the research project endeavoured to determine the opinions of both the international and Australian disaster and health professionals working within the disaster health management field regarding the roles of pharmacists in disasters. The following research questions were addressed

- 1) Are there roles for pharmacists in disasters apart from logistics and supply chain management?
- 2) Do the roles pharmacists have performed previously in disasters which are reported in the literature, align with the opinions of the international and Australian disaster management and health professionals regarding the roles they believe pharmacists can undertake during a disaster?
- 3) Is there a difference between the opinions of the Australian and the international disaster health community regarding the roles they believe pharmacists can undertake during a disaster?

5.3 Methods

This phase utilised quantitative methodology and included two surveys, one to an international disaster health community and the other to an Australian disaster health community.

5.3.1 International Survey

5.3.1.1 Study Design and Participant Recruitment

The first survey consisted of a convenience sample of delegates attending the 20th World Association on Disaster and Emergency Medicine (WADEM) Congress in Toronto, Canada from April 25-30th 2017. There were 900 conference delegates representing 60 different nationalities. The international WADEM conference is an English-speaking conference. Survey distribution was limited to the physical

circulation of the survey by two researchers in attendance at the conference. Surveys were randomly distributed to a convenience sample of 222 delegates.

5.3.1.2 Participant Information and Informed Consent

Participant consent was implied with the handing in of the survey to either of the researchers or to the WADEM exhibit stand in the main entrance to the trade exhibition. Delegates were provided with the participant information sheet with the paper survey and confidentiality was ensured by the use of an anonymous survey and collecting no personal identifying information.

5.3.1.3 Data Storage and Security

All data were kept securely on Queensland University of Technology (QUT) hard-wired password protected computers and will be stored for the minimum five years upon successful completion of the dissertation. The hard copies of the surveys were electronically scanned onto a QUT secure computer for storage and then stored in a locked filing cabinet for the necessary data management specified period upon completion of the dissertation.

5.3.1.4 Ethics

This survey was approved by the QUT Health Research Ethics Committee - Approval Number 1700000048.

5.3.1.5 Data Collection

An anonymous survey was developed as there was no existing survey tool available to use to measure the opinions of disaster health professionals on the roles of pharmacists in disasters (refer to Appendix B for survey questions). The survey was pilot tested on academic health professionals before being released at the conference. With the diverse backgrounds of the conference delegates, the survey consisted of 11 questions focussing on the participants' demographic background and the current level of pharmacist involvement in disasters within the participant's home country. The demographic questions gauged the participants':

- gender
- age
- what was their profession?

- were they a registered health professional?
- what country did they currently reside in?
- how many years have they been in their respective profession?
- have they responded in an official capacity to a disaster (natural or anthropogenic) previously?
- how many disasters have they responded to before?
- what type of response they had participated in (local, organised, government, military) previously?
- do they have pharmacists in their country?
- are the pharmacists in their country involved in disaster management?

Participants were asked for their level of agreement on a selection of 11 potential roles for pharmacists to undertake in a disaster. These 11 roles were identified from the literature review, the findings of which are presented in Chapter 2. Answers to each role were obtained using a five-point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree and N/A= not applicable). Participants were also asked their prior knowledge before completing the survey of pharmacists undertaking these roles in disasters. The participants were asked about any additional roles they believed pharmacists could be undertaking in preparing and responding to a disaster. They were also asked to identify any barriers preventing pharmacists from assisting in disasters. These questions were open-ended and generated qualitative data.

5.3.1.6 Data Analysis

The data were entered manually into KeySurvey® (a web-based, survey management tool) and then exported to IBM® SPSS® Statistics Software Version 23. To allow for any missing data, each question was analysed respective to its individual sample size. Descriptive statistics were performed for the survey data. However, no further statistical tests were able to be utilised as the data were heavily skewed to the right, violating assumptions of several tests. The qualitative comments provided were manually coded by the researcher into themes following the coding manual by Saldaña and confirmed by a second researcher.²⁸⁹ The qualitative comments were

quite short snippets of text and were placed into common themes using Pattern coding methods.

5.3.1.7 Measurement Reliability

In the absence of a validated survey tool measuring participants opinions on pharmacists' roles in disasters, an anonymous survey was developed. This survey was pilot tested before being released to the congress delegates.

The five-point Likert scale was tested for internal reliability using Cronbach's alpha reliability statistic. The Cronbach's alpha was 0.79 indicating a relatively high level of internal consistency.

5.3.2 Australian Survey

5.3.2.1 Study Design and Participant Recruitment

The Australian survey was emailed to disaster health professionals who were members of the QUT Centre for Emergency and Disaster Management (CEDM) *via* KeySurvey®. The survey was sent on the 26th June 2017 to the QUT CEDM mailing list. There were 446 disaster health professionals who received the email. There was no Australian comparative conference to the WADEM conference which incorporated both the disaster community and the health community to utilise as a convenience sample.

5.3.2.2 Participant Information and Informed Consent

Participant consent was implied with the completion of the online survey. The participant information sheet was the first screen on the online survey for the participants to read before deciding to complete the survey. Confidentiality was ensured by the release of the survey *via* KeySurvey® and the software collected no personal identifying information.

5.3.2.3 Data Storage and Security

The survey was completed online *via* KeySurvey®. All data were kept securely on QUT hard-wired password protected computers and will be stored for the minimum five years upon successful completion of the dissertation.

5.3.2.4 Ethics

This survey was approved by the QUT Health Research Ethics Committee - Approval Number 1700000106.

5.3.2.5 Data Collection

The Australian survey contained the same questions as the international survey previously discussed however, the demographic questions were slightly different to reflect the community being surveyed (refer Appendix B for survey questions). The country related questions were removed, and participants were asked what state they currently reside in. Participants were provided with the same five-point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree, and N/A= not applicable) used in the international survey, asking for their level of agreement on the 11 potential pharmacists' roles in disasters. Participants were asked their prior knowledge before completing the survey of pharmacists undertaking these roles in disasters. Participants were able to provide qualitative feedback to open-ended questions on any additional roles, they believed pharmacists could be undertaking in the PPRR phases of disaster management and any barriers preventing pharmacists from assisting in disasters. The Australian participants were also asked an additional question regarding where they believe pharmacists' roles fit within the PPRR cycle.

5.3.2.6 Data Analysis

The survey was released through KeySurvey® and the data were exported to IBM® SPSS® Statistics Software Version 23 for analysis. Each question was analysed separately respective to its individual sample size, to allow for any missing data. Descriptive statistics were performed for the survey data. However, no further statistical tests could be performed as the data were skewed to the right, violating assumptions of several tests. The qualitative comments provided were manually coded by the researcher into themes following the coding manual by Saldaña and confirmed by a second researcher.²⁸⁹ The qualitative comments were quite short snippets of text and were placed into common themes using Pattern coding methods.

5.3.2.7 Measurement Reliability and Validity

The surveyed used in the Australian disaster health population was previously tested in the international population. The demographic questions were changed to reflect the different survey population and the slightly altered survey was pilot tested on Australian academics before being released.

Internal reliability for the five-point Likert scale was tested using Cronbach's alpha reliability statistic. The Cronbach's alpha was 0.85 indicating a relatively high level of internal consistency in this population.

5.3.3 Comparison of Survey Populations

Both sample populations were asked the same questions regarding pharmacists' roles in disasters. The survey results for the two populations were compared to determine if there was a significant difference in opinion between the Australian population and the international population. Chi-squared analysis was performed using either a Pearson's Chi-squared test of independence or where appropriate, a Linear-by-Linear Association test to determine if there was a statistically significant relationship between the two surveyed populations. Statistical significance was set at $p < 0.05$.

5.4 Results

The results for the two surveys will be presented separately and then compared to determine if there is a differing opinion in the Australian disaster health community compared to the international disaster health community. The sample size varies for some survey questions as some of the respondents opted not to answer all questions in the survey.

5.4.1 International Survey

Of the 222 surveys handed out to delegates attending the WADEM Congress, responses were collected from 126 yielding a response rate of 56.8%. Of the 126 participants surveyed, 96.8% (122/126) believed pharmacists had a role in disasters aside from the established role in logistics and supply chain management. The

majority, 87.9% (109/124), went on to state pharmacists' roles in disasters are within their current scope of practice.

The largest group of participants were from Canada, 31.1% (38/122), the Congress host country. Their neighbours, the US had the second largest representation at 23.8% (29/122). In total there were 22 different countries included in the international survey and all the continents (not including Antarctica) were represented (Figure 16).

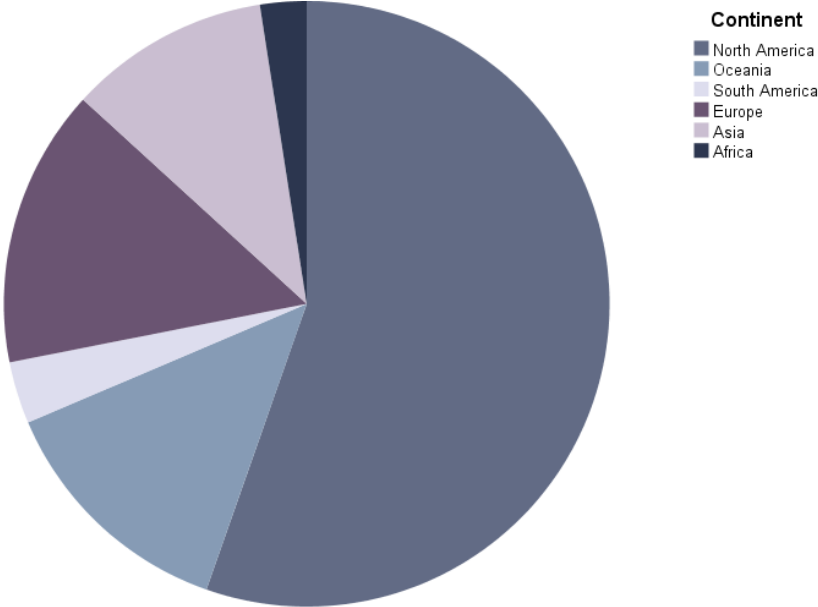


Figure 16: Diversity of the international survey participants attending 20th World Association on Disaster and Emergency Medicine (WADEM) Congress in Toronto, Canada from April 25-30th 2017

Of the participants that responded, 27.7% (33/119) identified as physicians (GPs or emergency physicians), 10.9% (13/119) as nurse practitioners or nurses, 8.4% (10/119) as pharmacists, 4.2% (5/119) were volunteers, 3.4% (4/119) were paramedics or emergency medical technicians (EMTs), 2.5% (3/119) identified with NGOs, 11.8% (14/119) were unable to be classified into one of the above professions, and seven respondents (5.56%, 7/126) chose not to disclose their profession (Figure 17). The 20th WADEM congress was the first to include a specific pharmacy stream dedicated to discussing disaster and emergency medicine matters related to pharmacy.

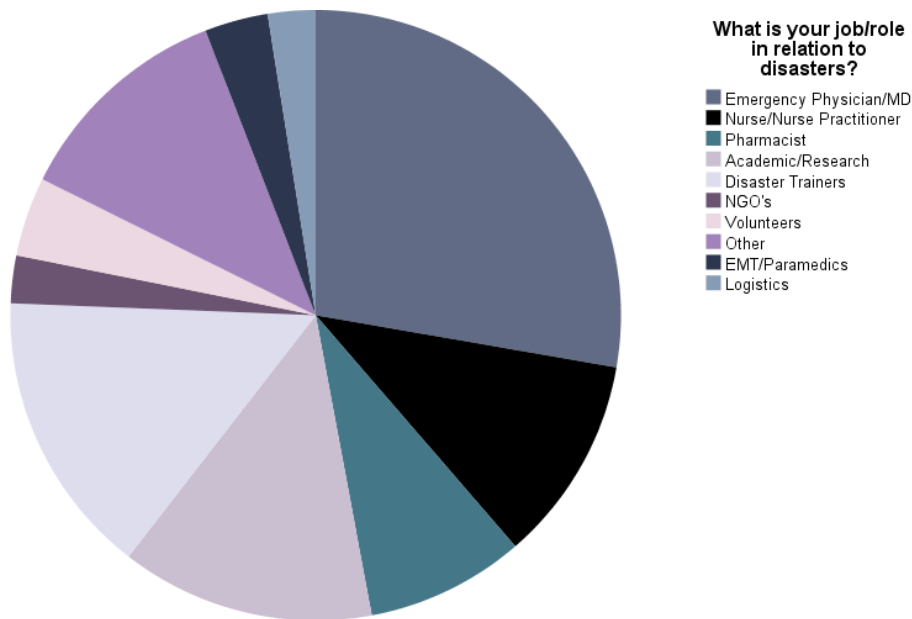


Figure 17: Range of professions of the international participants who participated in the study
 NGO – non-governmental organisation, MD – doctor, EMT – emergency medical technicians

A large proportion, 43.7% (55/126), of respondents have been in their respective profession for 21 or more years (Table 6). Twenty-three participants (18.3%) had five or less years of experience in their respective profession.

Table 6: International participants' years of experience in their respective professions from the survey collected at the WADEM congress

Years of experience in profession	Number of Participants	Percentage (%)
0-5 years	23	18.3
6-10 years	17	13.5
11-15 years	12	9.5
16-20 years	19	15.1
21+ years	55	43.7
Total	126	100

Of the surveyed respondents, 52.4% (66/126) had responded to between one and five disasters in an official capacity in their profession (Table 7). A smaller proportion 7.9% (10/126) had responded to more than 21 disasters, and 17.5% (22/126) of respondents had yet to respond to a disaster in an official capacity in their nominated profession (Table 7).

Table 7: Number of disasters officially responded to whilst working in a professional capacity in their respective professions by the international participants from the survey collected at the WADEM congress

Number of disasters responded to in profession	Number of Participants	Percentage (%)
0 disasters	22	17.5
1-5 disasters	66	52.4
6-10 disasters	12	9.5
11-15 disasters	9	7.1
16-20 disasters	7	5.6
21+ disasters	10	7.9
Total	126	100

Those surveyed were questioned on specific roles for pharmacists in disasters with their answers recorded using a five-point Likert scale. The responses of the five-point Likert scale are depicted in Table 8. Of the listed roles, eight were given a rating of ‘agree and strongly agree’, by over 70% or more of the participants (Table 8). The opinion ratings shown in the table suggest there is overwhelming support from the international disaster health community for pharmacists undertaking more roles in disasters in addition to the established logistics and supply chain management.

Table 8: Disaster and health professional opinion ratings on specific roles for pharmacists in disasters from the survey collected at the WADEM congress

Pharmacists’ Roles	Disagree & Strongly Disagree	Neutral	Agree & Strongly Agree	Total (n=)
Logistics of pharmaceuticals and stockpile management	0 0%	5 4.1%	116 95.9%	121
CPR and assisting in ‘first response’	24 20.3%	42 35.6%	52 44.1%	118
Providing first aid and wound care	23 19.3%	44 37%	52 43.7%	119
Triaging and screening in evacuation centres	35 29.4%	42 35.3%	42 35.3%	119
‘Prescribing’ continuing chronic disease medications	4 3.3%	10 8.3%	107 88.4%	121
‘Prescribing’ vaccinations	5 4.5%	13 11.8%	92 83.6%	110
Administering vaccinations	4 3.5%	12 9.5%	99 86.1%	115

Developing drug algorithms and guidelines to streamline patient diagnosis and treatment options	4 3.4%	15 12.8%	98 83.8%	117
Assist decision-making on health issues in disaster management	6 5%	21 17.6%	92 77.3%	119
Communication advocate between different healthcare professions	9 7.6%	24 20.2%	86 72.3%	119
Educate public on health risks in disasters and those most vulnerable	7 5.9%	19 16%	93 78.2%	119

The ‘first aid/wound care’ role and the ‘CPR’ role for pharmacists in disasters were only moderately in agreement with an ‘agree and strongly agree’ opinion rating by the participants of 43.7% (52/119) and 44.1% (52/118), respectively (Table 8). ‘Triage and screening in evacuation centres’ received equal participant opinion ratings of 35.3% (42/119) ‘neutral’ to 35.3% (42/119) ‘agree and strongly agree’ (Table 8).

More than half (57.1% (68/119)) of the international participants had some prior knowledge of pharmacists undertaking these additional types of roles in disasters.

5.4.1.1 Open-ended Questions’ Responses

Open-ended questions were asked of the participants to gather their insight on other roles pharmacists could be undertaking in preparing and responding to a disaster which may not have been identified in the literature. Participants were also asked what they believed were some of the barriers to pharmacists undertaking roles in disasters aside from the established role in logistics and supply chain management.

5.4.1.1.1 What roles can pharmacists have in preparing for a disaster? What roles can pharmacists play in responding to a disaster?

The participants provided their responses to two open-ended questions regarding what roles they believed pharmacists could be undertaking in preparing for and responding to a disaster. Thematic content analysis of the data was conducted using manual coding methods and the themes developed are presented in Table 9.

Table 9: Common themes identified by the international participants for pharmacists preparing and responding to disasters

Preparing for a disaster	Responding to a disaster
Education	Logistics
Stockpile Management	Medication Management
Logistics	Dispensing
Vaccinations	Included as a Disaster Team Member
	Vaccinations
	Education

Educating patients especially those requiring ongoing medications and/or those with chronic diseases was the most suggested role (Table 9Table 9). Ensuring continuity of care with supply of medications through logistics and medication management was considered the most valued role for pharmacists in the response phase of a disaster. Some of the comments made by participants were as follows:

“...key issue for many [patients/disaster victims] is medication renewal including Methadone/opiate to decrease withdrawal.” [Public health professional from Canada]

“Education. Helping community prepare by ensuring medications always filled, facilitate and encourage vaccination, logistics during response, patient advocate in response, help assist and facilitate pt/md [patient and doctor] relationship. some community response for low acuity patients.” [Canadian physician]

“Logistics/ supply chain management, medicines management, clinical input (triage, assessment, prescribing), educator of public and other healthcare professionals providing expertise in medicines/medicine management and optimisation.” [UK disaster volunteer Pharmacist]

5.4.1.1.2 What are the barriers to pharmacist’s roles in disasters?

Ninety-five participants commented on the barriers to pharmacists being more involved in disasters. The barrier themes identified from the data are listed in Table 10.

Table 10: Barrier themes to pharmacists' roles in disasters identified by the international participants

Barriers to pharmacists' roles in disasters
Funding or reimbursement issues
Insufficient interest from the pharmacy profession
Lack of inclusion as a disaster team member
Lack of pharmacy disaster training or education
Lack of understanding of the value pharmacists can provide in disasters
Legislative constraints
None
Prejudices of other health care professionals

Some participants claimed there should not be any barriers holding pharmacists back from being more involved in disasters, as response is the first and foremost priority. Comments provided by participants were:

"Perception that they [pharmacists] only count pills and have no real medical knowledge. STIGMA." [Australian Academic]

"In my country they are perceived as actual part of the health team, but I don't think they normally include in disaster preparedness plans. There is a belief that disaster preparedness is all about rescue." [South American Disaster volunteer]

"No defined role other than as logisticians and supply chain managers; other health professionals don't know what pharmacists can contribute. This is changing slowly in the UK among aid organisations as some of them recognise the value pharmacists bring." [UK pharmacist]

5.4.2 Australian Survey

There were 446 surveys distributed *via* email to the members of the CEDM mailing list at QUT. Of these, 97 surveys were completed yielding a response rate of 21.7%. Of the participants surveyed, 89.5% (85/95) believed pharmacists had a role in disasters aside from the established role in logistics and supply chain management. The majority, 79.4% (77/97) went on to specify pharmacists' roles in disasters are within their current scope of practice.

Of the 97 Australian respondents, 95 reported what state or territory they resided in at the time of completing the survey (Figure 18). The majority, 66.3% (63/95) were from Queensland (QLD) and 14.7% (14/95) were from New South Wales (NSW). There were 8.4% (8/95) from Victoria, 3.2% (3/95) from South Australia, there was one participant (1.1%) from Tasmania, one (1.1%) from Western Australia, and two participants (2.1%) from the Australian Capital Territory. Three participants (3.2%) were residing overseas at the time of completing the survey.

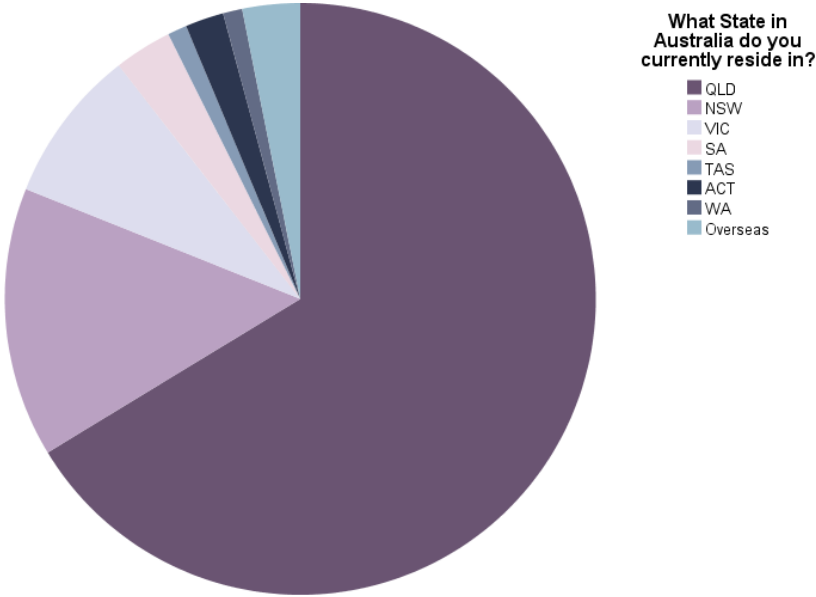


Figure 18: Diversity of the Australian participants involved in the study categorised by state/territory QLD - Queensland, NSW - New South Wales, VIC - Victoria, WA - Western Australia, ACT - Australian Capital Territory, SA - South Australia, TAS - Tasmania

Out of all the Australian participants that responded, 64.2% (61/95) were registered health professionals and 35.8% (34/95) were not registered - data were missing for two participants. Of these 95 participants, 13 participants (13.7%) answered the survey questions from a health background, 36.8% (35/95) from a disaster management background, and 49.5% (47/95) had both a disaster and a health management perspective. Breaking this down further, half of the participants, 50.5% (48/95) had jobs in the health industry, 22.1% (21/95) in the disaster management industry, 16.8% (16/95) in government, 4.2% (4/95) in academia, 3.2% (3/95) in industry, and another 3.2% (3/95) in NGOs (Figure 19).

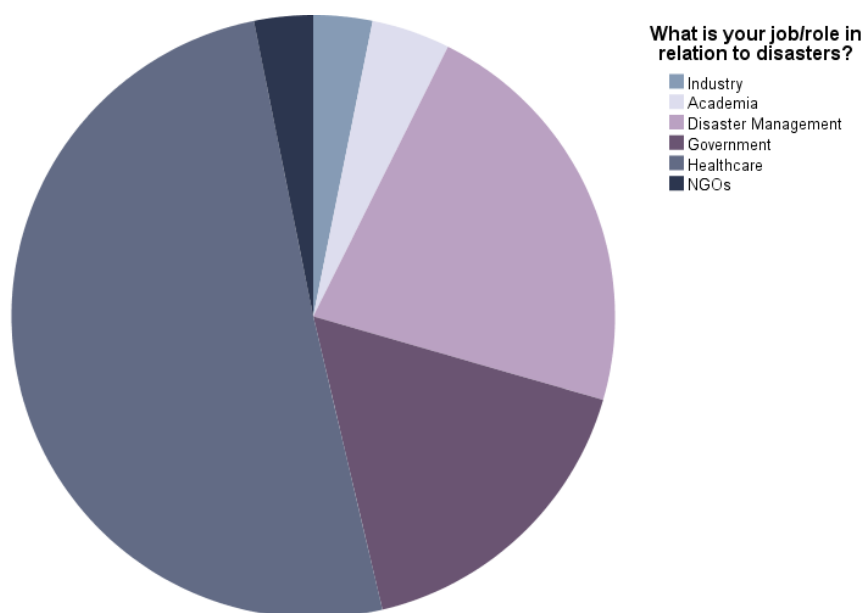


Figure 19: Range of professions of the Australian participants involved in the study in relation to disasters
 NGOs – non-government organisations

There were more males (57.3%, 55/96) than females (42.7%, 41/96), with one participant opting not to disclose gender. The majority of participants, 47.4% (46/97) were over the age of 51 and three participants (3.1%) were between the ages of 21-30 years old. There was an equal number of participants (24/97, 24.7%) in both the age brackets 31-40 years and 41-50 years. The majority of respondents (39.4%, 37/94) have greater than 21 years of experience in their respective professions and seven participants (7.4%) had less than five years of experience in their profession (Table 11).

Table 11: Years of experience in their respective professions of the Australian participants involved in the study

Years of experience in profession	Number of Participants	Percentage (%)
0-5 years	7	7.4
6-10 years	21	22.3
11-15 years	20	21.3
16-20 years	9	9.6
21+ years	37	39.4
Total	94	100

Of those surveyed, 46.3% (44/95) had responded to between one and five disasters in an official capacity in their respective profession, 17.9% (17/95) had responded to over 21 disasters in an official capacity in their respective profession and 10.5% (10/95) have yet to respond to a disaster in an official capacity (Table 12).

Table 12: Number of disasters officially responded to whilst working in a professional capacity in their respective professions by the Australian participants involved in the study

Number of disasters responded to in profession	Number of Participants	Percentage (%)
0 disasters	10	10.5
1-5 disasters	44	46.3
6-10 disasters	9	9.5
11-15 disasters	9	9.5
16-20 disasters	6	6.3
21+ disasters	17	17.9
Total	95	100

The Australian participants were questioned on specific roles for pharmacists in disasters with their responses recorded using a five-point Likert scale. The roles participants were asked to respond to, were the same roles used in the international survey (collated from the literature review). The Likert scale responses are presented in Table 13. Of the listed roles, eight were given a rating of ‘agree’ or ‘strongly agree’, by 68.8% or more of the participants (Table 13). The opinion ratings expressed show an overwhelming support from the disaster health community for pharmacists undertaking more roles in disasters in addition to the established logistics and supply chain management.

Table 13: Australian disaster and health professional opinion ratings on specific roles for pharmacists in disasters

Pharmacists’ Roles	Disagree & Strongly Disagree	Neutral	Agree & Strongly Agree	Total (n=)
Logistics of pharmaceuticals and stockpile management	3 3.1%	1 1%	93 95.9%	97
CPR and assisting in ‘first response’	29 30.2%	40 41.7%	27 28.1%	96

Providing first aid and wound care	25 26%	33 34.4%	38 39.6%	96
Triaging and screening in evacuation centres	39 40.6%	25 26%	32 33.3%	96
'Prescribing' continuing chronic disease medications	8 8.2%	9 9.3%	80 82.5%	97
'Prescribing' vaccinations	9 9.4%	9 9.4%	78 81.3%	96
Administering vaccinations	8 8.6%	11 11.8%	74 79.6%	93
Developing drug algorithms and guidelines to streamline patient diagnosis and treatment options	14 14.6%	15 15.6%	67 69.8%	96
Assist decision-making on health issues in disaster management	8 8.3%	17 17.7%	71 74%	96
Communication advocate between different healthcare professions	10 10.4%	20 20.8%	66 68.8%	96
Educate public on health risks in disasters and those most vulnerable	7 7.2%	14 14.4%	76 78.4%	97

The participants were asked where they believed pharmacists' roles fit within the PRRR phases of disaster management. Only 46.4% (45/97) of the participants, believed pharmacists had a role in the prevention phase. The majority believed pharmacists had roles in the preparedness phase (92.8% (90/97)), the response phase (85.6% (83/97)) and in the recovery phase (84.5% (82/97)).

5.4.2.1 Open-ended Questions' Responses

5.4.2.1.1 What are the roles pharmacists could undertake in the prevention, preparedness, response, and recovery phases of a disaster to assist their community?

Participants were asked open-ended questions to gather their insight into additional roles pharmacists could undertake within each of the four PRRR phases. The common themes identified in the manual coding from the participants comments for each phase are presented in Table 14.

Table 14: Common themes identified by the Australian participants for pharmacists' roles in the PRR disaster phases

Prevention/ Mitigation	Preparedness	Response	Recovery
Education	Education	Medication	Medication
Logistics	Point-of-Care	Management	Management
Medication	Messaging	Logistics	Behavioural and
Management	Logistics	Pharmacy Service	Psychosocial Support
Disaster Planning	Disaster	in Evacuation	Disaster Team
& Guidelines	Planning	Centres	Member
Vaccinations	Medication	Provide Clinical	Logistics
Outreach Services	Management	Resource	Develop Action Plan
Risk Assessment	Health	Disaster Team	Return to 'Normal
No Role	Surveillance	Member	Business'
	Risk Assessment	Health Surveillance	Outreach Services
	Vaccination	Education	Health Surveillance
	Shared	Vaccinations	
	Pharmacy		
	Database		
	No Role		

A QLD local disaster management group member suggested pharmacists could be more involved in the PRR phases in the following ways.

***“Prevention** - Get involved in planning such as input into disaster plans to ensure that theirs and other organisation expectations on roles are realistic and achievable. Disaster planners are very good determining and documenting what needs to happen in a disaster, but this needs to be consulted with those key roles and pharmacists need to have input into any plan that determines and documents they have a role. Their role also needs to be clear and documented so that in a disaster response there is no time spent trying to determine roles and clarifying these. Pharmacists should also develop their own disaster plans and guidelines (and consult with disaster groups/organisations they would work with) so that they can be as prepared as possible.*

***Preparedness** - Work with existing clients to ensure they are prepared for imminent disasters or at least at the start of each disaster season. Provide checklists and resources to help people be better prepared for disasters - through advice on current/ongoing medication, but also in relation to advice on basic first aid kits for homes and community groups that may become*

isolated. Providing education and support to the community for low acuity illness or concerns. Participating in projects that aim to increase community resilience to disasters in relation to medications and also minor and preventative health care.

Response - *Play a key role in any primary healthcare facility being established, particularly in heavily impacted communities - perhaps through planning of things like co-mixed GP/Primary Health clinics (Doctors, Nurses, Pharmacists, other allied health professionals) and even set up adjacent to current recovery centres where many agencies are involved (as this is where people go to get their money so make it a real one-stop-shop. They also play a role in being able to provide usual business to customers for medication access and advice on lost or missing medications/scripts.*

Recovery - *Ensuring ongoing health needs are met through medication management, wound care advice, preventative health strategies (immunisation now we have the Pharmacist Immunisation Program) etc.”*
[QLD local disaster management group member]

A senior advisor for an NGO and a senior commonwealth bureaucratic provided comments on how pharmacists could be better utilised in a disaster.

“Pharmacists are key community institutions. They have a deep understanding of who may be more at risk in their community, particularly those with acute or chronic illness, and associated disability or frailty. They are in a position to advice on household disaster preparedness advice, or link people to existing preparedness advice, such as emergency Rediplan or hazard specific advice.” [Senior Advisor for NGO]

“Pharmacists are a key interface with local communities and are currently underutilised in the provision of advice on a wide range of matters to do with the administration of pharmaceuticals (prescribed and unprescribed), particularly with regards to advice regarding preventative medications/treatments in anticipation of disaster impacts as well as medication management.” [Senior commonwealth public servant]

A hospital director of pharmacy who participates as a member in the Health Emergency Operation Centre when enacted for a disaster suggested pharmacists could

“Identifying those who are struggling in the community post-disaster for a multitude of reasons. Advocating for minority groups with special needs during a disaster. Early identification of outbreaks. Debriefing. Assisting with identifying lessons learnt during the disaster to improve systems for the future. Sharing knowledge with others training/preparing for a disaster. Educating the public on disaster recovery.” [Hospital director of pharmacy]

5.4.2.1.2 What are the barriers to pharmacist’s roles in disasters?

The barriers to pharmacists’ roles in disasters described by participants were manually coded using Pattern codes (Table 15).

Table 15: Barrier themes to pharmacists’ roles in disasters identified by the Australian participants

Barriers to pharmacists’ roles in disasters
Funding or reimbursement issues
Insufficient interest from the pharmacy profession
Lack of inclusion as a disaster team member
Lack of pharmacy disaster training or education
Lack of understanding of the value of pharmacists in a disaster
Legislative constraints
None
Personal concerns
Prejudices of other health care professionals

The most described barrier was a ‘lack of understanding of the value of pharmacists in a disaster’. The second highest barrier identified by the Australian participants was ‘legislative constraints’. Other barriers identified were ‘lack of pharmacist disaster training/education’, ‘lack of inclusion as a disaster team member’, ‘prejudices of other healthcare professionals’, ‘funding/reimbursement issues’, ‘no interest from the pharmacy industry’, and ‘personal concerns’. Interestingly, five participants mentioned there should be no barriers as response should be the first priority.

A QLD local disaster management group member suggested the barriers to pharmacists being further integrated in disasters were

*“**Legislation** - even with existing emergency supply provisions, there are still barriers to accessing medications (particularly S8's). Recognition of the role they play in disasters by non-health emergency managers (many are aware of having Doctors available, but not other health professionals that can also provide services and take the pressure of the hospital system).*

***Engagement** - I don't see a lot of engagement/interaction in disaster groups (that are predominantly government-led and focused) so this is a potential barrier as it leads to lack of thought for or consultation with these groups. GP's are quite well recognised in the need for their services, but also their representation through PHN's [public health nurses]. On local and district disaster management groups (that are local government and state government led) we have one Health (state government) rep, however no other direct engagement with community health providers (GPs, Pharmacists etc) and I think this is to our detriment. Health don't engage particularly well with these groups (except maybe GP's through PHNs) or consider them in disaster planning from the point of view of engaging them in plan development or review - this leads to everything health being focused out of hospitals and public health units and only engagement with broader groups if each of these sees a need.” [QLD local disaster management group member]*

A logistician from NSW listed barriers believed to be preventing pharmacists from being better incorporated in disaster management.

- “1. Most acute disasters work on a nurse-doctor model*
- 2. The availability of suitably trained Pharmacists in most locations*
- 3. Perceptions that pharmacists lack clinical skills*
- 4. The perception that most disasters are simple “war zones” where a no-frills militaristic acute care work force with advanced CPR skills is all that is required.*
- 5. A medically lead team*
- 6. The difficulty of a medically lead team to handle a more complex work forces*

7. "Pragmatic" i.e. "simplistic" planning
 8. The idea that there is only a need to plan for the acute phase of a disaster i.e. the first 6-24 hrs when patients are triaged, assessed and stabilised.
 9. The belief that disasters are mainly localised and static events e.g. a bus or train crash, a terrorist incident
 10. The lack of appropriate people researching, planning and leading"
- [NSW Logistician]

Interestingly, a coordinator of a Primary Health Care (PHC) emergency plan in a QLD community, suggested pharmacists are not capable of separating the retailer role from their health professional role in relation disaster planning.

"Pharmacy need to profit from sales rather than services. As a shopkeeper, there is a risk of conflict of interest and non-evidence-based advice (e.g. Recommending rehydration fluids when water may be adequate, additional vitamins "for stress"). This risks any collaboration with evidence based PHC [primary health care] groups."

[PHC Coordinator]

5.4.3 Comparison between survey populations

The sample populations were quite similar in terms of experience in participants' respective professions and the number of disasters they had responded to (Figure 20 and Figure 21). The international population had a larger sample size with 126 participants compared to the 97 participants in the Australia survey population, however, the trends are similar in both populations.

Statistical testing using Pearson's Chi-Square test of independence showed there was a statistically significant difference in the opinions of the Australian and international participants regarding pharmacists having a role in disasters in addition to logistics ($\chi^2_1 = 4.93$, $p = 0.026$). The international participants (96.8%, 122/126) were more likely to report that pharmacists had a role in disasters in addition to logistics compared with the Australian participants (89.5%, 85/95).

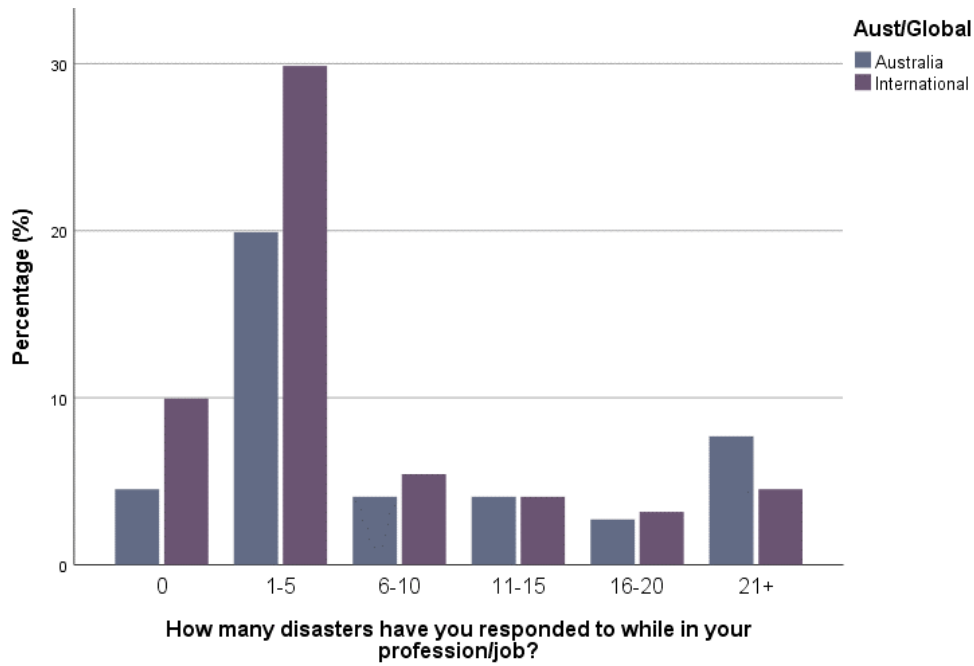


Figure 20: Comparison between the international (n=126) and Australian (n=97) surveys of the number of disasters responded to in an official capacity of their profession

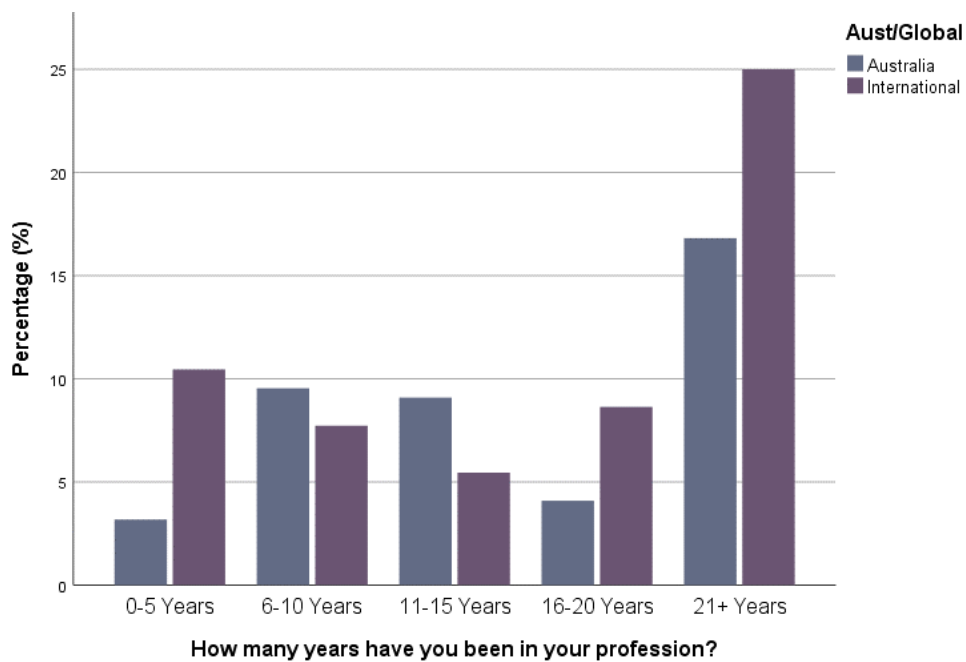


Figure 21: Comparison between the international (n=126) and Australian (n=97) surveys of the number of years within their profession

The Likert scale results from the two survey populations are compared in Table 16. A Linear-by-Linear Association chi square test was performed to determine if there was a significant difference between the two survey's distribution of results using a 3x3 table. The logistics role violated the assumptions for a Chi-square analysis as both surveys were skewed to the 'agree and strongly agree' rating. Of the

participants, 95.9% in each survey population agreed to pharmacists undertaking the role in logistics and supply chain management (Table 16). The ‘CPR and assisting in first response’ role distribution between the two survey populations was significantly different (Table 16, bolded for emphasis). Of the international surveyed population, 44.1% (52/118) were in favour of pharmacists performing this role in disasters compared to 28.1% (27/96) of the Australian surveyed population (Linear-by-Linear Association (1) = 5.83, p= 0.017). The other nine roles showed no significant difference in distribution between the two survey populations.

Table 16: Comparison of Australian and international opinion’s on roles of pharmacists in disasters provided in a five-point Likert scale

Pharmacists’ roles identified in literature	Disagree & Strongly Disagree		Neutral		Agree & Strongly Agree	
	Aust	Int	Aust	Int	Aust	Int
Logistics of pharmaceuticals and stockpile management	3.1%	0%	1%	4.1%	95.9%	95.9%
CPR and assisting in ‘first response’ **	30.2%	20.3%	41.7%	35.6%	28.1%	44.1%
Providing first aid and wound care	26%	19.3%	34.4%	37%	39.6%	43.7%
Triaging and screening in evacuation centres	40.6%	29.4%	26%	35.3%	33.3%	35.3%
‘Prescribing’ continuing chronic disease medications	8.2%	3.3%	9.3%	8.3%	82.5%	88.4%
‘Prescribing’ vaccinations	9.4%	4.5%	9.4%	11.8%	81.3%	83.6%
Administering vaccinations	8.6%	3.5%	11.8%	10.4%	79.6%	86.1%
Developing drug algorithms and guidelines to streamline patient diagnosis and treatment options	9.6%	7.6%	14.9%	13.4%	75.5%	79%
Assist decision-making on health issues in disaster management	6.3%	6.7%	21.1%	15%	72.6%	78.3%
Communication advocate between different healthcare professions	9.6%	8.3%	22.3%	19%	68.1%	72.7%
Educate public on health risks in disasters and those most vulnerable	8.4%	5%	17.9%	13.2%	73.7%	81.8%

*Aust – Australian survey, Int – International survey, CPR – cardiopulmonary resuscitation

** difference between populations is statistically significant for this role

5.5 Discussion

The level of experience in each group of participants in disaster health management, both in their respective professions and in responding to disasters, gives credibility to the results of this survey. Having been in disaster zones themselves, they are aware of what works and what does not, and what is needed to provide optimal healthcare to mass casualties with limited resources.

Including pharmacists in the local, state, and national disaster plans of PPRR would help in achieving the Sendai Framework's target of decreasing the disruption to basic health services.¹² Access to medications can have a significant impact on the overall outcome for a patient and the healthcare system in terms of adequate response and recovery. Pharmacists in the community setting triage and prescribe daily, recommending over-the-counter medications and referring where necessary to other healthcare professionals. This was evident in the 'thunderstorm asthma' event in Melbourne, Australia in 2016 when community pharmacists were vital in the health crisis response. If pharmacists had not been involved the health impact and mortality rate could have been significantly higher.²³¹ Pharmacists' knowledge and professional experience lends voice to the argument for the better utilisation of pharmacists' skills in disasters.

It was clear from this study that the international disaster health community believe pharmacists are capable and should be fulfilling additional roles besides the all-important logistics and supply chain role. The international disaster health professionals rated lower on the consensus the roles 'CPR', 'First aid/Wound care', and 'Triage'. The participants suggested in their general comments provided at the end of the survey, that it was not because pharmacists were not capable of performing these roles but rather, questioned where on the priority list of high importance these roles are for pharmacists in a disaster. They referred to the multidisciplinary team approach in disaster teams and how these roles would potentially suit another health professional's skill set better.

The surveyed Australian population was also in favour of additional roles for pharmacists in disasters. A potential reason for the lower acceptance of these

additional pharmacists' roles in disasters compared to the international community, could be related to the limited exposure Australian disaster health professionals have had to pharmacists being involved in these additional roles. The case studies of pharmacists performing these more clinical roles has stemmed largely from the US.^{71-74,111,203-205} The Australian disaster health professionals rated the roles – 'CPR', 'first aid/wound care', and 'triage' lower on the rating scale than the international population surveyed.

The Australian disaster health professionals identified that pharmacists are at the key interface with the local community. It was found in a study of US State rules and regulations for pharmacists disaster efforts, pharmacists could be better utilised if there were sufficient regulations to govern their activities.²⁰¹ Interestingly, one participant in the survey suggested the integrity of pharmacists in disasters is compromised as pharmacists operate predominately as shopkeepers. They questioned pharmacists' ethical ability to assist in disasters as healthcare professionals, as they run retail businesses. However, many would argue pharmacists are health professionals first and foremost, putting their patients above all other needs. A systematic review was conducted in 2005 in Australia to evaluate the evidence of pharmacist professional services.²⁸² This review found pharmacists are capable of providing above reproach professional services which can improve the quality and safety of healthcare services.²⁸² They state this could be an important factor in relieving some of the burden on the healthcare system with shortages in the community of other professions.²⁸² In terms of disasters, pharmacists are often found to be putting themselves in harm's way to maintain the community's access to essential medications.^{290,291} The recent 2019 bushfires in Tasmania Australia, are another example of the length pharmacists will go to ensure their communities have access to essential lifesaving medications and services.²⁹¹ A Tasmanian pharmacist had taken to living in his pharmacy after the town was evacuated to look after those who remained behind.^{291,292} Another Tasmanian pharmacist had to drive himself through an emergency area, along closed roads, after they helicoptered a paramedic in to help the local GP but forgot to take the pharmacist.²⁹¹ In Michigan State in the US, during a snowstorm a pharmacist began delivering medication by snowmobile

to patients snowed in.²⁹⁰ These actions do not seem to be those of a shop keeper but of those of a concerned healthcare provider to a community.

Several issues were raised by the international health professionals as to why pharmacists are not better utilised. One of the major barriers to greater participation by pharmacists in disaster health management identified in this study was the lack of understanding of what roles pharmacists are capable of during a disaster. It was suggested this could be due to a lack of awareness of pharmacists' complete abilities. Although, FIP released guidelines² recommending clinical roles pharmacists can perform in the disaster, the awareness of the wider disaster health community to accept these roles is lacking. There are some physicians, nurses, and members of the public that believe pharmacists are better suited to continue with the mechanical functions of pharmacy - coordinating the logistics of drugs or dispensing and labelling medications.^{281,293} Rather than undertaking roles in the clinical aspects of pharmacy which require more independent judgement or access to patient records.^{281,293}

The other major barrier identified by the participants was the 'perceived prejudices of other healthcare professionals/turf encroachment'. Some of the participants believed the barrier to pharmacists' roles in disasters was the fear they were taking something away from other healthcare professionals. This issue of turf between physicians and pharmacists was experienced in Australia when pharmacists began vaccinating patients²⁹⁴ and when pharmacists were integrated into GP clinics.²⁹⁵

These barriers along with the others mentioned in this study (legislative constraints, funding/reimbursement issues, lack of disaster training, and potential lack of pharmacy interest) could explain why even with overwhelming support from the disaster health communities identified in this study, pharmacists have not been further integrated into disaster management.

5.5.1 Limitations

Due to the similar nature of the professional backgrounds of the conference attendees and the CEDM members, the use of a convergence samples from a single conference and mailing list may limit the extrapolation of the results to the larger

global disaster health community. However, the WADEM congresses attract different health and emergency service professions from many different countries. The international survey covered 22 countries and eight different professions related to disaster and emergency medicine, allowing for some generalisation of the results from the cross-section sample. The Australian survey covered all seven states and territories and six disaster health professions. The advantage of this study was that its scope was not limited to a single disaster event. Participants based their responses on experiences across several disasters – taking an all-hazard approach. Participants were not defending actions taken in the aftermath of a single disaster event.

It should also be noted that the term ‘triage’ has a different connotation depending on the profession’s perspective. The survey results could have been affected as further explanation of ‘triage’ in terms of pharmacist’s roles in disasters was not provided. It is suggested by the researcher future use of these survey questions should define the term ‘triage’ in the context of the pharmacy profession to provide clarity to others outside the profession.

5.6 Conclusion

Pharmacists need to embrace an advocacy role to communicate how they can contribute to disaster management within their local, state, and federal disaster health teams and community. They could begin by effectively engaging in state and federal disaster planning activities.

Chapter 6: Interviews with Disaster Health Stakeholders

This chapter presents the product of interviews with key disaster stakeholders which were conducted to further explore the roles of pharmacists in disasters. Section 6.1 introduces the study and Section 6.2 outlines the aims and objectives. Section 6.3 describes the methods used and Section 6.4 presents the results of this study. Section 6.5 positions the findings within the literature and Section 6.6 provides a concluding statement.

6.1 Introduction

It was identified in the surveys presented in Chapter 5 that the acceptance by disaster health professionals of pharmacists as team members needed further exploration. The roles pharmacists are currently performing in disasters, generally occur spontaneously as described in the case studies presented in the literature review in Chapter 2. In the guideline 'Responding to Disasters'² FIP suggested potential roles pharmacists could undertake to be of assistance across the PRRR phases.² However, there is little research on the opinions of key stakeholders as to whether they believe pharmacists can perform these additional roles in disasters (as outlined in Chapter 5) and if pharmacists have a place within their disaster teams.

6.2 Aims and Objectives

In this study, key disaster health management stakeholders from around the world were interviewed. The aim of these interviews was to gain an in-depth understanding of the role's pharmacists have currently been undertaking or could be undertaking in disasters. The objectives were:

- 1) to identify what roles pharmacists could be undertaking in disasters

- 2) to determine where disaster health management stakeholders believe pharmacists roles fit within the disaster PRR cycle and disaster health teams
- 3) to identify perceived barriers and facilitators to pharmacists being further integrated into disaster management

6.3 Methods

6.3.1 Study Design

For this study, the theoretical framework of PRR was used (Chapter 3). This theoretical framework recognises the roles required of a pharmacist may shift as the needs of the affected community change throughout the disaster cycle. This study allows for the participants to define a pharmacist within their context and experience.

6.3.2 Participant Recruitment

Key stakeholders from international disaster and emergency management organisations and pharmacy organisations were systematically identified by the research team and approached through the PhD and wider networks. The organisations approached were defence/military, NGOs, WHO, DMATs, academics, public health agencies, physicians (GPs and emergency physicians), and pharmacists. Once the research team had developed an initial list of stakeholders, participants were recruited through purposive and snowball sampling techniques. Participant recruitment continued until data saturation of the thematic analysis was reached, which for this study was 28 participants.

The 28 stakeholders comprised 15 international and 13 Australian participants. There was an even split of 14 females and 14 males. Of the 15 international participants, three were from Canada, two were from NZ, and 10 were from the US. Sixteen of the participants had a pharmacy background, eight had an emergency services background, and four had a government background. The 16 participants with a pharmacy background had different levels of experience working in disasters including the military, DMATs, hospital, community, and logistics. Participants were included who had a specific health background in disaster management and/or work

with pharmacists in disasters. Typical first responders (e.g. police, fire fighters, state emergency service personnel) were not included in this study as their primary objective is 'search and rescue' and not the health and welfare aspects of disaster management, they also do not work in close proximity to pharmacists.

6.3.3 Participant Information and Informed Consent

Participants were provided with a participant information sheet outlining the project and details of their involvement *via* email before the scheduled interview. Each participant was asked to read the detailed outline of their involvement and then if they wished to participate in the interview to return a signed written consent form *via* email. A verbal consent was reiterated at the beginning of the Skype® interview to ensure the participant understood the terms of their voluntary involvement and provide them with an opportunity to ask any questions they had on the project and data collection.

6.3.4 Data Storage and Security

The audio recordings of the interviews and transcripts are stored on a secure, password-protected computer. Only the principal researcher has direct access to these files; however, the research team are able to request access to the documents at any time. All files are stored electronically; no hard copies of the informed consents were obtained. The electronic files were backed up to cloud storage and onto a password-protected hard-drive to ensure data security was maintained. Data will be kept securely for five years upon completion of this research project and the consent forms for a minimum of 15 years after completion of this project.

6.3.5 Ethics

Ethics approval for this project was obtained from the QUT ethics committee, approval number 1700000106. No other ethics approval was required for this study of the research project.

6.3.6 Data Collection

Interviews were conducted with 28 stakeholders in a semi-structured format. The interview questions differed slightly between the Australian participants and the international participants to obtain relevant demographic information. Appendix C contains the questions used during both sets of interviews. Interviews ranged from 30 minutes to 1.5 hours in length depending on the amount of information the participant shared for each question. Each interview was recorded using a Livescribe® Echo® smartpen and Livescribe® dot paper for field notes and memos during interviews. Audio files were transcribed *verbatim* by a professional transcription services agency - Pacific Transcription®. Written memos for each interview during the research process were stored electronically in the Computer Assisted Qualitative Data Analysis Software (CAQDAS) NVIVO®.

The same Likert scale questionnaire as used in the interview was used in the surveys in Chapter 5, to obtain qualitative comments on pharmacists' roles in disasters identified in literature.

6.3.7 Data Analysis

Two methods were used to analyse the qualitative data. First, manual coding was conducted following the coding methodology of Saldaña and utilising the CAQDAS NVIVO® computer software.²⁸⁹ To provide triangulation of methods, the text-analytics software Leximancer® was used to compare participants' opinions and views of pharmacists' roles in disasters based on their perspective and experience working in disasters.

6.3.7.1 Manual Coding

Each interview transcript was manually coded individually. Coding gives structure to extensive texts, providing an interpretation of the interviews.²⁹⁶ Manual coding consists of three passes – codes, categories and themes. Coding in this study was developed following Johnny Saldaña's coding manual.²⁸⁹ The interview transcripts were assigned 'codes' which are essentially keywords used to identify text statements in a systematic way.^{289,296} Once the first cycle of codes were assigned, the

interviews and 'codes' were re-evaluated and were recoded where necessary following Saldaña's recommendations.²⁸⁹ The second pass of manual coding involves the process of finding the pattern amongst the codes, and grouping similar codes together into categories.²⁸⁹ As per Saldaña,²⁸⁹ the final pass involves applying a higher level of abstraction to the codes and categories through the development of themes.

The first cycle of coding incorporated the use of Holistic and Descriptive coding methods.²⁸⁹ Descriptive coding summarises the topics discussed and is ideal for new qualitative researchers.²⁸⁹ Holistic coding comprises of coding data as larger texts segments into broad ideas.²⁸⁹ The initial coding by coding large segments into broad ideas using holistic coding method, did not capture some of the important points being made by the participants. Thus, the data was recoded using different coding methods as suggested by the coding manual.²⁸⁹ During the re-evaluation and recoding process of the first pass codes the data was recoded using Magnitude, *In vivo*, and Descriptive coding methods. *In vivo* coding uses the participants' own words as the codes, grounding the context of the code in the data.²⁸⁹ Magnitude coding assigns categories to identify the intensity or evaluation of the text (weak, moderate, or strong).²⁸⁹ Some scholars do not support the notion of quantifying qualitative data, however such quantification can be an excellent representation of the strength of opinions or level of experience.²⁸⁹ The magnitude coding was used to apply the level of personal experience participants had working in disasters and working with pharmacists in disasters (limited, moderate, and high). This method of coding was also used to apply the perspective or lens through which the participant approached the interview (government, emergency services, or pharmacy). The first section of the interview asked the participant to describe their experiences of working in disasters and provided the information in which the magnitude codes were applied.

Second cycle coding is the development of categories from codes. Pattern coding methods were used with the grouping together of similar codes into categories.²⁸⁹ The third pass of coding comprised the applying of a theoretical coding method.²⁸⁹ According to Saldaña, a theoretical code,

*"functions like an umbrella that covers and accounts for all other codes and categories formulated thus far."*²⁸⁹ (p.163)

6.3.7.2 Leximancer®

The second data analysis method employed the text analytic software Leximancer®. This software converts lexical co-occurrence text from natural language into semantic patterns.²⁹⁷ Leximancer® according to Smith and Humphreys,

“employs two stages of co-occurrence information extraction —semantic and relational—using a different algorithm for each stage. The algorithms used are statistical, but they employ nonlinear dynamics and machine learning.”²⁹⁷

(p.262)

Leximancer® analyses the text and produces a visual concept map. This concept map displays the main concepts and the relationships between the concepts in a heat-mapped visual representation according to the colour wheel (red signifies the most important concept). Concepts displayed are words identified in the text that are found in close proximity to each other and are weighted by relevancy.²⁹⁸ Concepts which are closely related will appear near one another on the concept map. The size of the dot associated with a concept represents its frequency in the text. Leximancer® has the ability to quantify the relationship between the concepts and provides a conceptual structure of text.

With algorithms determining its themes, Leximancer® removes some of the potential bias in qualitative research which may be due to the subjectivity of the researcher. Using Leximancer® to analyse data removes the ‘human error’ which can influence human decision making in ways of which they may be unaware.²⁹⁷ However, there is an editing process with Leximancer® like any software program, in which the researcher may remove words as potential concepts (which have high occurrence but add no semantic content). This adds an element of subjectivity to the Leximancer® data analysis process. However, it is acknowledged with qualitative research that subjectivity is an important part of a researcher’s data analysis process. In terms of reproducibility of the concept map, there is a small amount of randomness associated with the clustering of the two-dimensional maps, thus the map was re-clustered several times until a stable configuration was obtained to ensure reliability.

6.3.7.2.1 Modifications made to default settings

Plurals and singular terms of the same concept were merged in some instances when used in the same context in the text (e.g. disaster and disasters). The term ‘medicine’, ‘drug’, and ‘medication’ are often used interchangeably in the English language. However, when running the initial analyses in Leximancer®, it was identified that participants were specific in the language they used and therefore these terms were not merged into a singular concept. Thus, to provide a clean dataset for the Leximancer analysis, these terms were kept as separate concepts when referring to specific roles of pharmacists. The concept ‘drug’ was used in the context of pharmacists’ roles in logistics and supply chain, whereas the concept ‘medication’ was used in the context of pharmacists’ roles with patients and medication management.

This was similarly the case with the concept ‘people’. Participants used the terms ‘pharmacists’, ‘healthcare professionals’, ‘patients’, or ‘disaster victims’ when specifically referring to different settings. However, on the odd occasion participants used the concept ‘people’ in place of one of these terms in the same context. Table 17 outlines the changes made to the Leximancer® default settings and data files before producing any of the concept maps.

Table 17: Adjustments made to the Leximancer® default settings

Concepts removed - conversational word fillers	Probably Sure Things Stuff
Merged concepts - interchangeably in the same context	Disasters and disaster Roles and role Pharmacists and pharmacist Patients and patient Drugs and drug
Data cleaning of concepts – depending on context and commonality by majority of the participants	Medicine/Medication Medicine/Drug Chemist/Pharmacist People/Pharmacist People/Healthcare professional People/Disaster victims People/Patients

6.3.7.2.2 Comparing commonalities

It was identified in the manual coding of the interview transcripts that participants were raising commonalities in their responses but not necessarily under the same question asked but rather under the overarching topics. Thus, to produce more informative results from the Leximancer® analysis, the interview questions were grouped into four common sections – experience, pharmacists’ roles in disasters, PRR cycle, and barriers and facilitators. The first series of questions asked participants to focus on their own personal experience and challenges they have faced with disaster events – this section was labelled – ‘experience’. This section was coded using the manual coding method ‘magnitude codes’ to assign participants’ responses to categories (tags) for the Leximancer® analysis. Participants were assigned one of three categories based on their level of personal experience working in disasters (expertise 1, 2, or 3), their level of personal experience working with pharmacists in disasters (expertise 1, 2, or 3), and participants’ disaster perspective (government, emergency services, or pharmacy). This first section and the categories/tags developed were used in comparison with the other sections within the Leximancer® analysis to determine if there was a difference in participant’s opinions.

The second section was labelled ‘pharmacists’ roles in disasters’. It included participants discussions on the role’s pharmacists are currently undertaking and the roles they are capable of undertaking in a disaster. The third section was labelled ‘PRR cycle’ and comprised questions on where pharmacists’ roles specifically fit in the disaster PRR cycle. The fourth and last section of the interview was labelled ‘barriers and facilitators’. Participants were asked to identify any limitations to utilising pharmacists in disasters and provide suggestions for the better integration of pharmacists in disaster teams and in disaster health management.

6.3.7.2.3 Insight Dashboard Report

Leximancer® has an Insight Dashboard report function which allows a comparative analysis between categories. This is ideal for comparing the difference between participants’ opinions. The Insight Dashboard,

“...adopts a more quantitative focus than the concept map, and is designed to provide a quick understanding of the project results.”²⁹⁸ (p.99)

It investigates relationships between attributes (independent variables) and categories (dependent variables).²⁹⁸ The Dashboard report presents the concepts on a quadrant map. The concepts found in the upper, right-hand quadrant are those most frequently discussed in the text; it is referred to as the ‘magic’ quadrant.²⁹⁸ The concepts found in this magic quadrant are strong, prominent, and are the most likely to co-occur with the category.²⁹⁸

The relative frequency of concepts is plotted on the Y-axis on the quadrant graph and denotes the conditional probability of an attribute or concept coded in the text.²⁹⁸ It is presented as a log scale frequency score allowing it to be plotted on the quadrant graph.²⁹⁸ The measure of frequency of how often a concept is mentioned in the text is affected by the categories distribution of comments.

The strength score relates to the reciprocal conditional probability of a concept in the text related to a particular category and is plotted on the X-axis.²⁹⁸ Strong concepts (high strength score) differentiate a category from others, regardless of how frequently the concept or attribute is mentioned (displayed in the upper two quadrants). A maximum of three categories were used in this research within each segment of the interview, as the first section (experience) was only used to define the category tags for the Leximancer® analysis. Comparisons were made in the categories based on participants’ perspective (pharmacy, government, and emergency services), their level of personal experience in disaster (expertise 1, 2, and 3), and their level of experience working with pharmacists in disasters (expertise 1, 2, and 3) within the three sections – ‘pharmacists’ roles in disasters’, ‘PPRR cycle, and ‘barriers and facilitators’).

For each concept the relative frequency and strength scores are combined to yield a ‘prominence’ score using Bayesian statistics.²⁹⁸ This score is an absolute measure of the correlation between the category and the concept (attribute). Leximancer® produces a prominence score for categories with the concepts more prominent and likely to co-occur with the category, appearing in the magic quadrant.²⁹⁸ In this study the relative frequency score was not as useful on its own

compared with the prominence score which takes into account both the relative frequency score and the strength score. This is because the number of participants assigned to each category differed across the categories due to participants' differing levels of experience and thus the frequency of concepts may be overrepresented in a category purely based on the number of participants.

6.3.7.3 Case Vignettes

Through the interview process, segments of data were discovered to be too rich to usefully dissect in the coding analysis. According to Miles and Huberman these 'pockets' of data are best analysed as a whole vignette.²⁹⁹ Erickson describes a vignette as a

"vivid portrayal of the conduct of an event of everyday life, in which the sights and sounds of what was being said and done are described in the natural sequence of their occurrence in real time."^{300 (p.149-150)}

Vignettes take on a narrative story like flow and in the context of this research instead of describing everyday life, describe unique disaster scenarios providing supportive evidence to the results of this study. Case vignettes will be used throughout the presented results to supplement and support the findings. Names were changed in the case vignettes to protect the confidentiality and anonymity of the participants and their stories.

6.3.8 Measurement Dependability, Trustworthiness and Transferability

6.3.8.1 Dependability

Dependability is the measure of consistency of the research findings. To guarantee reliability of measurement, the research journey and procedures used should be documented to provide evidence of consistency and dependability.³⁰¹ In this research dependability was ensured by conducting data collection and analysis with transparency and care.²⁹⁹

Each transcript was checked before data analysis by re-listening to the audio file to ensure context was not misinterpreted (which only the interviewer and interviewee would understand). Memos were used throughout the data collection and analysis process of the research to document the development of thoughts and

codes. A codebook with descriptions of the codes was used throughout the data analysis process.

Although the majority of the coding was completed solely by the primary researcher following Saldaña's advice, open dialogue and discussions were maintained throughout the coding process with the research team and peer networks. This enhanced relationships with the development of the categories from the codes and the themes from the categories and codes.²⁸⁹ Inter-rater reliability was achieved in this study by having a second researcher independently code 10% of the interviews using the codebook collaboratively developed by the research team. Any differences in codes were discussed by the two researchers and agreed upon. This was used to ensure the accuracy of the findings presented and provide reliability in the coding.³⁰¹

6.3.8.2 Trustworthiness

Validity in terms of qualitative research refers to the credibility or trustworthiness of the interpretation.³⁰² Credibility is ensuring the results are a true representation of the data.³⁰¹ This research incorporated triangulation of methods,²⁹⁹ using both the subjectivity of manual coding with the more objective comparison using the text-analytic software Leximancer® to compare the themes developed and results.

Another term often used in qualitative research to describe validity is authenticity, i.e. using the participants' own voices where possible.²⁹⁹ To ensure credibility of the findings, it is suggested the participants' own voice is heard to give context and description to the themes discussed. Therefore, participants' quotes and case vignettes were used throughout the presented results to provide support to the findings.^{299,301} The anonymity of the participants was essential; therefore, in some instances the country or profession of the interviewee was not able to be provided along with the quote.

6.3.8.3 Transferability

Transferability in the context of qualitative research is regarded as the ability of the findings to be generalised. This is often limited due to the specific populations

and narrow focus.²⁹⁹ However, by including the multiple perspectives of both international and Australian stakeholders it is hoped this study provides a wide context of the disaster health community. This study also took an all-hazard approach to disasters and referred to pharmacists regardless of the context of their employment – not breaking down into the individual specialised areas or buildings (i.e. community, hospital, industry) allowing for some generalisation of pharmacists' roles in disasters.

6.4 Results

Qualitative data analysis was performed on the 28 interviews with international key stakeholders. Two methods of data analysis were employed, manual coding and Leximancer[®]. The manual coding identified five broad themes outlining the participants' experiences, perspectives and opinions on pharmacists' roles in disasters. A discussion of each theme including excerpts from the data and case vignettes to illustrate the categories and codes within the theme is outlined below. Analysis of the qualitative data using Leximancer[®] is discussed in Section 6.4.2. Leximancer[®] was utilised to determine the differences in the participants' perspectives and their experiences on their opinions of pharmacists' roles in disasters, where they believe pharmacists' roles fit in the PPRR phases, and the barriers and facilitators to pharmacists' roles in disasters. For the protection of participants' confidentiality, it was not always possible to provide the profession or country of an interviewee with their quote.

6.4.1 Manual Coding Results

Data were manually coded following the methodology outlined by Saldaña.²⁸⁹ There were 167 codes created in the coding of the interview transcripts. The 167 individual codes outlined under each of the categories can be found in Appendix D. Table 18 summarises the themes which were developed through abstraction from the categories and codes. Quotes and case vignettes will be used throughout to provide evidence to support the findings.

Table 18: Themes and categories derived from 167 codes developed in the manual coding of 28 interviews

Theme	Category
Disaster Management	Each Disaster Presents Unique Challenges Military & DMAT Objective in Disasters PPRR Cycle Training & Skills Required in a Disaster Where do pharmacists fit? Donations in Disasters
Community	Business Continuity Importance of Pharmacy in the Community
Government	Ethico-Legal and Moral Need for Government Involvement Information Dissemination
Pharmacy	Context of Pharmacists' Current Role in Disasters Recent Movement in Pharmacists' Roles in Disasters Pharmacy Purpose in a Disaster Benefits of Further Inclusion of Pharmacists in Disasters Training Opportunities to Facilitate Inclusion
Barriers & Facilitators	External Barriers Intrinsic Barriers External Facilitators Intrinsic Facilitators

*DMAT – disaster medical assistance teams; PPRR – prevention, preparedness, response, and recovery

6.4.1.1. Disaster Management Theme

The theme 'disaster management' pertained to the categories and codes discussed by the participants specific to the disaster PPRR cycle and the unique challenges disasters present to healthcare professionals. The participants discussed where pharmacists' roles fit in the PPRR phases. Figure 22 illustrates how the theme developed from the codes and categories.

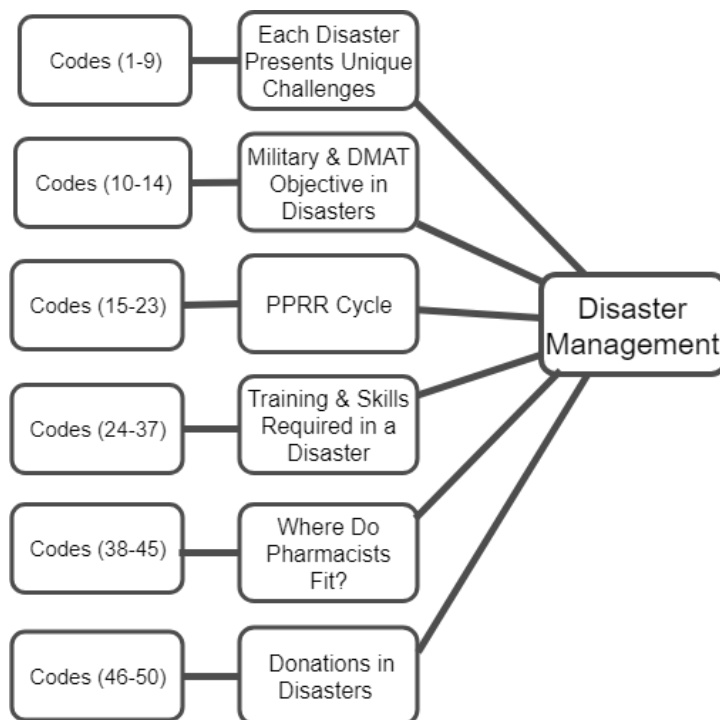


Figure 22: Disaster Management theme and its associated categories and codes

* Appendix D lists the individual codes 1-50

**DMAT – disaster medical assistance teams, PPRR – prevention, preparedness, response, and recovery

6.4.1.1.1 Each disaster presents unique challenges

Disasters become public health emergencies quickly with the collapse of public health infrastructure. This is highlighted in the quote by an experienced disaster emergency physician and senior international public policy scholar.

“All disasters turn out in a very short period of time to be public health emergencies, or within two weeks become a public health emergency. Ninety per cent over a long period of time, of the deaths and morbidity are actually from public health infrastructure loss, not from the war itself and weapons. But every single disaster in a very short period of time when the public health infrastructure gets destroyed or is no longer functional then a bunch of public health preventable diseases - diarrhoea, respiratory things, et cetera, et cetera, come out. So not only - made the pharmacists actually become part of the screening process for that. Usually within 10 days we start seeing those cases like diarrhoea and respiratory things, but what they might actually represent and how do you prevent them?” [111]

Those adversely affected by disasters may be evacuated or displaced, often leaving behind their prescriptions and medications. In many instances these disaster-

affected areas become declared disaster zones and health professionals' roles are tailored to provide assistance. However, when disaster victims are displaced and/or evacuated out of a disaster zone to a state which is not operating under the declared disaster rules, assisting them can be a challenge for health professionals. As the additional rules and regulations (i.e. extending emergency supplies and out-of-state licensing) are not usually in effect in the state outside of the affected disaster zone. This is illustrated in the quote from a disaster pharmacist in the US.

“One unique thing that we've seen with Hurricane Maria is the State of Florida also declared a state of emergency so that pharmacists could provide continuing care to evacuees from the Virgin Islands and Puerto Rico. Well normally it's people who are affected by the disaster, so you know, it's pertinent to the people in the disaster area. This emergency declaration was specifically that a disaster happened somewhere else, but we are anticipating thousands, if not hundreds of thousands of evacuees and they may not have immediate access to healthcare for renewing their medication. So, it will be up to the pharmacist's discretion to be able to provide them the 30-day supply.” [I15]

The need for pharmacists to perform this role is becoming more evident with the changing patient demographic in disasters. Chronic disease exacerbations and interruptions to medication management are becoming more prevalent than acute injuries in the aftermath of disasters. This is shown in the following three comments from experienced disaster responders.

“There's so many people that have chronic diseases that if they're not managed it can make their life so intolerable. Yep, which also puts a strain on the disaster response system if it's not managed,” [A1]

“Since non-communicable diseases are increasing and more and more the larger percentage of disaster victims - this is not something that the doctors and nurses want to deal with. They want to deal with the blood and guts.” [I11]

“Hurricane Katrina we had millions of people displaced from their medications. Their pharmacies were gone, and these people were walking in and hadn't had their blood pressure medicine, their heart medicine, their diabetes medicine, for weeks.” [I9]

Another aspect to consider with the changing patient demographic is catering for the patient's dietary needs, not just their medical wellbeing. In the event of a disaster, mass packages of food are usually provided by organisations to shelters and disaster victims as their food supplies have been lost. The specific diets required by those with some chronic diseases is often not considered. This was evident in the acute-on-chronic cyclones affecting the Pacific Islands and the remarks from an NGO volunteer pharmacist.

“Looking at the food that's being provided, making sure that it's healthy, particularly knowing the group of people who you're dealing with, and knowing that you've got diabetes being such a huge issue in the developing world. Yet they're just being give rice and noodles and rice and noodles and no vegetables and no fruit to live on, for potentially the next six months.” [A2]

With the changes in pharmaceutical drug stock levels kept in hospitals and pharmacies, small scale disasters can have a significant impact on a community if the supply chain of drugs is interrupted. This is highlighted in the comments by an emergency physician.

“I think one of the things that we see is that sometimes something that might not be as bad a disaster becomes a disaster because there are not adequate supplies of medication, because many places operate in this just in-time inventory fashion. They may have all - a given pharmacy at a hospital or a retail pharmacy may only have a week of medications on hand for a lot of common things that get them delivered. I don't know if it's a problem in Australia, but it's definitely a problem in the US. Then you have something - even a technological disaster like a big power outage or something and/or a communications problem or a flood that's not that bad, but then you can't deliver things that are needed. I think the pharmacist's role in advocating for a realistic supply of medications.” [I7]

The category of ‘each disaster presents unique challenges’ has highlighted the following take away messages:

- disasters quickly become public health crises
- patients with chronic conditions are increasingly becoming a significant adversely affected group in disasters
- pharmacists can be of assistance with providing continuity of care
- inadequate stock levels of medications can turn a small-scale incident into a disaster

6.4.1.1.2 Military and DMAT objective in disasters

The objective of the military medical team when going on deployments is to treat their own if they get injured while performing their civic duties as outlined below by a military pharmacist.

“We don't send the whole hospital, but we tend to send small medical teams, generally to look after our own boys. Especially when we're sending up a few hundred or a few thousand boys and of course, they're going to get cut, they're going to get hurt, they're moving heavy debris et cetera. That's when we've done that kind of health planning and say, well, what are our boys going to be dealing with and how are we going to keep them safe? How are we going to keep their hygiene levels up? How are we going to deal with all their cuts and scrapes et cetera? That's our primary role, yes, to look after the military, whether it's our own and the coalition forces as well. But there are times when we look after the locals as well,” [A6]

Acute injuries and illnesses are the primary focus of both the military and DMATs when heading into disaster zones. Their pharmaceutical drug caches are not designed to tend to the needs of ongoing chronic diseases of the community. This is illustrated in the comments by a military pharmacist and a WHO medical physician.

“But certainly, it's difficult for us to treat chronic things so we don't necessarily deploy with diabetic drugs or Parkinson's drugs and stuff like that. We do very much acute care.” [A6]

“Usually we forget that, and we fail the challenge of not being able to provide for example treatment for chronic diseases or neglected cyst because we couldn’t have the expertise of a pharmacist to analyse and plan what will happen the following month or years after the emergencies.” [14]

The role of pharmacists in the military is almost completely logistics based, ensuring and maintaining the supply chain as suggested by this military pharmacist.

“So, in the military, dare I say it, we are 95 percent logisticians, and five percent clinicians. Which is painful when you join the military after doing a five-year degree or four-year and one-year pre-reg [pre-registration], but I mean, at the end of the day it's absolutely crucial, and we're the ones who understand it the best. We're not dealing with blankets and boots, we're dealing with medical stores, which needs a completely different approach.” [A6]

The summary points as identified by the disaster health stakeholders from this category ‘military and DMAT objective in disasters’ were:

- both military and DMATs are focused on the acutely injured in a disaster
- pharmaceutical drug caches are tailored to acute injuries
- pharmacists’ roles in these teams are mostly logistics based

6.4.1.1.3 PPRR cycle

The participants were asked where in the PPRR cycle they believe pharmacists’ roles would best fit. All the participants believed there was a role for pharmacists across the entire disaster PPRR cycle and suggested the roles would evolve throughout each of the phases in response to the specific needs of the community. This is demonstrated in the comments by an experienced disaster pharmacist.

“I think that's all part of all stages of disaster and preparedness response, because were not just talking natural disasters, we're talking about emerging infectious disease, potential violent terrorism, potential chemical weapons, all of those kinds of things as well. Pharmacists have an essential role for all.” [115]

There has been a shift in the last decade from only focusing on the response phase to focusing on the entire disaster PRR cycle. This is important as only reacting to a disaster is costlier than preparing for and mitigating the impact of a disaster event. This cost effectiveness of preparedness over response is shown in the remarks from the senior international public policy scholar and experience disaster medical physician.

“So, if indeed you spend for every, one dollar you spend in prevention and preparedness you save four dollars in response. You're just going to get too darned expensive to just focus on response. So, part of this SENDAI framework of issues with WHO and everything it's all pushing for the broader disaster cycle broader purpose.” [I11]

Pharmacists need to be involved across the entire PRR cycle as leaving pharmacists out of the preparation planning may lead to inappropriate or inadequate response. Response should involve an active investment and not something that ‘happens’ to a community. The degree of response depends on the level of collapse of community services. This is outlined in the remarks made by a government disaster responder and manager.

“So therefore it's not one option or another because they [pharmacists] need to be involved in the preparedness, because if they're not then - if they don't plan for it and make account, then in fact their response is not going to be appropriate because it will be something that's thrust upon them by somebody else and possibly with little or no knowledge. It's dangerous to think you could understand that in fact you can do - I mean, response is not something that you have done to you. It is in fact you have an integral part - we all have an integral part in being responders.

So therefore, if somebody's going to come along, do something you need to do or how you run an organisation - you should already have a part with it and how it was going to happen. So that's the planning stage. In fact, in the recovery, which can be the longer process of course, they're involved in that space as well. So, I don't think you could be selective across it. I mean they [pharmacists] need to be involved and participating in the whole cycle.” [I13]

Assistance during the respond and recover phases of a disaster should not be allowed to harm the local services. Local community pharmacies and physicians cannot compete with the free services and medications provided by the military and DMAT services following a disaster.

“it is about supplementing the locals and trying to assist them without again causing harm. Because again the care we give is free and the local providers, the United States is fee for service or it's a private medical system. So, the local providers cannot compete with free. We can end up putting them out of business or can disrupt the patient physician relationship that they have there. In your case, like in the pharmacy world, they can't compete with our free drugs. After Katrina, the hurricane that hit New Orleans for a good bit of time, the Governor of the State of Mississippi kicked us out after about six weeks appropriately, because we were starting to impact the commercial ventures of his pharmacist, hospitals and doctors.

Louisiana, the State there, they have a more of a history of social care and they would not let us leave. We ended up staying there about six months rather than just six weeks. The local doctors, pharmacies, whatever could not compete with us, they actually closed, and they moved from the rural areas to more profitable parts of the state or just frankly moved out of the state. But Katrina was in 2005 and so when I went back to Louisiana in 2010, same area, same impact area, but this time it was the BP oil spill. I went there and the doctor's office, pharmacies and hospitals where we had been there for a long period of time were closed and had remained closed. Because there's no doctors, pharmacies, hospitals that nobody wants to have families there. So, the families move. Then Walmart closes and then the whole community, they call them parish's there not counties. But they just - the whole county just goes downhill because they lost their medical infrastructure because they could not compete with our free care.” [13]

The key messages for the 'PPRR' category are:

- pharmacists have a role across the whole PRR cycle
- there has been a shift in disaster management focus from response to the entire PRR cycle

- pharmacists' roles need to be included in the preparedness phase or the response can be inappropriate
- assistance from healthcare professionals and disaster teams cannot lead to harm in the disaster-affected communities

6.4.1.1.4 Training & Skills Required in a Disaster

The pharmacy perspective is often not included in generic disaster training and disaster management is often not covered in most undergraduate pharmacy degrees. It was suggested being prepared for disasters and disaster management should be a part of every health professional's training. Most pharmacists who work in disasters, learn on the job from others more experienced. This was highlighted in the comments from two pharmacists – a disaster pharmacist and an NGO pharmacist.

"I find that every pharmacist - I haven't found anybody that doesn't really enjoy it. I think it should be part of every pharmacist's training. I think you have to overcome this notion that the medical establishment has that any pharmacist is trained to go out and do this role. I can tell you for sure that that's not the case. The first I'd say 72 hours of every disaster is every person's total nightmare. Not only do you have to have the clinical knowledge and get your logistics in place but you're constantly confronting them with issues that are insurmountable. Well they just emptied three hospices and they're on the way to your location. All the patients are on ventilators and most of them are on morphine and they'll be there in an hour and a half and you have no ventilators and no morphine. Those are skills that you just learn in the field. So yeah, it would be nice if everybody had some training and some knowledge and people that are good at that are hard to find." [19]

"I didn't use much of what I learned in my four years. I learned everything on the job." [A10]

As disasters turn into public health emergencies (previously discussed in the category 'disasters present unique challenges'), public health knowledge and skills are vital to adequately respond to them. This is highlighted in the remarks by an experienced disaster physician.

“We're getting so specific that we have - we can tie medications to the disaster event. What are the most common ones? When Ebola happened, I remember being on the phones with Geneva in the early morning hours here. They were saying, we need more emergency physicians. Can you send them? I said, wait a second this is a public health emergency. Emergency physicians don't necessarily know a lot about public health. So, we talked about that. As a matter of fact, they ended up writing an article about the lack of public health skills was the Achilles heel in this. So many people that responded to Ebola in West Africa had to relearn an awful lot.” [11]

The participants also discussed the better integration of pharmacists in disasters. They highlighted that pharmacists need to be trained in all facets of disaster management to be adequately prepared and understand the role of other health professionals in disasters. This is illustrated in Case Vignette 1 from a US pharmacist.

“We had - in a hospital that I worked at, when I was a teenager and early in my career as a pharmacy intern in Orlando that was the recipient of 52 victims from a gunshot wound. You probably heard about it, the Pulse nightclub shooting and 49 people that were killed, but there were 52 people that were injured in that shooting. The majority of those went to a hospital which is two and a half blocks away from the nightclub. If you're talking about - I mean a disaster is anything that over - as you know, definition is anything that - over - that taxes the resources available. Five gunshot wounds all at the same time would be a challenging, busy evening and really a problem. They would call extra people in, but - it may not rise to the level of a disaster, but if you had 49 victims or 52 victims that are coming in at once, then, clearly, that's a bad - that's a disaster. I think that I - I think because of our proximity to that and the national attention that that particular incident - or maybe international attention that that incident happened - it was unique, I think, particularly because it was terrorism related, allegedly, and/or it was a gay nightclub, it got a lot of attention... The hospital was very, very - the pharmacy response to that was very, very, very poor. They had emergency department pharmacists that are there for their two shifts. The pharmacist - who was one of my former students - was on duty. She left her shift at midnight - at 12:30, I think - then an hour and a half later the first victim came in, several minutes after 2 AM. They called for help. They called for a pharmacist to come help them from the central pharmacy, and they go we're not - we're busy, we're whatever, we can't do it. They called the director of the department, who didn't answer his page, and they had minimal to no pharmacist support in treating 52 victims. It was interesting. I think that maybe it's changed now a little bit. I think that - anyway. I'm sure that there are a lot of places that don't really have an intake plan or have a... They have something down, but how they would really operationalise it and what it would have been in reality. I don't know. I'd be surprised.” [16]

Case Vignette 1: Pulse nightclub shooting

In Australia, pharmacists were previously able to rely on the Australian Therapeutic Guidelines to assist their clinical decision-making in CBRN disasters. This resource was removed based on the assumption it was not used. This is discussed in the comments by an Australian hospital pharmacist.

“So now there's not a huge resource that's standardised across the country that the pharmacists can tap into when they're asked these clinical questions to give the answer. So, if we had a central repository of information to be - enable pharmacists to help with that - those clinical questions that would be really good. I contacted the eTGs [electronic Therapeutic Guidelines] about that and they were unaware that people actually used it. So that's why they took it out.” [A9]

There is a need to provide pharmacists with specific resources in treating and managing disaster specific injuries and illnesses as they are on the frontline of the health system. They need resources to help them identify the signs and symptoms of CBRN-affected individuals who present to pharmacies. This is highlighted in the quote from a US pharmacist:

“But the other things, when you think about the other possibilities which you really need to prepare for all the time, like nuclear, biological, chemical incidents and things like that, that information is really hard to find. At least good information about that is hard to find.” [I9]

The summary points from the category ‘training and skills required in a disaster’ are outlined below:

- pharmacists need to be included in training
- currently in disasters, pharmacists learn mostly on the job
- public health skills are required to appropriately manage the complexities of disasters
- CBRN resources for pharmacists are necessary

6.4.1.1.5 Where do pharmacists fit in?

Pharmacists bring a different point of view to disaster management which can add value to multidisciplinary teams and can assist in the driving of disaster planning. They can facilitate idea generation which has previously not been developed. Case Vignette 2 summarises the different thought processes and viewpoints pharmacists can add to disaster preparedness.

“I mean you have to have one of the issues that we came across was we had no - when the airport was upgraded, and the staff were upgraded, they realised that they have no disaster management plan in place, in case of a plane crash. They came to us and said we need these drugs. I'm going why do you need these drugs, because there were things like morphine and what have you in there. Because this is what we're supposed to have in the event of a disaster. I said well where's your disaster action plan, and who's going to be the doctor, you don't have doctors, you don't have nurses, you don't have pharmacists. Who's going to be the person attending to this? They went oh, well we'll just ring the hospital, and someone will have to come. I said well the hospital needs a plan, so those sorts of things. No one had actually thought through the process, they just thought if they had the drugs sitting there, they'd be fine. But I said well probably, the hospital will bring their own supply but then when I investigated that, they hadn't thought of that either. It was like oh gosh. It all became a huge task that pharmacy almost was driving, because there was nobody else thinking about plan and in preparedness for this potential disaster.” [A2]

Case Vignette 2: Pacific Island airport disaster planning driven by a pharmacist working in the area

This case vignette raised an interesting point. Pharmacists are typically only included when the need for medications is considered. The difficulty with integrating pharmacists into disaster health teams and improving interdisciplinary collaboration is deciding where they fit within disaster teams. Pharmacists do not neatly fit into any of the single entities (i.e. governance, patient care, and public health) currently found within disaster management. Professionally, pharmacists straddle multiple entities including both the logistics and the medical fields, speaking both languages but not fully belonging to either. This is highlighted in the comments made by an NGO pharmacist:

“Role of pharmacy was historically shared between a nurse and a logistician - taking that away from those positions. A nurse has many more roles that a

pharmacist doesn't have and would be much more use as a nurse in these disasters setting and logisticians don't have the technical skills if something is a bit strange, while they can easily manage with the A-B and the setting up structures - they are not prescriptive in how things are set up. So, I see the key to be able to buffer between those types of positions. You [pharmacists] can speak medical to the medics and logistics to the logisticians, speaking the two languages. I think pharmacists are good at changing their language depending on who they are speaking to, even with the same information."

[A13]

From the comments made by the NGO pharmacist, pharmacists are placed under the logistics umbrella as that is currently where they are seen to fit the best.

"It's treading between the medical teams and the logistics team and you're [pharmacists] are essentially not in either but more under the logistical head - how to be in those discussions takes a lot of diplomacy, trying to get the fridge operating at the right temperature or why we need air-conditioning for the drugs. It's probably the least of the head of logistics concern in the scheme of things." [A13]

However, pharmacists also work across both the medical and public health sectors looking after the welfare of patients and the community in everyday circumstances and in times of disasters. Many patients tend to seek out pharmacists for public health advice in community pharmacies before considering making an appointment with another healthcare professional or going to overcrowded EDs. The recognition of the value pharmacists provide with regards to the health needs in a community during everyday circumstances and in times of crisis are highlighted in the quote by an Australian emergency manager.

[Everyday]

"We have pharmacies open seven days a week. So, [they] wouldn't be open seven days a week if there wasn't a need for that. There must be enough need to generate the income. So, the more I think about it, the more I'm thinking how important the bloody pharmacist is. I've never thought about that. It's stressing me out. But even in my little rural community, when I'm out at the farm, that pharmacy is open seven days a week. It might only be

for two hours on a Sunday morning, but he's open seven days. You go, wow, I never thought about that, but, yeah, there must be a need.” [A1]

[Crisis]

“Part of the challenge is actually integrating or liaising with the disaster welfare aspects of a disaster, who are more people focused, to get - is probably where the pharmacist is going to get greater understanding of their role. So, I think that the - in the health setting, what I'm seeing in Australia and in New Zealand, public health people are not like - have a different mindset to the medical people or primary healthcare. So, the idea of holistic medical - this is going to upset doctors, but doctors are very much, come in, fix this problem, I go out. Probably such souls having a close connection to the hospital/ambulance system. But I think that the pharmacist is more about people and probably has that more affinity to these - to the psychosocial welfare aspects of disasters.” [A1]

Pharmacists need to ensure responses in disasters are minimising the potential risk of their and others' actions, putting into place risk mitigation strategies. This is demonstrated in the quote by an NGO pharmacist who volunteers in the Oceania region.

“Some things you just have to let go, there may not be any medication charts for example. Some things that are in our [pharmacists] training here and that are important for checks and balances – you have to let go. So, it's trying to identify what it would potentially do the most harm and making sure the dispenser is giving the right thing and that the drugs are there when they need.” [A13]

The problem with attempting to achieve a role change in disaster management is that such changes need to be thought of and enacted before an event occurs. Once a disaster happens it is too late to change the roles and introduce new ideas – the status quo tends to be maintained by default when chaos ensues. This is highlighted in the following quote from an emergency manager.

“The hardest time to do it is when something's happening, because people are not open to new ideas. So, the idea's got to be done through the lead up to an event.” [A1]

The struggle is to keep the momentum following a disaster to carry through the role changes as people tend to lose interest as time passes before the next event occurs. There is potential for roles to be lost if interest in preparing for disasters is not maintained. This is illustrated in the remark from a US disaster pharmacist.

“The critical thing is when disasters aren't happening is when these roles get dropped out.” [19]

The summary points for ‘where do pharmacists fit in?’ are highlighted by the disaster key stakeholders. These are:

- pharmacists professionally straddle both the logistics and medical practice areas
- pharmacists professionally straddle both the medical and public health practice areas
- pharmacists need to participate in risk mitigation strategies
- pharmacists’ roles need to be incorporated in the preparedness phase
- momentum to maintain pharmacists’ roles in disasters is difficult

6.4.1.1.6 Donations in Disasters

Donations of medications in disasters are often believed to be wanted but are frequently found to be inappropriate. The reasons donated medications are often not appropriate for the disaster-affected country include not being medications used by that country, packaged in a different language, or medications which have expired or are close to expiring. This is highlighted in the quotes by a volunteer NGO pharmacist and a WHO emergency physician.

“We discovered that almost 75 percent of the donations will, of the little donations that will take a large time to classify - will go to the third group and will never be used.” [14]

“Things like 50,000 jars of face cream, I'm going why do we need 50,000 jars of face cream. It was just crazy, the stuff that was being sent, and it was purely as a tax thing from America. They were going to send us all this short-dated stock and excess stock that they'd collected from various companies,

write it off against their tax as a donation. It gets dumped in these countries that have no facilities for disposal, and we wouldn't have used. I went through and worked out that we would have maybe been able to use about seven or eight percent of the supplies that they'd offered us. They were already packed up and ready to go, but I intervened and stopped it. I wasn't very popular with the man who'd packed it all up, but anyway. That's a very important role for pharmacists, because not everybody has the time in a disaster to actually look at that stuff." [A2]

Pharmacists have been identified as having a role in preventing the inappropriate donations and ensuring the appropriate disposal of inappropriate donated medications. They have the requisite attention to detail in evaluating lists of potential donations and the expertise to know what drugs are needed. The WHO's essential medicines list and donations guidelines¹⁹² are good resources for companies wanting to donate as developing countries drug formularies are typically based of the essential medicine list.

"He [central medical stores manager] said I just went through and went oh yeah, we have all those things. I [pharmacist] said but did you not notice that it was 90mg sustained released Nifedipine and we only have 20s, and did you not notice it was 360mg mini bag of Gentamicin and we only have 80mg in 2mL. I mean those sorts of things cause mistakes in those countries, because people aren't familiar with different strengths and different forms of things. I said did you not notice that it had expired. He wasn't in to checking the detail because he was overwhelmed with his responsibilities and his day to day operations. It just helps to have someone a bit more pedantic I suppose and prepared to check those things." [A2]

The 'donations in a disaster' category raised the following topics as identified by the disaster health stakeholders,

- donations of medications are not always wanted or appropriate
- pharmacists have a role using their expertise to ensure the correct disposal of inappropriate donated medications

6.4.1.2 Community Theme

The theme 'community' encompassed the identified categories 'importance of pharmacy in the community' and 'business continuity'. Pharmacies provide vital everyday primary healthcare services that members of the community rely on to obtain access to their medications and advice on their health and medications. This theme discussed the reliance on pharmacies and pharmacists during times of disasters not only from those adversely affected by the disaster but by volunteers who came in to assist. Figure 23 illustrates the development of the 'community' theme from the two categories 'business continuity' and the 'importance of pharmacy in the community'.



Figure 23: Community Theme and its associated categories and codes

* Appendix D lists the individual codes 51-69

6.4.1.2.1 Business Continuity

Business Continuity Plans (BCPs) acknowledge the inevitability of a disaster affecting any business and outline the management strategies to handle the disaster event. Pharmacies are no exception from this and as businesses need to have BCP that include disaster management strategies. Many pharmacies may not have a comprehensive BCP that includes disaster management strategies. A government disaster manager illustrates the dilemma faced by pharmacies in disasters and how a BCP suggests pharmacists need to be proactively involved:

“Most pharmacies are businesses. They run a business and a business at the end of the day is there to make money. Nobody's in a business not to make money otherwise it won't - it'll cease to be a business. They have two options when - if they are involved directly in a disaster - their community - their business can either succeed and survive or it can fail. The failure for the pharmacist is that their business potentially is - that location is jeopardised,

ceases to exist and they either financially go under or they go away and start the business elsewhere. That doesn't really help the community because up to then they were waiting for that pharmacist - that particular pharmacy - and relied upon them to supply them with their pharmaceutical needs. So, there's almost like an obligation that's part of the business continuity to make a decision that you're either going to be there for that community hell or high water. But how you're going to manage it." [I13]

Disaster management strategies need to be incorporated into BCPs. This is especially important for pharmacies which are often found in potential disaster-prone areas and provide care to those individuals in the community who are more vulnerable to adverse health outcomes in a disaster. This was highlighted in a national disaster simulated exercise described by this government disaster manager in Case Vignette 3.

"I'll give you an example - so we did the national exercise based on a relatively close tsunami event affecting the coast...As part of that - the majority of the coast lines would be affected and there'd be little warning because unfortunately it was a close tsunami...The climate there is in fact lovely, it's beautiful - and it's where a lot of people come to retire. They come to the sea and the beach and so they build a lot of retirement villages and homes there and of course that means you have an elderly population quite close to the beach. As a consequence, you've got - that unfortunately and a fact of life is, GP practices and pharmacies are attracted to those sorts of populations because there is a need. So, they build their premises in the same sort of locations which are adjacent to these retirement villages and retirement homes and unfortunately because old people like to have - majority is a sweeping statement - but majority - they like to have flat surfaces to walk along - flat surfaces and beaches, tsunamis love. So basically, when we did the mapping for all the inundation zones and we looked at it and overlayed it where the pharmacies and GP practices were, I think there were probably two out of the 20 that were not lined to be inundated with a tsunami wave. So I would suggest to you that there's possibly 18 pharmacies that aren't going to be doing - applying their trade for a considerable time even if they have got some form of business fall back plan, because pharmacists things like - as you know pharmacies have to be licenced premises and there's a raft of legislation around securing capabilities there, double locks and controlled drugs et cetera.

So, none of it's easy, but I don't know how much attention is paid to what one would do if that scenario happened. The impact for the community I would suggest would be huge for that sort of loss. So yeah, does that sort of give an indication of why I am a little concerned about some of the - I think probably on the domestic front, I'm not sure that enough attention is paid to what either their business continuity plan would be because I don't know if it's looked at in as much depth as it could be." [I13]

Case Vignette 3: Simulated government tsunami mapping exercise and its projected impact on pharmacies

If a disaster inundates a pharmacy infrastructure that does not mean the pharmacy services and the pharmacist's expertise are rendered unavailable. With adequate preparedness and a comprehensive BCP, pharmacists can continue to provide services to their communities under difficult circumstances. Hurricane Andrew in 1992 wiped out almost every pharmacy building in Miami, however, the local pharmacists continued to provide what they believed was an essential service to their community for months after the hurricane had passed. This was mentioned by a US pharmacist.

“Another great example is when Andrew came through in 1992 at Miami. The extended recovery phase for a pharmacist down there was significant because basically every pharmacy in Miami got the windows blown out and all the stock destroyed. They had to bring in basically tractor trailers and set up temporary pharmacies on the parking lots of places where there used to be actual pharmacies. The pharmacists that worked in those had to basically work through that recovery period until such time as their infrastructure was back in place. That was an extended period of time, sometimes months before everyone was back to normal.” [I5]

To assist pharmacists with providing support to their communities, pharmacists and their wholesalers have a long-standing relationship in terms of ensuring timely access to supplies of medications. In Australia this is ensured through the CSO agreement between the government and pharmaceutical wholesalers (discussed in Section 2.6.1.5.2). This is illustrated in the remarks by a north QLD pharmacist who had experienced numerous cyclones.

“Over the years I know we have been cut north and south. But being - the wholesalers are quite nimble with - they will airfreight medication in. I know back in - I think it was '91, we got stuck both ways, and it was a bad year. We got cut off north and south, so it took some time for that order to come down. We were actually flying in the stock. So, the wholesalers having contingency plans to be able to get medication in is critical as well.” [A8]

A business cannot rely on the tacit, corporate knowledge of their experienced staff who may have weathered previous events or lived in disaster-prone areas for years. If this knowledge is not recorded or embedded in the pharmacy's BCP, the pharmacy's ability to prepare or respond to future disasters may be impacted. This concern is portrayed in Case Vignette 4 by an NGO pharmacist who assisted in response and recovery activities during cyclone events which affected the Oceania region.

“Simple things, like there was only one key, Japanese government built a new hospital for the village. But they had only given two keys for the pharmacy department, and one of those had been given to the executive and they'd lost it. There was only one key for this particular door, and it was a door that you couldn't change the locks, you couldn't get another key cut in country, you couldn't even get another key cut in Australia. It was only a Japanese particular construction and there was only one key. I said well what would happen if Garry had been unable to get to work. He'd actually got in there before the cyclone hit and they moved many of the patients in to the pharmacy, because it was one of the most secure building, the new buildings.*

They were lucky that he was close, and he could open up, and they moved all these patients in to the pharmacy department. Because it was one of the most secure buildings, because the old ones are losing their roofs left right and centre. In that situation, you're going lucky he was there, but he may not have been there, and then there would have been the whole situation of okay, who's got the key, how do we get the key, where is Garry et cetera et cetera. Those sorts of things need to be addressed and it's going to need replacement of the door effectively, which is no mean feat, given it's a specially designed door from Japan. They'd gone, oh yeah well it was no big deal because Garry* was here. I said but what happens if he's not here next time, who's going to get the key then and maybe they won't be so lucky or so close at the time of the cyclone.” [A2]*

Case Vignette 4: Disaster plans are essential, a business cannot rely on institutional knowledge
*name changed to protect confidentiality

The 'business continuity' category raised the following matters by the participants:

- pharmacies should have comprehensive BCPs that include disaster management as many pharmacies can be built in disaster-prone areas
- pharmacists are capable of helping outside of the bricks and mortar of a pharmacy building
- healthcare organisations should not rely on tacit, institutional knowledge that is not recorded in any BCP
- relationships with wholesalers can assist in maintaining supply of medications during disasters

The reason BCPs are so important for pharmacies taking an all-hazard approach to disasters is because of the strong reliance on the important role pharmacists and pharmacies have in their communities.

6.4.1.2.2 Importance of pharmacy in the community

The ‘importance of pharmacy in the community’ is illustrated in Case Vignette 5 by a US disaster pharmacist following a hurricane.

“I had a person come to me as a pharmacist at some hurricane and I looked down at his foot and it just looked horrible. It smelt pretty bad too and he came just because he didn't have any more prescriptions. I said how did you let your foot get so bad? He said when the hurricane came it knocked down my house and killed my wife. He had this scruffy little dog with him and he said all I have left in the world is this little dog and I knew if I came here you would take my dog away. So that's where you as a pharmacist started out with a prescription and ended up unfortunately not saving somebody's wife but at least saving his life.” [19]

Case Vignette 5: Community pharmacist making a difference in a disaster to a patient’s outcome

Pharmacy services are relied upon not only by those disaster-affected individuals but also by those volunteer and workers who come into the disaster zones to assist as highlighted by an incident command controller.

“So, I think that pharmacists have an important role in supporting first response, even in terms of like I've seen some bushfires where there'll be 200 firefighters in and the first thing you spend the first few days going to the pharmacist getting stuff for them, because they've left it all back in their home state.” [A1]

It was identified in the interviews that a pharmacy is a community landmark, pharmacies are easily accessible, and pharmacists hold the public’s trust as medication experts as outlined in the quote made by a local citizen and incident command controller.

“Whereas a pharmacist is actually with a person through their health cycle. The medical response tends to be at specific, intermittent parts of your health cycle, when things go bad. But I go to a pharmacist when things aren't bad, when I have little things that just need tweaking...I think the pharmacy itself,

not just the pharmacist is a huge asset, so if I asked - probably in my opinion if I could ask someone where the pharmacy is, they go, it's there. If I said to someone, where's the laundromat? Only some [would know] where it is, because not everyone goes to a laundromat, but I think [everyone] virtually goes to a pharmacy at some point every year, because there's always something you've got to go and get fixed.” [A1]

Pharmacists are identified as the third largest group of healthcare professionals and therefore are easily accessible, being the most widely distributed healthcare professionals in a community. Pharmacies are more accessible than supermarkets, banks, or medical centres.³⁰³ Pharmacists are well-placed in the community to be a significant asset that could be utilised in disaster management. This was highlighted by an US pharmacist:

“The other thing that makes pharmacists uniquely well suited for disaster response is just the sheer number, at least in the United States, I'm not as familiar with other countries and how they're set up, but in the United States we have over 60,000 community pharmacies and the average distance that a patient live from a community pharmacy, if they live in a city, is less than a mile. If they live in a rural area, it's typically somewhere between five and 10 miles to the closest pharmacy. That's a greater density than any other healthcare provider.” [I6]

Community members expect pharmacists to keep pharmacies open, to provide general health supplies and prescription medications. Pharmacists are often operating as first responders in a disaster as those adversely affected by a disaster come to pharmacies as their first port of call to get help. This is highlighted in the quote from an Australian community pharmacist from their experience working in a cyclone.

“A lot of the doctors weren't open or available. The hospital was chock-a-block, so there was certainly an immense amount [of] primary care. I can't remember how many cuts, injuries I saw that day that I either literally treated myself or bandaged up or referred to the hospital, if I felt it was necessary. So there was certainly a lot more primary care stuff, rather than your

traditional dispensing...definitely the role becomes more of a primary care, nursing, first aid type role in the immediate aftermath.” [A12]

Interviewees who had participated in disasters as healthcare professionals mentioned how vital the community pharmacy was in acting as a communication hub and surveillance tool in the recovery of the local community. Often it was the community pharmacy which would be the first business to be operational following a disaster event as discussed by this US disaster emergency responder.

“When I got to a community after a disaster, the pharmacy - I don't know how it works in Australia. But these would be the private drug stores, pharmacies like Boots[®] in the UK. But there's CVS[®] and Rite Aid[®] and Walgreens[®] here in the United States. There's Mom and Pop Pharmacies, private ones. The pharmacy is generally the first institution that gets up and running. They will know what physicians are in the area and whether they're operational or not. They'll know the patients that are in the area. So, they're one of the key groups I find. So, I will go and try to find the closest unaffected pharmacy that's operational and then start there and then work back towards the epicentre of the disaster. So, I actually, you know they have a huge role in taking care of their community. But I actually use them as a surveillance tool to find out how the community is recovering. Hospitals take a little bit longer to do that.

Doctors are mobile. So, they are victims as well as first receivers. Not first responders, but first receivers and caretakers. But the pharmacist or the pharmacy is usually the first medical operation, first yeah, medical entity that's fully operational. So, the role they play is to rebuild the community. Because if you aren't able to get your medications, then you will send the kids and the non-bread winner out of town and the bread winner generally stays behind to rebuild. However, if you have medical care there and it starts with the pharmacy, then the family will generally stay intact and will work on rebuilding the community.” [13]

It has been suggested pharmacists could assist with roles in providing shelter and administering or prescribing medications in a disaster. However, there is a question of the legality of pharmacists performing these roles under their respective country's or state's regulations as commented on by a UK emergency physician.

“Community pharmacy like within a store, they may be able to provide shelter. They might be able to provide hydration. They might be able to provide certainly basic first aid and materials to achieve first aid. They would probably be able to provide in a certain context - but I'm not sure - this would be taking them perhaps out of scope - is whether or not they could give analgesics or antibiotics or tetanus and other types of things. I think they would have that capability but whether they would have that legally I don't know.” [I12]

The ‘importance of pharmacy in the community’ category raised several key concerns and issues identified by the international disaster health community. In summary these were:

- pharmacies are landmarks and communication hubs of their communities
- pharmacists have the accessibility and availability within communities to be of assistance
- pharmacists’ roles change during disasters into more of a ‘first responder’ role
- pharmacies are vital to the recovery of a community as they are usually the first business to reopen following a disaster event
- concerns of legality for some of the pharmacists’ roles in disasters

The roles of pharmacists in the community are important but it was also identified by the participants there is a place for pharmacists to positively influence government policy. It was suggested pharmacists should be included in health decisions made at the government level for disaster plans.

6.4.1.3 Government Theme

The theme ‘government’ exemplifies the need for government involvement to bring about positive change to the roles of pharmacists in disasters. It was acknowledged throughout the interviews by the participants that pharmacists can assist governments with health decisions pertaining to disasters. Pharmacists with the support of their government can provide cost-saving services to the community

by seeing to the needs of patients with chronic diseases. Figure 24 illustrates how the theme ‘government’ was developed from its respective codes and categories.

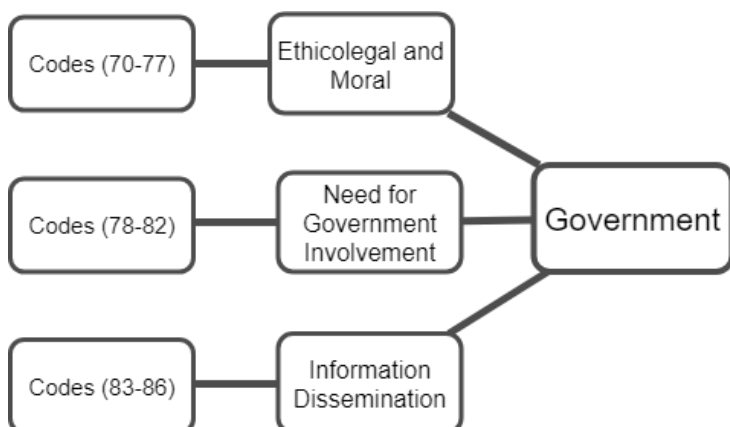


Figure 24: Government theme and its associated categories and codes
 * Appendix D lists the individual codes 70-86

6.4.1.3.1 Ethico-legal and Moral

The question of when pharmacists become more active in disasters is not hypothetical. Pharmacists are already performing many of these roles in an *ad-hoc* fashion in different capacities when a disaster impacts their community. The ethico-legal and moral issues need to be discussed and resolved. Some pharmacists believe they have a duty of care to respond and assist and this outweighs the current legal constraints. This is highlighted in the comments by a community pharmacist and their experience during cyclones.

“I came back in the morning. We then battened down the hatches because it hit that evening, okay, then I went back in on the next morning early, and I'd been communicating with the hospital the previous - you know, before it hit - to say that I'll be in the pharmacy by 9am on that day - the next day and if you have any prescriptions, et cetera - because we were getting warned to be off the roads. The police, emergency services, don't want everyone driving around, so I said I will come in, I will do one hit, get as much of it as I can to you and then, yeah get it to you by sort of 10-11 o'clock that next day and then after that I'd hope that everything would return to normal.” [A8]

These pharmacists are risking their lives to ensure their communities have their medications and providing pharmacy services.^{290,291} There is an ethical consideration with the giving away of free medications in a disaster. In many instances, patients

cannot pay for them as they have been evacuated without their money or with power outages usually proceeding disasters. Electronic pay systems can be down for days to weeks.

Another ethico-legal and moral issue that arises for pharmacists in disasters is the restriction of the three-day emergency medication supply rule. This was compounded with other issues identified by the participants. These were:

- 1) disasters usually last longer than three days,
- 2) in Australia, without a PBS prescription, patients do not receive their medications at a government-subsidised cost but rather the patient is charged the whole cost of the medication,
- 3) patients do not have any money to pay for the medications, and
- 4) the need to resupply medications every three days for disaster-affected individuals means ongoing trauma to both the patient and pharmacy staff.

Therefore, more often in a disaster, pharmacists find themselves spending hours attempting to contact and get prescriptions from patients' doctors from other states to be able to provide an adequate supply of medications. Pharmacists sometimes find themselves considering providing patients with what is known as an 'owing' for a month's supply of their medications to get them through the crisis until they can get to their doctor to obtain a prescription to cover the 'owing' provided. Some pharmacists consider supplying an 'owing' prescription for medications to continue the care of patients is ethically appropriate. However, this supply of a month's worth of medications without a prescription is not allowed according to pharmacy legislation. In Australia oral contraceptives and lipid-modifying agents may be given by a pharmacist according to the National Health (Continued Dispensing) Determination under the National Health Act 1953.³⁰⁴ This is highlighted in the comments by an Australian community pharmacist.

"I mean, obviously you can supply your three or four days, but our preference is always to contact surgeries, regular prescribers. So in most of the instances, we were actually able to get either a verbal or a faxed prescription from out of region doctors for their patients, so that's better than doing an

emergency supply and then the person had to - it's always better to do a owing script for a whole lot after contacting the doctor, because that gives the patient a bit more time, because two or three days, you know, they've got to try and find the doctor again. It just - it gets messy with emergency supplies. There were a few situations where we did - obviously we did have to do emergency supplies. We couldn't contact every doctor. But then we just - we always - when we get the prescription, we fax the balance of the box. The whole emergency supply system is reality doesn't work in communities. It's just not functional.” [A12]

The remuneration of pharmacists was raised as an issue in relation to disasters. Pharmacists who volunteered to help their communities in disasters should have their contribution recognised. It was mentioned by an Australian community pharmacist that retail pharmacists are not paid enough to risk their lives to help. There is an underappreciation of the value pharmacists contribute whether it is a specific disaster pharmacist position or a local community pharmacist responding. This is illustrated in the remarks by a US disaster pharmacist and an Australian community pharmacist.

“The agency that I deploy with, the National Disaster Medical System, undervalues pharmacists from a number of aspects, not the least of which is we're volunteer responders, but we are paid for the times that we're responding and the pay rate, as a responder is about less than half of what a pharmacist makes in a real world. So, people have families and mortgages, you know, it's all well and good to say, okay I commit to deploying for two weeks, but being able to make it at home is important and that would help with recruitment. Some of us are nuts like me and I'm not in it for the money, but you know, that's not the case for everybody.” [I15]

“Well one part of me said they don't pay us [pharmacists] enough money to risk our lives.” [A8]

An interesting point regarding legality of medication supply during disasters was raised by a disaster pharmacist who has extensive experience in the field.

“It kind of amazed me that in a regular hospital or a retail setting nothing happens that isn't supervised by a pharmacist. That's the law in most places here and yet they [disaster teams] were sending medicines out into the field completely unsupervised which would be enough to lose your pharmacy licence in the real world.” [19]

The participants discussed several ethico-legal and moral issues associated with pharmacists' roles in disasters, which are summarised below:

- pharmacists feel there is a tug-of-war between their duty of care to their patients in disasters and the legal constraints
- the three-day emergency medication supply rule hinders appropriate patient care in a disaster for some countries and states (reviewed in Chapter 4)
- the issue of remuneration was raised for pharmacists who provide medications, supplies, and pharmacy services to disaster victims
- legally medications are not able to be given to a patient without the supervision of a pharmacist in everyday practice, disasters should be the same

6.4.1.3.2 Information Dissemination

Communication was seen as a critical component of disaster management. Participants suggested communication needs to be improved across the different organisations and stakeholders involved in disaster management. Information needs to flow across the different platforms of healthcare but also needs to filter down to the public. Pharmacists should be included in the decision-making processes to assist with the information dissemination from the command centre to pharmacies and *vice versa*. This was highlighted in the comments by an emergency manager.

“...because when we had our crypto giardia scare and a lot of those people who fronted up at pharmacies and, look, I've got diarrhoea, I've got this, I've got that, no one had gone to talk to the doctor and said it. So - but the only information stream that went out from health was going to doctors through - in those days it was faxes. These days it would be email. But I'm 99 percent

sure there was never any - in any meetings, in any of the coordinating meetings, no one ever mentioned about how they would get that same information about what was happening to - we had eventually got a way to get that information to dentists, which wasn't normal. So, we - that - I would have thought health would handle that, but we had to go and work with health to contact the dental association or some damn thing. So, I think the health departments have a very narrow view of the health provider sector. Well, that's - this - like, that - the Water crisis was '98. The world might have changed, but I'm not seeing it." [A1]

The disaster health stakeholders identified a few concerns in the information dissemination category. These were:

- communication needs to be improved across organisations involved in disaster management, filtered down to pharmacies, and conferred back from pharmacies to the command centre
- information sent out to the health sector does not include providing information to pharmacists and pharmacies

The participants identified there is a significant role for pharmacists to play assisting governments to improve their health disaster plans. They also identified there is a need for governments to support roles pharmacists are undertaking in disasters.

6.4.1.3.3. Need for Government Involvement

Pharmacists need to be more active in government roles and be given the opportunity to contribute on health policy decisions especially in terms of disaster management as they are a significant portion of the private health sector assisting the community. Pharmacy professional organisations should be advocates promoting and raising awareness of pharmacists' roles in disasters. Government and health departments tend to have a narrow view on healthcare services and the immediate professionals necessary to provide them. They often overlook the community services (i.e. GP practices and pharmacies) and focus on the emergency services and government funded hospitals. This is highlighted in the comments by a government pharmacist.

"I do think that when you have health policy being made in these areas, if you don't have pharmacists involved in the conversations we'll never - where we are challenged to overcome those knowledge deficits and we'll miss an opportunity to help tabulate and the pharmacist skillset to extend...

Legislative setting, policy setting, have pharmacists involved in those processes. Local relationships or lack of local relationships. Part of it is other providers not understanding what pharmacists can add. It's also part of the same picture if you've got your regional emergency planners who don't understand the role that pharmacists do or could play, and they're not proactively included and engaged with the regional emergency response planning, and that would be a barrier to pharmacists playing a useful role; (a) it wouldn't have been thought through what the role of the pharmacist could look like and (b) you turn up in an emergency scenario and you expect somebody to respond when they've really not been required to think through what that looks like and how you'd do it.

I think it's quite important to ensure that your government-based pharmacists are hooked into that emergency preparedness policy work. I think that your regional emergency teams need to be bringing their local community pharmacists into the conversation. But I also think our professional organisation can set a different expectation. It disturbs me when I hear you say things before like well, we don't get paid enough to do that. I don't hear other health professionals saying the same thing and I'm not convinced that there is that much an income disparity across the professions that I've heard, that I'm thinking of. It wouldn't land well if you had an emergency and you have a local health provider who said I'm not going to help." [A14]

6.4.1.4 Pharmacy Theme

The 'pharmacy' theme incorporates where the pharmacist's role is currently in relation to disasters. It also discusses the recent movement in pharmacists' roles in disasters, highlighting why the interviewees believe it is a good idea to have pharmacists involved in a disaster. This theme also outlines how training opportunities given to pharmacists can facilitate better inclusion in disasters.

Figure 25 illustrates the development of the abstract pharmacy theme from the codes and categories.

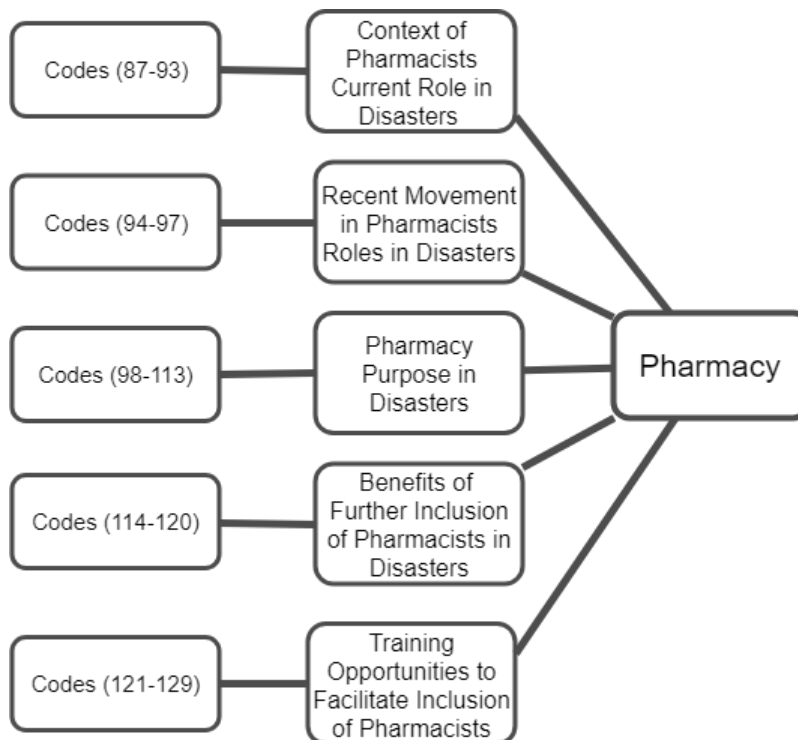


Figure 25: Pharmacy theme and its associated categories and codes
 * Appendix D lists the individual codes 87-129

6.4.1.4.1 Context of pharmacists' current role in disasters

It was discussed at length by several of the participants that pharmacists are not utilised in disasters to their full potential. It was emphasised pharmacists bring a unique skillset of both logistics and clinical skills into the mix. However, currently in terms of disaster management there is an underutilisation of the clinical abilities of a pharmacist. This is highlighted in the comments from an Australian hospital ED pharmacist.

“So, I mean, the biggest thing at the moment is using the clinical aspects of a pharmacist's skills in a disaster as well as the logistics, both being important, but at the moment...the logistics is probably the only thing that's used of the pharmacist's skill set.” [A9]

However, the argument was raised that if a pharmacist was included in a disaster team there is usually only one of them and they are predominately doing the job of several pharmacy profession/industry personnel (pharmacists, dispensary

technicians, supply management, and logisticians). As suggested by this disaster pharmacist.

“Then in country, the job is basically to do all of the roles of the pharmacy technician and pharmacist in the field hospital. So, we've got to make sure about medication security, medical supply, impress supply, clinical checks of all of the patients, liaising on short stock to get resupply, et cetera...

Everyone was saying I don't want to go on a deployment as a team of one, because the pharmacist was up at six and working till 10 to try and get everything done, because they were so busy in the hospital, restocking, et cetera, et cetera and they were involved in so many different things with the clinical work and just stock control, et cetera....I think it's quite stressful for the pharmacists on deployment because we just don't do logistical work normally, so we don't normally check Impress and top up Impress and all of that kind of thing, we're just so focused on the clinical side of things, that we don't have that luxury on deployment.” [A3]

This then raised the question for many of the participants as to ability of pharmacists to expand their skills and assistance in a disaster, due to the large responsibility of a single pharmacist on a team.

“A big part of it is firstly that we have limited numbers of people available on the team and we haven't had enough deployments and we haven't documented the workload of the pharmacists enough to justify an increase in the one position on the team.... So, I think that's the limiting factor, we haven't actually been able to prove that we [pharmacists] are overworked. Yeah, I know it anecdotally, but we haven't actually collected that data.... They generally go in with logistics as well, so they're not doing - but at the end of the day, when we deploy, we're on call 24 hours a day for however long it takes, so we've got nowhere else to go. That sounds really sad, but you know it's not like you're going off shopping or down the road, so you literally man the pharmacy for 14, 15 hours a day, and that's just what you do.” [A3]

With the limited presence of pharmacists in disaster teams, there is a push for pharmacists to keep their focus and time on logistics which is the primary reason they are often deployed. One DMAT member stated,

“Our pharmacists and pharmacy do other things, they do order and help with patients, they do file size. Quite frankly the large number of responders can do multiple jobs, and so pharmacists are not - pharmacists can do other things that help but we need them as pharmacists who keep track of drugs and are very useful, rather a pharmacist in a field than a nurse or a managing practice person trying to do the same job.” [18]

It becomes a tug-of-war between ‘the could’ versus ‘the should’ for pharmacists’ roles in disasters. Just because a pharmacist can help in a particular way, does not mean it is in the best interest for the response team or the community. In terms of roles for pharmacists in disasters, the participants mentioned the importance of not neglecting their pharmacy duties to undertake these new roles. This is highlighted in the comments provided in response to the Likert scale questionnaire.

“I think there are some things a pharmacist should be doing, like supply management and anything to do with medications and algorithms of treatment and treating the outliers that are not to do with the disaster and treating the patients with their chronic medications, if they might be missing out - anything a pharmacist should - that a pharmacist should be doing that’s their mainstay background of what they should be doing. All the other things - yeah, a pharmacist could do. There’re pharmacists in the health department doing some of those education roles and the pharmacist could be doing that but doesn’t have to be a pharmacist. That could be a health education officer, who doesn’t have a pharmacy background. So, yeah, it could be a pharmacist, but I don’t think it needs - should be a pharmacist. So, yeah, a pharmacist could vaccinate, a pharmacist could administer a vaccination, a pharmacist could prescribe vaccinations. I don’t feel strongly against that they can be doing that. But should they be doing that? No. They do - there are other people that can be doing that role. I think the ones that I put high [as a higher priority], I was probably thinking they were more in the pharmacist’s scope of practice that a pharmacist has the skills of and the ones I put lower, there are other people that could be doing those roles.” [A4]

“As I say they shouldn't lose sight. You don't want to - one of my pet peeves - nurses, pharmacists, who want to be doctors. If you want to be a doctor go to medical school. There're so many important roles for pharmacists you don't need to be a, you know, when I first - I thought to become a paramedic was going to help me somehow. It's okay because I have another pair of hands that they can use if they need me but I'm always careful not to get out of my pharmacy role to go work somewhere else. That would be the key to me.” [19]

The context in which a pharmacist is working can impact on what their role in a disaster might be. In a hospital there would be access to multiple physicians to work collaboratively. However, in a cut-off community the pharmacist may not have access to other healthcare professionals and may need to step up in their roles. This is demonstrated in the comments by a UK emergency physician.

“So, I think the location very much determines what the clinical practice would be because in the hospital, there's multiple physicians right there that can always work directly hand-in-hand with a pharmacist, but then in community, it wouldn't necessarily have that. It doesn't mean that it couldn't be established by radio or phone, but that would have to have some sort of plan and some sort of legal framework to make sure that it's considered acceptable and everybody understood the limits and the standards that would have to be maintained around that.” [112]

The disaster health stakeholders outlined the main points in the 'context of pharmacists' current role in disasters' category. These were:

- pharmacists are underutilised in disasters
- there are not enough pharmacists involved in disaster teams, with a single pharmacist taking on the role of several pharmacy personnel
- pharmacists cannot lose sight of their main priority of medication continuity of care during disasters - only they can do their role
- the context in which a pharmacist works can impact on the role required of them during a disaster

6.4.1.4.2 Recent movement in pharmacists' roles in disasters

Although the context of the current role of pharmacists in disasters seemed to be limited to logistics, there were signs of the slowly changing attitudes of other health professionals on pharmacists' roles in disasters. Disaster health teams are beginning to rely on pharmacists for their clinical expertise as medication experts. This is evident in the statement made by an experienced disaster medical physician who served in the armed forces.

"But pharmacists - it may be the culture - I don't know how they are in Australia but here they stand behind the counter in the pharmacies and pretty much there was no conversation. But over the years they have become much more engaged in giving education to people that show up as you know. Now they give shots for flu and other things. So, you can have a real engaged conversation with them about disease. Again because of my age, the pharmacists I knew before were, 'just pill pushers'. If you asked them something, they'd either have to look it up or say I don't know. Now you [can] have an engaged, intellectual conversation with them about side effects and everything else like that. So, academia has come to pharmaceuticals and more broadly - especially in the humanitarian field - they do have to know a hell of a lot more than just prescription, fill it, give it, tell the side effects. They do engage with us clinically when we are running out of supplies or we're looking for options. So, we talk to them about it...

As I alluded to before pretty much, I never relied on a pharmacist for a lot of education nor would I ever call them or things like that. It was always my - I always thought I knew more about the drugs than they did. Essentially, they filled the prescriptions and said very little. That has totally changed. That has totally changed. They're the experts now. Probably sometime slowly in my own life I overcame it and started seeing them more and more as colleagues that I can chat about a disease situation. I provide what my dilemma is, and they provide what their dilemma is. We're much more collegial. That has been a big, big change. That should positively transmit to a disaster situation."

[111]

Many of the interviewees made comments to the impending shift they expect for pharmacists into more clinical roles in disasters and compared this to previous shifts in pharmacists' roles on hospitals wards.

“It’ll be like clinical pharmacy, they never thought we needed pharmacists in the wards, and now we’re everywhere, so it’ll just take time. Hopefully it’ll be a shorter space of time and people will acknowledge and appreciate the value of having a pharmacist on board.” [A2]

One of the participants mentioned that before 2004 there were limited pharmacists' roles available in NGOs. Whereas today, with the increased awareness of the value of having a pharmacist within NGO teams, there are increasingly more pharmacist positions becoming available at all NGO levels (including at NGO headquarters developing plans and procedures). Pharmacists are reportedly increasing in numbers attending disaster health training courses. These courses previously only had doctors and nurses in attendance but are becoming much more multidisciplinary over time. This highlights not only the increase in jobs being made available in the NGOs for pharmacists but also in the interest from pharmacists to upskill and prepare for disasters.

The participants identified there has been recent movement of pharmacists' roles in disasters. These are summarised below,

- there has been a shift from pharmacists being viewed as “pill pushers” to medication experts
- increasing presence of pharmacists in NGO positions
- pharmacists are increasingly interested in and attending disaster training courses

6.4.1.4.3 Pharmacy purpose in a disaster

The purpose of pharmacists in disasters was discussed at length by the participants with their primary objective being to identify the core responsibilities of a pharmacist in a disaster. The participants decided ‘ensuring continuity of care’ is the primary purpose of pharmacists in disasters. Ensuring continuity of care encompasses many facets of a pharmacist's skillset and services – logistics,

vaccinations, medication reconciliation, being open and accessible, providing emergency supplies, educating and counselling patients, providing behavioural first aid, managing chronic disease patients, and participating in risk mitigation strategies. Pharmacists are trained and qualified in a vast array of skills. A Canadian pharmacist suggests ensuring patients have their medications is ensuring continuity of care.

“I think in terms of a frontline pharmacist prevention and mitigating - I think management of chronic diseases, if you're going to be in the scenario of where patients are without medicines or need new medicines to manage chronic disease, pharmacists can easily do that.” [12]

Pharmacists can assist patients in their community in ensuring continuity of care by keeping the pharmacy operational where possible.

“They have a role to play in ensuring that they can be - for the extent humanly possible, be up and functioning as soon after an emergency as possible.” [14]

It was highlighted in the interviews by several of the participants that the main purpose of pharmacists in disasters is to manage chronic disease patients and those with minor ailments. Disaster victims with chronic diseases and/or minor injuries who do not require a doctor’s immediate attention are often referred to as the ‘walking wounded’. These groups of individuals, whilst seen as a low priority on the triaging scale of disaster management, can quickly develop acute complications if not adequately managed in a timely manner. This can result in the consumption of more of the limited healthcare resources. Many of these ‘walking wounded’ patients can be prevented from escalating up the triage scale by ensuring continuity of medication management. This is illustrated in the comments by a disaster pharmacist and a hospital ED pharmacist.

“So, the biggest concern is making sure that chronic care needs are taken care of, because what we kind of typically see is that if chronic care needs aren't taken care of, then patients actually decompensate pretty quickly without about three to five days. We start to see blood pressure, diabetes and those kinds of things become such an issue that patients may have to go to a hospital or urgent care setting.” [15]

“In the bushfire events it was not so much the bushfire victims coming in, but rather everybody else that was left in the department while people were being attended for bushfire victims, so just your normal old lady with the fractured hip that was getting a little less care in the department, just to ensure they had their medications appropriately charted and were receiving their pack of medications appropriately, because people weren’t - they weren’t being given the same amount of time and attention that they may have previously, when there wasn’t an event going on.” [A4]

Medication reconciliation was considered by participants to be an important role for pharmacists in disasters. Pharmacists have the expertise and time to assist patients in determining what medications they are taking, and identifying which ones are critical for them to have immediately following a disaster. This is discussed in the comments by an experienced disaster emergency physician.

“It mirrored society but it was amazing not only how many people needed their medication right away or stated that they did or did not know what medications they were on. So sometimes the pharmacist gets into playing touch with them. Okay, what size was it? What are you taking it for? Okay. Any information we could get on that, so they end up being - and how sure they are that that is what people are taking - allergies and a whole bunch of other things. So, they [pharmacists] are an important part of that educational team. There's no doubt about that, no doubt about it at all.” [I11]

It is essential to know what medications a patient is taking when they are evacuated in a disaster and are displaced from their records. This is highlighted in Case Vignette 6 from a disaster pharmacist.

“Hurricane Katrina we had millions of people displaced from their medications. Their pharmacies were gone, and these people were walking in and hadn't had their blood pressure medicine, their heart medicine, their diabetes medicine, for weeks. They had no idea what they were taking, and all the records were destroyed. They were gone. My pharmacists sat down with those people one at a time and talked their way through all their medications and did their best to reconstruct what they were taking and get them stabilised.” [I9]

Case Vignette 6: Hurricane Katrina and medication reconciliation

Part of the responsibility for continuity of care is in the logistics of maintaining the pharmaceutical drug cache for deployment into disaster zones. Due to the unpredictability of disasters, these drug caches need to be kept up-to-date constantly, rotating out any expired stock and updating the kits to contain the drugs that are most likely going to be needed in the right strengths and quantities. This was highlighted in the comments of a Canadian military pharmacist.

“I believe we have a big role because as a pharmacists we are responsible to make sure the kits [pharmaceutical drug cache] are ready to be deployed on a very short notice and we are responsible to maintain all the kits and there is no expired medications in the kit and because once we know we have to deploy, we have no time to order medications. We have to keep up-to-date and keep the kit up-to-date all the time, so we have a big role in the preparedness and also in maintaining the kit and also is what do we keep in the kit as things are changing. So, we can give our advice as to what is kept in the kit [pharmaceutical drug cache].” [11]

This includes ensuring disaster team and DMAT members are up-to-date with their vaccinations to be able to be deployed at a moment’s notice as raised by a disaster team pharmacist.

“So, prevention obviously with all the vaccinations et cetera. Again, when our guys - with the military, we actually have our people quite heavily vaccinated because we never know what environment we're going to put them into. So, we have a whole bunch of vaccines that are mandatory for all our members so that they can be ready to deploy. Then we have a list of other vaccinations, Yellow Fever et cetera, that we might have to administer to our members in preparation for them going into different scenarios, so they're not mandatory ones, they're on top of you know, Japanese encephalitis or whatever have you.” [A6]

The participants discussed how pharmacists’ roles in continuity of care includes counselling and educating patients and community members on medications. This is illustrated in the Case Vignette 7 by a disaster pharmacist.

“Things like that no-one else can do. The doctors are few and far between in disasters. Nurses aren't really good at doing those sorts of things. Pharmacists are just perfect. Post 9/11 when the anthrax - when we were trying to distribute medications for anthrax. They tried to have nurses and EMTs [emergency medical technicians] and people like that distribute the medicine, but people had lots and lots of questions and the doctors and the nurses couldn't answer them. There were interactions, and how to properly take it and what do I do with my kids? That was when they brought a bunch of us [pharmacists] in from the military at that point because they didn't have enough pharmacists to fill those roles.” [19]

Case Vignette 7: Pharmacists are irreplaceable in a disaster for medication advice

Another key aspect of ensuring continuity of care is in educating the public and patients on their own medication management, are they prepared for a disaster, do they have a reserve of their ongoing chronic disease medications, or a list of what medications they are on. This is discussed in the remarks by a government pharmacist and a US pharmacist.

“I think they [pharmacists] have a key role around - if you think about medicines supply, they have a key role in educating the public around what are essential medicines to - key messaging around medicines like always have a supply and always having x number of days' worth with ensuring that people know how to safely store medicines. Understanding - getting communities to understand where they should go - who they should see and what they should do if they need emergency supplies of medicines.” [114]

“One of the things we try to educate the public about is for the public to keep a supply of medication, because if you've got all your meds at home for a couple of weeks and you always have a couple of weeks of buffer, that event is going to affect you or your family much less because you're not running out of your medications and your blood sugar is under control or whatever.” [17]

Most of the participants identified behavioural first aid support as a role for pharmacists to assist their communities in disasters. This support involves pharmacists looking out for the signs of when someone may be experiencing a mental health crisis and referring them onto the appropriate professional support.

Pharmacists' role in behavioural health support is highlighted in the comments by an emergency physician and a disaster pharmacist.

“Well I had referred to disaster behavioural health. I think it's worthwhile for all healthcare providers really, but pharmacists in particular to be trained in disaster behavioural health, because I think we have a really important role in potentially mitigating after effects for disaster survivors, just in knowing how to counsel them, how to approach them, how to let them just talk about the experience that they've had. So, I think that's something that we don't - we haven't focused on and that could really have a big impact with actually pretty minimal training...I've heard it's been called behavioural first aid. So it's not being administered by a professional, it's more of an awareness level of these are the kinds of things that you can expect, these are the kind of things that you can say to be helpful, these are the kind of things you don't say and some of the actions that you can take to be helpful. Just that minor level of awareness has made me personally more comfortable in my role as I think I'm better able to take care of patients who have been survivors of not just disasters, but other kinds of outrageous events as well.” [I15]

“But there's a lot of other issues that will occur, particularly people that were marginally in their healthcare situation, that's both mental as well as physical healthcare. They generally deteriorate much rapidly, much more rapidly and because they've lost their social infrastructure, their way of doing things, their pattern, their ritual. And so, all of that stuff is going to be sometimes more observed by the pharmacist rather than the doctor of a hospital who sees the person just in a 15- or 20-minute appointment in their office, you know once a week or once a month.” [I3]

The disaster health stakeholders highlighted several aspects in the 'pharmacy purpose in disasters' category. These were:

- pharmacists' primary objective is ensuring continuity of care which has multiple facets (logistics, vaccinations, medication reconciliation, being open and accessible, providing emergency supplies, educating and counselling patients, providing behavioural first aid, managing chronic disease patients, and participating in risk mitigation strategies)

- pharmacists have a role in treating low priority cases and performing medication reconciliations
- pharmacists' management of chronic diseases in disasters can prevent these patients deteriorating or experiencing exacerbations
- pharmaceutical drug caches are the responsibility of pharmacists as well as the vaccinations of disaster team members
- pharmacists have a role in educating the public and patients on medications and personal preparedness for disasters
- pharmacists have a role in providing behavioural first aid support to their communities and disaster-affected individuals

6.4.1.4.4 Benefits of further inclusion of pharmacists in disasters

Some of the participants mentioned having pharmacists as team members adds to patient safety and optimises the outcomes for patients and the disaster teams. This is evident in the quote by a US emergency physician.

"I think pharmacists are critical. We have a pharmacist in our emergency department for 10 hours a day and it's an incredible resource and it really adds to patient safety...I really think pharmacists are a tremendous asset to any disaster response and actually for my everyday job as well, but having a pharmacist just increases the safety and the capability of the teams on the ground, the patient's safety and the ability to do a meaningful response."
[110]

As highlighted in this comment from the emergency physician, pharmacists add to patient safety in everyday practice and in disaster events. This lends voice to the argument that a disaster event does not necessarily require any new skills to those of a pharmacist already working in an emergency setting (e.g. EDs) but the utilisation of these same skills applied in a slightly different context or circumstance. This is discussed in the remarks of an NGO pharmacist and US emergency physician.

"In terms of response, as I said, at Katrina, particularly - having a really excellent pharmacist there was - it was just irreplaceable. We could not have functioned without the pharmacist. They were able to keep straight all the inventory, help me with substitution if I needed that, get stuff for me, pretty much the same as I would if I were working at home in a large academic

hospital emergency department...I really think pharmacists are a tremendous asset to any disaster response and actually for my everyday job as well.” [I10]

“Yeah, sure. Why not? Why would it not be in - within our [pharmacists] current scope of practice to be able to do - work in disasters? I mean, what does disasters need more in our scope of practice that we currently don’t have?... I think in local practice we do. We have this type of practice, because I mean, we know what managed systems are. We know how to manage medications. We know what patients need. We should be skilled enough to be able to handle a disaster - or should be.” [A10]

Participants discussed the benefits of pharmacists’ knowledge on the legalities of moving drugs around a country and import and export licences. This includes ensuring the drugs are in the right quantities needed, monitoring for temperature excursions, and rationing medications where necessary. Medical consumables, adhesives, plastic in bandages, sutures, and tubing also require temperature monitoring as can deteriorate if left to the elements. This is highlighted by the quotes from two disaster pharmacists and a military pharmacist.

“It’s like do pharmacists have a role in disasters? I’m going like oh my goodness. It’s just a strange question from my perspective. Just to understand import, export licences. Like how it goes is, your military can move your pharmacy, a pharmacy supply in military aircraft and just be able to do basically a wire to the receiving country and it’s covered under Status Forces Agreement. If an NGO wants to move those same medications, these are not narcotics. These are just legend drugs, patented prescription drugs, you have to apply. You have to apply for an import licence. Then when you go to move them back home, if you’re not going to leave them behind for some reason, you have go through the export licence part of thing. A physician would not know how to do that or understand even that there are laws that covered this.” [I3]

“So yes, we do have to consider much more out of a scope than of a regular pharmacist. You’ve got to talk about cold chain as well and then you’ve got

to talk about the legalities and the authorisations to carry schedule eight drugs, cold chain, your fridge things, et cetera. How do you do that?" [A6]

"I think the pharmacist can obviously relate one on one with the people who are getting this stuff and that's usually a doctor, a nurse or a pharmacist. When there's shortages of medicines, pharmacists have probably a better idea of the necessity and the impact of any rationing that needs to happen. Also, more of a perspective of good wholesaling practice and the needs for consideration to be given to how the product is going to be transported and what excursions in required temperatures you've got and where those excursions occur, how to follow through and determine whether that stock can be used and under what circumstances or not used." [A5]

Pharmacists involved in the logistics of disaster management can potentially provide clinical support to teams indirectly. This support might not involve participating in clinical ward rounds, but it could include contributing an understanding of the ramifications if the team runs out of a medication. Pharmacists can anticipate surges on medications based on disaster needs and the implications if there are no medications available to meet those needs, as highlighted in Case Vignette 8 by an NGO pharmacist volunteer in the Oceania region.

"We had a logistics person in the central medical stores probably for two years in 2011, 2010, 2011 I think it was. They decided that they wouldn't put a pharmacist in that role, they would just put a logistician in to help with the logistics. I happened to be there working with the malaria team at the time. They were totally out of Salbutamol inhaler throughout the whole country. I went to this logistician, and I went you haven't got any Salbutamol inhaler, and she went well procurement is not my responsibility it's distribution and logistics. I'm going it's all part of a cycle, it's like if you haven't got a product you can't distribute it, she kept saying it's not my responsibility, I don't do the procurement. I'm going yeah well if you had no procurement of anything, would you still say it's not your responsibility? I said people are going to die because we haven't got these products here. She's like oh it's not my responsibility, that's the manager of the central medical stores, I'm thinking that's why they put a logistician in there to help the manager at the central medical stores, because he's hopeless. Yeah anyway that was quite an interesting exercise, the logistician obviously doesn't see the clinical impact, whereas pharmacists do and are more likely to respond accordingly." [A2]

Case Vignette 8: Pharmacists understand the flow on effect of the logistics supply chain

Pharmacists are able to have discussions with other team members and suggest alternative treatment options to overcome logistic challenges.

"That's the advantage that a pharmacist always brings to a logistics role and knowing what alternatives can be used if you don't have something. For instance, if you run out of penicillin, maybe you could use Cotrimoxazole, but a logistician doesn't know those things. They just go oh, we have to get some of this penicillin in. That's the sort of role that a pharmacist can go, hang on a second, we've got plenty of this, why don't we use this instead. You're still using your clinical skills, it may not be what people might think of as the clinical role that a pharmacist has in this day and age. But it's still uses of your clinical skills and I strongly advocate for pharmacists to be put in to roles in charge of central medical stores, often in the developing country experiences, they put logisticians in. They have no idea what those drugs are for and they don't bring to the table - sure they might have more experience in getting stuff from point A to point B, but they don't understand about the product...

Going to be more respected, when you approach a doctor, if they just think you're a logistics person compared to a pharmacist, at least as a pharmacist you can say, look we're going to run out of this, we've got oral form, would

that help, or we've got, and you can have a discussion. Whereas a logistics person's not going to be able to offer alternatives. They're just going to say, we've run out of IV penicillin, is there anything else you can use. Whereas a pharmacist can always make some recommendations and say well, this is an alternative. That's the sort of thing that I think you're using your clinical skills and it's appreciated I think by the doctors. There's no reason why a pharmacist couldn't continue, as you say, prescribing of chronic disease medicines, to release the doctors up to do their own things and what have you. Pharmacists can follow that role and assist with prescribing and what have you as well" [A2]

As suggested in the comments above from the NGO pharmacist, in disasters pharmacists have a role managing chronic diseases. This could free up other healthcare professionals' time (doctors and nurses) to focus their attention on treating the higher acuity disaster emergencies. This was suggested in the following extended extract from an experienced disaster physician and senior public policy scholar (previously quoted on p.170) but is worth repeating in the present context. The second quote is from a US pharmacist.

"Since non-communicable diseases are increasing and more and more the larger percentage of disaster victims - this is not something that the doctors and nurses want to deal with. They want to deal with the blood and guts. I would say - I don't think I'm wrong in saying this is a five [strongly agree it's a role for pharmacists] because my prediction is that nobody will want to do it. They'll say, kick it to the pharmacist...

The other thing is I see it through medicine mitigation in the last two questions for the pharmacists because they can take a tremendous amount of the strain away from those that might be dealing with acute issues. Not that they don't deal with acute issues but that's what - I've been in five wars and 40 complex emergencies as I told you. You are so overwhelmed that if you start getting - I mean they're important cases but they should be managed in something other than the acute phase. It's important because there's not much time before then they would become acute if not treated, given medication or whatever. That's where the prevention side comes in. Our usual design of disaster teams doesn't really call for that. So that would be

the kind of clinical role that I'd see the pharmacist taking, especially in non-communicable disease, the chronic conditions, the kidney problems, the respiratory problems, the diabetes, et cetera, et cetera. The one measure of that is how many of those patients are prevented from coming into the acute situation.” [11]

“The thing about that is when you have a shortage of positions, maybe not because they are actually less of them but because they're needed to do other things, like procedural things, then if you can free the chronic care patients up by allowing pharmacists to look at what the normal med list is, see what they need and get them that stuff without having another doctor having to come and sign off on it, you're talking about freeing up a resource that's going to help in the long term and the short term for that matter.” [15]

Pharmacists can also free up resources and other health professionals' time in disasters by vaccinating individuals. This is an everyday skill of a pharmacist; however, the condition under which pharmacists can vaccinate (i.e. age limit and types of vaccines) depends on the country or state legislation. This role is potentially useful but is often not carried through to disasters. Some of the participants could see the public health benefits of having pharmacists vaccinate as they could potentially reach more disaster victims than the traditional vaccination channels. This is highlighted in the comments of a US pharmacist regarding following protocols for pharmacists to prescribe and administer vaccinations in disaster management strategies.

“I mean we don't have to have prescriptions for vaccinations in this country. I believe that it's a very, very significant contribution to public health in a non-disaster situation. Certainly, if there are disasters - whether it's giving people typhoid vaccines or tetanus or whatever, some other disease or condition they might have been exposed to, I think it's very definitely a role that they [pharmacists] can do. I think they can do that. I think a public health official's going to say okay, we want all of our people that are exposed, who have been walking around in flood waters - we want everybody to get typhoid and whatever. Or if it's some other biological agent or something. I think that that's not so much diagnosis involved there. I think it's basically just saying you've been - you fall in this category of potential exposure.” [16]

The disaster health stakeholders participating in these interviews identified several factors that sit under the 'benefits of further inclusion of pharmacists in disasters' category. These were:

- pharmacists' roles in disasters could improve patient safety
- pharmacists' roles in disasters are an extension of their everyday practice
- pharmacists understand the legalities for exporting and importing drugs across countries
- pharmacists can have discussions on therapeutic substitutions and alternative therapies
- pharmacists can increase the overall healthcare resources available to provide services and free up others time

6.4.1.4.5 Training opportunities to facilitate inclusion of pharmacists

The participants had several suggestions on how pharmacists could be better integrated into disaster management. Interprofessional multidisciplinary training exercises and drills showcasing the roles pharmacists can value add in disasters was mentioned by the participants. This was discussed by two emergency physicians.

"Whenever they are doing it or it's a decision that's made at some level or another that everybody in the disaster team knows that it's okay. If a disaster happens and they are part of some kind of response and the other team members don't know of these things, then whatever pharmacists have done in preparation doesn't mean diddly. It's got to be known. You can't after the fact say, oh okay, oh so you have this training and whatever. I mean there's got to be some mechanism. Trespassing the professional boundaries is what's really difficult, okay? So, there's got to be some mechanism where whatever training there is with the pharmacist it's known and is also included in the training of others; nurses, physicians, et cetera, et cetera. Finding out about this at the time of the disaster cancels out a lot of the benefits." [111]

"I think we need to go back to the basics which is it should be part of education - so nursing, physicians, medics, physician assistants, should probably all take the same disaster management type of training and should probably exercise together starting in school... Now after that, if that was in

place, I think it would be pretty common to then see pharmacists as part of an inter-professional team that looks and works on these on a regular basis,”
[112]

The disaster management health training courses are increasingly taking on an interprofessional multidisciplinary focus shifting from a disaster medicine focus. These courses could benefit from the expertise of pharmacists to assist in the development of the material pertaining to pharmacy and medication aspects of disaster management. It was also suggested there is a need for pharmacy-specific disaster courses with the increasing number of pharmacist positions in NGOs and DMATs to better equip pharmacists deploying into disasters. There were recommendations from the participants that disaster training should be a part of the undergraduate pharmacy curriculum and thus a part of every pharmacist’s basic training maintained through continuing professional development (CPD) and specific courses. This is illustrated in the comment by a US emergency physician.

“Number one, I think it should be a core part of the pharmacy curriculum in pharmacy school. I think, number two, there needs to be engagement of retail pharmacists because I would say a lot of the supply and a lot of what patients perceive is their pharmacist is the - that’s the apothecary on the corner. I think that those - at least in the States they’re not that - a couple of our big chains have gotten better but, in general, they have not been that engaged in planning.” [17]

“I’ve seen some very good models. One of my favourites was the University of Washington has a medical reserve corps, which is a volunteer corps, that’s solely made up of their pharmacy students. It’s a voluntary thing, but basically the students were given a choice, either join the medical reserve corps or write a paper, so they pretty much all joined the medical reserve corps. That provided them some basic training in disaster response and expectations and the role of the pharmacist and get it by a colleague - where it was all pharmacists and pharmacy leaders who were involved in it. So, the role of the pharmacist didn’t get neglected, as it often does in a lot of training, because the pharmacist in the room is usually the only one. So that’s something that I

think is really valuable. I remember while I was in public health and non-profits, I was a preceptor and had a public health elective rotation and educated pharmacy students, but that was a very small piece. I've educated or I've had a total maybe about 20 students that have come through with me and learnt things that they didn't learn in pharmacy school about bioterrorism and radioactive terrorism and chemical threats and all of that kind of stuff. I think adding a basic thing into education is essential.” [I15]

This was further discussed in the utilisation of the pharmacy student workforce to supplement the pharmacy workforce in assisting in disasters. The idea was raised of backfilling some of the less pharmacist-specific roles to free them up to perform more pharmacist only roles by utilising pharmacy students and dispensary technicians. It was mentioned that pharmacists as a team of one usually are taking on the role of the entire pharmacy profession and therefore it would be a struggle to undertake more clinical roles. Utilising both pharmacy technicians and students would solve this overburdening and train future generations of pharmacists and pharmacy personnel in disaster management.

To equip pharmacists and pharmacy students for disasters, it was suggested involving them in mass gathering events as a training opportunity for disasters. Routine practice at large sporting events or festivals could develop pharmacist and pharmacy students' knowledge and skills in emergency medicine. These large mass gathering events could showcase to other healthcare professionals the skills pharmacists have to offer in emergencies and simulate the role pharmacists could play in disasters. This is highlighted in Case Vignette 9.

“Okay, so it's a 3:30 game at the Stadium. There are 95,000 people there. It's hot. It's September. It's probably 98 degrees outside and about 98 per cent humidity. There are literally hundreds of people coming to the first aid stations that we have. We have four cooling buses set up outside the stadium that people can go out and just sit in so they can cool off and they're full. The first aid stations are overrun with people with heat exhaustion and alcohol because people drink before they come to the game. They don't realise how much they've drank and then they get dehydrated on top of it. We have a young woman in one of the first aid stations. She comes in. She's obviously drunk. She's probably a little dehydrated. They get her in, they give her some fluids, they get an IV and they say that she probably needs to stay a little longer, but they really don't have a lot of space for her. So, she decides that she's going to leave, and she'll be fine. She gets up to leave and starts to walk out of the first aid station.

One of my pharmacy students notices that on her thong, because her clothes are a little dishevelled, there's a black box that looks like a pager. And she says wait a second. Before you go, I want you to come sit back down and then she says to the paramedic she has an insulin pump. So, the paramedic says, 'oh my god' and they do a blood glucose on her. Her blood glucose is 536mg/dL [\sim 30mmol/L] so she then - she had been doing somewhat - she starts to lose some of her faculties but still refuses to go to the ambulance... They finally get her over to the ambulance and she wakes up one last time and says she doesn't want to go, and the physician actually called down to the emergency department and they do what they call a Marsha act on her which means she's not capable of making her own decisions medically. So, they put her in the ambulance and take her down there but none of that would have happened had my student not noticed the fact that the girl was wearing an insulin pump. I don't think just anybody would have recognised it for what it was and that's the difference of someone who just has a little bit of a knowledge and a little bit of observation skill can make with someone. The paramedics were going to let her walk out because they didn't know that, but my student did.” [15]

Case Vignette 9: Mass casualty event showcasing pharmacist skills

The participants identified a few key ideas in the category ‘training opportunities to facilitate further inclusion of pharmacists’ in disasters. These included:

- disaster health management should be included in the pharmacy undergraduate curriculum
- utilising pharmacy students and dispensary technicians to backfill pharmacy positions, freeing up the pharmacist to undertake more clinical roles

- interprofessional multidisciplinary training drills/exercises to raise awareness of pharmacists' skillset
- mass gathering events (sporting events or festivals) for disaster preparedness and response training opportunities for pharmacists

6.4.1.5 Barriers and Facilitators Theme

The 'barriers and facilitators' theme encompasses the areas identified that are believed to be limiting pharmacists' roles in disasters and what factors could enable the progression of pharmacists integration in disasters as team members.

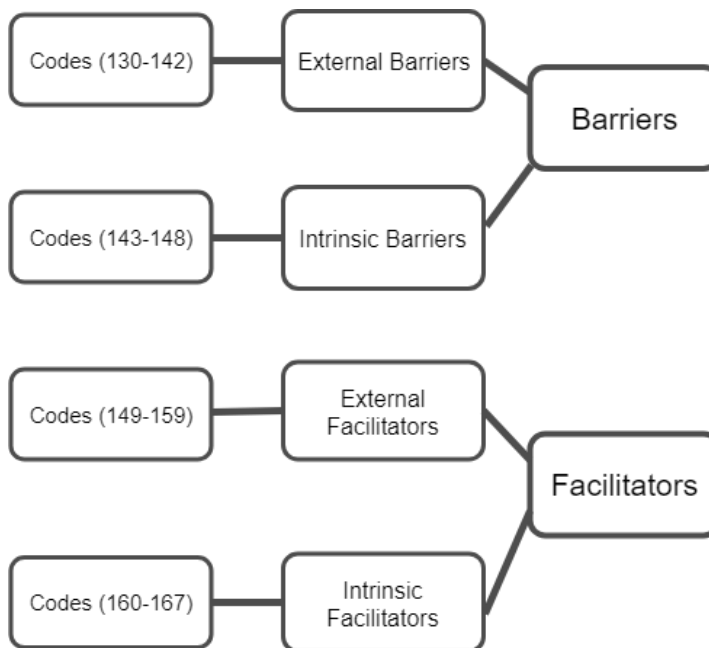


Figure 26: Barriers and Facilitators themes and their associated categories and codes

* Appendix D lists the individual codes 130-167

6.4.1.5.1 External Barriers

The external barriers identified by the participants are those which limit pharmacists' progression and are outside pharmacists' control. The external barriers mentioned were turf encroachment/turf 'wars', egos/attitudes of other healthcare professionals, lack of awareness, language barrier, lack of a job description, not considered an essential team member, job security, ethical/financial conflicts, and pharmacists not being included in decision making. There is a perception among some that pharmacy is a hands-off profession and there is an associated social stigma that pharmacists just stick labels on boxes. This is discussed in the comments from two disaster pharmacists.

“You think about in hospitals when doctors do the ward rounds with all the registrars and there are some consultants that say, I am not going on a ward round unless the pharmacist is there, because I need to know the pharmacy side of things. Others that just go, no, no, there's no need for a pharmacist. We'll always have those barriers, because they see us as people that put labels on boxes.” [A6]

“I just, when I talk with public health colleagues, that the mindset of pharmacists is not that we couldn't get into medical school, is that we decided to go to pharmacy school so we wouldn't have to touch people. While it's a joke, I think there's a grain of truth to that.” [I15]

It was suggested, part of the explanation for the exclusion of pharmacists in disaster management could be attributed to the lack of awareness by other healthcare professionals, disaster management personnel, and administrators on what pharmacists' roles could be in disasters. Pharmacists are often viewed as either an unnecessary resource or a support service and not an essential member of the team. This is illustrated in the remarks from an international experienced disaster emergency physician and a US disaster pharmacist.

“Well first off it's going to have to - they've got to become a legitimate team member. I don't know how my colleagues will respond to that. But they would probably say, well I can see they have to be but right now they're not. So right now, you've got to get to, they are part of the team. Everybody responds to that. So, whatever it takes to get that...With what you just said, that question, are they an essential part of disasters or could they be, you're asking two questions there.

I think at this stage of the game the majority of people from medicine and probably nursing - maybe less in nursing, but with medicine - they would answer the first part - are they [pharmacists essential in disasters] - they would probably say no. But then you asked, but could they be, or should they be? They'd probably universally say 100 per cent yes. So, it's just the fact that they're just not part of that broader team concept just yet, maybe with some. Especially if you get people who are sort of thinking afterwards, after you ask

the question, then you'd know that that's what they're thinking about. They're not now but boy yes they should be.” [I11]

“I can't tell you how many times I've had pharmacists be cut out of critical roles and the answer has always been come on, if we need somebody, we will call on you guys, but you don't need to be here for this.” [I9]

Many of the participants mentioned that if there was clarity on the job description of pharmacists' roles in disasters, perhaps other healthcare professionals would be more comfortable and willing to include them in additional roles and as team members.

“I think if medical professions that are involved in disaster management had greater awareness of what skillsets pharmacists had and what role they could play, I think that might help champion and facilitate greater involvement and maybe help us more clearly define what the role is. Rather than this ad hoc and it just happens and then you figure out what you need to do.” [I2]

Language was mentioned as a barrier for pharmacists trying to educate and counsel patients on health and medications who are deployed to non-English speaking countries.

“There could be a role for us [pharmacists] but it is very different from our setting here. One of issues is the language barriers so how you explain clearly in Swahili how to insert a pessary – it's just not feasible – it just doesn't happen. So, there's probably more so in the training and the oversight and I've been in settings where you can't speak the language and you kind of get the feel the wrong information is going out – it is probably better that the patient is getting the complete course of the right drug than anything else, going back to real basics. Are they getting what is prescribed and what is prescribed is that correct? Down the line does the patient understand it – that would be amazing if we get to that but if we can just get the antibiotic they need, the correct amount and the dosage is written correctly, and that information is transferred onto the packet.” [A13]

Other barriers raised were job security for pharmacists to leave their regular employment and go on deployment and the reduced staff capacity of pharmacy

personnel to run the pharmacy. Staff can be personally affected by the disaster or not physically able to get to the pharmacy.

An issue for community pharmacy owners in a disaster is the dilemma of balancing their pharmacist ethical and moral decisions against their business owner financial decisions. Pharmacists believe they ethically should provide care for affected individuals and in some instances providing these services and items free of charge. However, as business owners they need to consider the financial implications of providing free medications on the business' bottom line. If a community pharmacy is already experiencing financial vulnerability, providing free medications and services to the community without subsequent compensation from the government could see the pharmacy close as a result of the disaster. It is a difficult choice to make and it comes down to the individual pharmacist and business owner's judgement on how they choose to respond with regards to their pharmacy. This was highlighted in the interviews by two different Australian pharmacists' perspectives.

"A lot of times we end up doing things for nothing and we don't get remunerated and it doesn't pay the bills unfortunately. If there was some sort of remuneration package associated with it, not a problem...I know other pharmacies within our retail environment definitely wouldn't do it...It comes down to us and what do we get paid to do this? As an ex-owner, if you don't pay the rent you go broke. So, you can do all these things and it's all good, but you need to get remunerated in a retail sense." [A8]

"We were just giving vital or urgent medicines and antibiotics and painkillers, and I was just giving it to patients, because I couldn't charge them anyway. It was ridiculous to even think...The day after [the disaster], I didn't charge anyone for anything.... It was just a write-off." [A12]

Community pharmacies sometimes may not be given the option to make the decision to assist in a disaster depending on their location. For convenience many pharmacies can be found in shopping centres or malls and are therefore bound by the opening or closing of the shopping complex in the event of a disaster.

The participants highlighted several 'external barriers' to pharmacists' roles in disasters. These were:

- turf encroachment
- attitudes of other healthcare professionals
- remuneration of community pharmacists for services provided during disasters
- lack of awareness of pharmacists' capabilities
- language barrier for counselling and educating local communities in non-English speaking countries
- job security
- reduced staffing capacity
- lack of job description
- ethical and financial conflicts
- pharmacists not included in decision making
- pharmacists not viewed as an essential team member

External barriers are not the only potential obstacle to pharmacists' roles in disasters. There are intrinsic barriers which are within a pharmacist's capabilities to change and could allow them to be more involved in disasters.

6.4.1.5.2 Intrinsic Barriers

The intrinsic barriers are the identified factors potentially holding pharmacists back from being further included in disaster management but are believed to be within their ability to change. One of the major factors discussed was the individual pharmacist's confidence in their expertise/skills in a disaster and their perception of themselves. This is identified in comments by three pharmacists from different employment backgrounds – disaster, government, and community.

"So many pharmacists would say, in my opinion, many pharmacists would think, someone else could be doing that. Someone else will do that. I can go off and do this - whatever that might be. So, I think in many of the cases the barriers would be the pharmacists themselves not feeling either competent or resourced or basically that - competent or resourced to be able to fill most of those roles." [A4]

“All of a sudden all that stuff I learned in pharmacy school that I rarely used in a retail environment became really necessarily and useful and I've been doing this ever since.” [I9]

“I think part of it is they don't see themselves as healthcare providers. They see themselves as retail.” [I14]

Some participants suggested pharmacists are currently not more involved in disasters because there is a lack of interest from the pharmacy profession. Some suggest this is because there is competition for their time. This is illustrated in the remarks by a disaster emergency physician.

“The biggest barrier is that there is so much demand already for issues, medical issues. Preparation for disasters is just one of many things that civic leaders, medical civic leaders have to contend with. Whether it's chronic care, access to care, care for the disabled. There's no limit of possibilities for an individual to volunteer for or to spend their extra time in. So that's the biggest challenge I think is just the competition for a health care professional's time and where she or he has to decide what their side project, their avocation, their extracurricular interests are going to be. That's just the challenge.” [I3]

The disaster health stakeholders discussed a few ‘intrinsic barriers’ which pharmacists have the power to overcome to be more involved. These were:

- lack of confidence in their own abilities
- pharmacists’ perception of themselves (not seeing they have a place in disasters)
- lack of interest from the pharmacy profession

6.4.1.5.3 External Facilitators

The participants were asked to provide suggestions and recommendations on how pharmacists could be better integrated into disaster health management and subsequent disaster teams. Some acknowledged that although there are constraints, if pharmacists want to further their involvement, there are always work-arounds for the current limitations (e.g. distributing current pharmacists’ workload on deployment). This is demonstrated in the quote from a Canadian military pharmacist.

“But at the same time, you can, if we really wanted to have more responsibilities to, we can redistribute some of the workload – like the resupply of the medical material can be done by say a nurse and then the pharmacist could do more of a bigger scope of practice. There are constraints but there are always solutions if we really want the pharmacists playing new roles.” [11]

Some suggested that pharmacists could work under remote orders in countries where there is shortage of physicians. This is highlighted in the comments by a UK emergency physician.

“It might be something that would have to be in the event of a disaster they're allowed to do these things or if communications can be done like what we do with paramedics - we give remote orders. We just give orders over the phone. There's probably no reason in certain instances that a pharmaceutical - a community pharmacy - couldn't be attached to a physician who could also, under those conditions, give them the orders that they need to deliver those medications or that care within their scope.” [112]

To improve communication and collaboration between the different healthcare professionals, it was suggested to form a healthcare coalition by a US disaster emergency physician.

“It's great to have some kind of forum or coalition where your pharmacists, your physicians, your emergency planners from across a bunch of different institutions - let's say - we've got about - we've got a lot of hospitals in my area. We've got two dozen hospitals. We have a health care coalition that meets every other month, where we've got pharmacists, surgeons, emergency physicians, paediatricians, other supply people that meet and talk and get face-to-face and get to know each other because they're going to have to work together during disasters; so just the fact of getting people together, I think, helps to mitigate some of that.” [17]

The participants recommended that pharmacists should have a role in the surveillance of disease outbreaks by monitoring their over-the-counter sales. This is evident in the quotes from a government pharmacist.

“They did the role in contributing to the data around some drone surveillance. I know that there are some certain various places to use over the counter sales data to identify outbreaks earlier. So, pharmacists engaging in that data-sharing space can be hugely valuable for prevention.” [I14]

It was discussed that pharmacists need to get actively involved in disaster management, whether volunteering with NGOs or developing their skills in mass gathering medicine (i.e. large sporting events and festivals) to prepare for disasters. A disaster emergency physician commented.

“I would look for ways you could prepare in just small types of disasters or pending disasters. This could be get involved in mass gathering medicine...Get involved in those types of things. It could just be local festivals that are not mass gatherings for real. But you go in and you prepare. You have a big influx of tourists in the town for a special event and you try to go through what the demands are for your, if it's a commercial pharmacy, what the pharmacy is. What the increased demands on the hospital will be on the action in casualty or the emergency department would be. But you through the same motions that you might need the same steps, that you might need to respond to a disaster in general. That's - you try to do the same thing every time no matter what.” [I3]

Some of the US participants suggested there needs to be a review of insurance reform. In the US, insurance companies can set restrictions on how soon patients can refill their prescriptions, meaning patients may not be able to build up personal reserves especially in high risk disaster-prone areas. This was highlighted in the remarks from a US emergency physician.

“Pharmacists have a big role in advocating for things like some insurance reform, so we can always make sure patients get their medications at the appropriate time. One of the things we see in the US a lot of are third party payers in our insurance industry will only pay for a certain supply of medication and won't refill the prescription until it's within two days of being empty. That doesn't really help someone be prepared if you live in a hurricane or earthquake prone region. That's a big advocacy role for pharmacists because they often understand that better than anyone else.” [I7]

The participants recommended the temporary extension of global pharmacy government legislation to increase emergency medication supplies by pharmacists to chronic disease patients to cover the disaster period. This is highlighted in the comments by an incident command controller and a disaster pharmacist.

“Also, like, up here, we could have events where we get a couple of thousand tourists stranded. They come up just before the snow... The roads are closed. They didn't bring any more medication than one night's worth or all the rest is left at home. But you go and see a chemist. We've actually had that one. Yeah. So, I think in terms of providing pharmaceutical resupplies to transients like emergency services people, evacuees, tourists, there's a role there.” [A1]

“In the State of Florida, for example, we have - when there's an emergency declaration, the governor has the option to add and usually does, the option to allow pharmacists to give a 30-day emergency supply of chronic care medication. That's become well publicised in the state and pharmacists are generally very comfortable with that. So, we do that already, but isn't in some places. [I15]

There was a proposal made by the participants for the sharing of dispensing histories and databases in the event of a disaster. This could ensure pharmacists and healthcare professionals in the community have access to patients' medical histories and patients in a community have access to the right medications. This is outlined in a comment from a government participant.

“We could actually access the dispensing records of those pharmacies via a webserver, we couldn't enable another pharmacy to dispense of the history because they were owned and operated by a different legal entity. There was understandably reluctance between the pharmacy owners to want to relinquish their licence. They felt like it was handing their business over to another pharmacy. You can see why that would be a problem for them. So, we got together and worked through our policy and worked through what the law actually said and came up with a modified policy which enabled the pharmacy to - what were the phrases - it was to suspend the licence, not terminate, which enabled them to temporarily put their licence into abeyance

and that - according to the way our legislation is written, then enabled us as the regulator to allow another legal entity to dispense off the history. Because it was just a suspension of a licence, not a revocation of the licence, once that pharmacy could get back into their premises, we were able to, with the stroke of a pen re-instate the licence. It wasn't a new licence. We didn't have any - we could just notify them their licence was now active again and they could go back and operate from their premises once the building had been cleared."

[114]

The 'extrinsic facilitators' identified by the disaster health stakeholders are summarised and outlined below. Pharmacists could:

- operate under remote orders
- become actively involved in NGOs and mass gathering events (sporting events and festivals)
- form a healthcare coalition
- advocate for insurance reform
- petition for extended disaster pharmacy legislation
- conduct surveillance of over-the-counter sales for disease outbreaks
- distribute their current workload changing the skills mix to one better aligned with the disaster context
- share dispensing histories and data for pharmacies rendered inoperative

External facilitators may improve pharmacists' integration into disaster management. This research study also identified some intrinsic facilitators pharmacists can undertake to change their current positioning in disaster teams.

6.4.1.5.4 Intrinsic Facilitators

The participants provided some recommendations on things pharmacists themselves can do to raise awareness for better integration of their roles in disasters. It was proposed that pharmacists interested in disaster management should assemble together to form a pharmacist collective interest co-operative group. The participants recommended pharmacists need to begin advocating their role and making their presence better known in disasters. This is demonstrated in the comments by a UK emergency physician.

“This is just sort of an observation over 10 years. I think pharmacists themselves need to step up and make themselves - their presence known because I think as physicians, we are used to writing prescriptions but never really seeing pharmacists. Patients actually see the pharmacist. Physicians are maybe the ones leading the plan development, and because of the way in which we normally interact - which is quite often not to see the pharmacists - we don't visually include them in our preparations.

It has improved and it can improve more, but my thinking is it's really something that the pharmacists really need to step up and demonstrate their role and the importance of their role both in the development and the distribution - and logistics of distributing medications - but also being the ones that connect directly to the people in the community that are vulnerable or need the medications.” [I12]

Due to their daily interactions with the community, pharmacists have the ability to identify those individuals in the community who are most vulnerable to adverse health outcomes as a result of a potential disaster. They can provide public health messaging to their patients to assist them in preparing for disasters and educate them on having personal reserves of medications and first aid kits. This is highlighted in the comments by a US emergency physician and a US pharmacist.

“The public health message about making sure do you have enough of your medications. Keeping a personal cache of medications available in case you can't get to the pharmacy. I think those kinds of things would be, like public service announcements and those sorts of things would be popular in terms of how they prepare the public.” [I10]

“I mean right now in Florida - 1 June is hurricane season, so there are community service thing - announcements on television, but there's also fliers and brochures about being prepared for storms: have 30 days of your medicines at all times, especially if there's an approaching storm, making sure that you have flashlights and batteries and other first aid supplies that will work, food that can - I think in preventing - I think being prepared for that is something that a pharmacist definitely can be an advocate for.” [I6]

Pharmacists can also provide written information sheets to assist with counselling large volumes of patients that come into pharmacies following a disaster. Participants encouraged pharmacists to contribute to writing post-disaster after-action reports. These reports would include discussions on what challenges were faced by pharmacists in their communities and how the pharmacy response can be improved for future disasters.

“I'd say that's the number one thing, is tracking what really happened and looking at - writing a decent common-sense after-action report and, at the same time, participating in the planning for future responses.” [17]

In summary the ‘intrinsic facilitators’ identified by the disaster health stakeholders were:

- pharmacists forming co-operative interest groups
- pharmacists to make their presence known in disasters
- provide written information for counselling the masses in a disaster
- provide public health messages in pharmacists’ local communities on the risks of potential hazards and how to be personally prepared for a disaster
- participate in post-disaster after-action reports

6.4.2 Leximancer® Analysis Results

Leximancer® was used to examine the difference in opinions between the participants and to provide triangulation of methods. The transcripts were divided into four sections – ‘experience’, ‘pharmacists’ roles in disasters’, ‘PPRR cycle’, and ‘barriers and facilitators’. This was to gain the most from the Leximancer® analysis as the interview focused on four distinct topics. The first section ‘experience’ was used along with the ‘Magnitude’ coding method²⁸⁹ to categorise the participants into the following groups. Participants’ perspectives in approaching the interview questions (government, emergency services, or pharmacy), level of personal experience working in disasters (expertise 1, 2, or 3) and level of experience working with pharmacists in disasters (expertise 1, 2, or 3) were examined for each of the remaining three sections.

6.4.2.1 Pharmacists' Roles in Disasters

The 'pharmacists' roles in disasters' section of the interviews included any responses to questions specific to the topic of pharmacists' roles in disasters. This included discussions around what roles pharmacists are currently tasked with and roles pharmacists could be potentially undertaking in disasters. Figure 27 illustrates the concept map for all the transcripts analysed together for this section – 'pharmacists' roles in disasters'. The concept map was recorded at theme size 33% with visual concepts set at 100%. The concepts 'pharmacists' and 'roles' were removed for the Leximancer® concept maps in this section as these concepts formed the basis of the questions and thus showed a high occurrence without adding semantic content. The modifications to the Leximancer® default setting were kept consistent for all concept maps in this section.

The most important theme was 'disaster' which is shown in red on the concept map, which is heat-mapped according to the colour wheel. The concept 'disaster' referred to the value pharmacists, with their knowledge and expertise, provide in disasters. This is highlighted in the comment excerpt from the Leximancer® analysis.

"In a disaster situation that level of knowledge is really important because we still want to avoid making things worse. We want to avoid medical errors and medication errors in the disaster situation." [17]

Interestingly, highlighted in Bubble 1 and Bubble 2 are the specific terms used by participants when referring to pharmacists' roles in disasters. Participants used the term 'drugs' when referring to pharmacists' roles in logistics and supply (Bubble 1). The term 'medications' was used when making reference to patients and pharmacists' roles in medication management (Bubble 2). The concept 'question' incorporated participants questioning why pharmacists are not already included and why it is a topic of debate (Bubble 3). This is reiterated in the Leximancer® comment excerpt,

"But that is why when you asked the question when we were up in Toronto, I'm going like what?" [13]

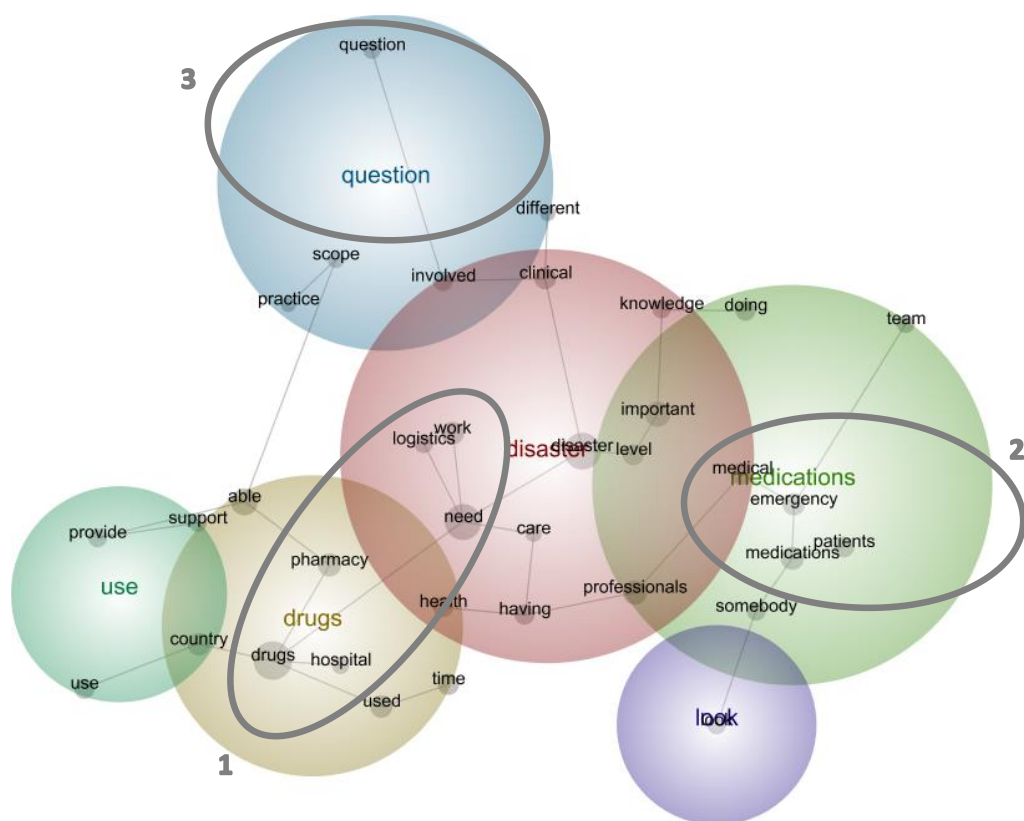


Figure 27: Leximancer® concept map of all the participant responses for the ‘pharmacists’ roles in disasters’ section. Bubble 1 highlights the concept ‘drugs’, Bubble 2 the concept ‘medications’ and Bubble 3 the concept ‘question’.

The Leximancer® themes emphasised in this concept map aligns with the manual coding ‘pharmacy’ theme and specifically the category ‘pharmacy purpose in a disaster’.

6.4.2.1.1 Participants’ Disaster Perspective

The Leximancer® concept map for the ‘pharmacists’ roles in disasters’ section categorised by the three disaster perspectives of the participants – emergency services, government, and pharmacy is shown in Figure 28. The concept map was recorded at theme size 50% with visual concepts set at 100%.

Based on the Leximancer® heat-mapping, the most important theme was ‘drugs’ which is the concept used by participants when referring to pharmacists’ roles in logistics. The participants with a pharmacy perspective focused on the ‘logistics’ theme as highlighted in Bubble 1, suggesting this is where they currently see their role in disasters. In contrast, the government and emergency service participants were on the opposite side of the concept map. The government participants

discussed the theme ‘emergency’ and how beneficial pharmacists can be to the team in an emergency. The emergency services participants focused on the concept ‘provide’ which encompassed pharmacists’ role in providing support to prescribers (Bubble 2) as highlighted in the excerpt below.

“They’ve got to provide support to the providers for prescribing. Then they have to track use so that we can get resupply for the right things as needed.”

[17]

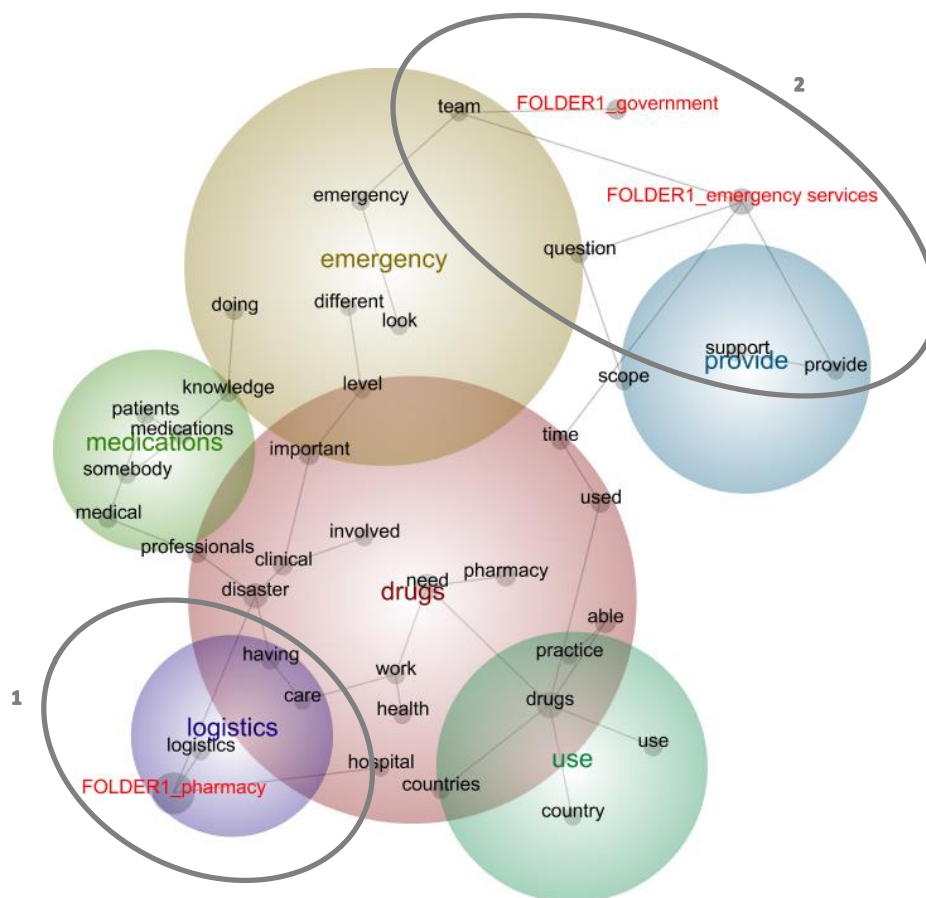


Figure 28: Leximancer® concept map of ‘pharmacists’ roles in disasters’ section based on participants’ disaster perspective. Bubble 1 highlights the concepts most closely aligned with the pharmacy category and Bubble 2 the concepts most closely aligned with the government and emergency services category.

A Leximancer® Insight Dashboard report was generated to compare participant’s disaster perspective and their opinions on pharmacists’ roles in disasters (refer to 6.3.7.2.3 for explanation of report). The Insight Dashboard report allows for a quick comparison of the relationship between the concepts of each category (Figure 29). Concepts from participants in the emergency services are in red, concepts from

government participants are in green, and concepts from pharmacy participants are in blue.

The quadrant overview in Figure 29 shows the most prominent concepts when combining the strength and relative frequency scores, belong to the pharmacy and government categories shown in the ‘magic’ upper right quadrant. These concepts in the magic quadrant were ‘support’, ‘disaster’, ‘need’, and ‘drugs’. The concept of ‘support’ identified by the government participants referred to the need to provide support to pharmacies that are potentially in the pathway of impending disaster (refer to Case Vignette 3 on page 187). The most prominent concepts from the pharmacy category referred to pharmacists’ roles in dealing with donations of drugs and assisting in ensuring they are needed by the country. The most prominent concepts in the pharmacy category in the quadrant overview belonging to the ‘drugs’ theme was also identified as the most important theme on the Leximancer® concept map (Figure 28).

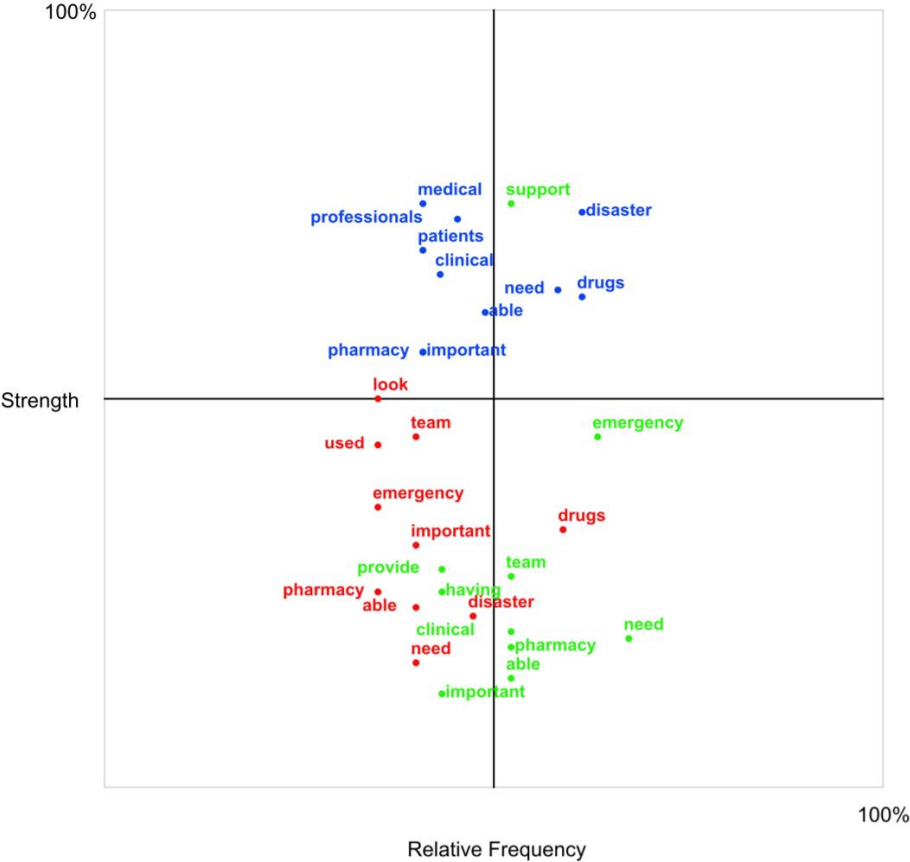


Figure 29: Leximancer® quadrant overview of participants’ disaster perspective (emergency services category (red), government category (green) and pharmacy category (blue)) and their opinions of pharmacists’ roles in disasters.

6.4.2.1.2 Participants' Personal Experience in Disasters

The Leximancer® concept map for the 'pharmacists' roles in disasters' section of the interviews categorised based on participants' personal level of experience in disasters (expertise 1, 2, or 3) is illustrated in Figure 30. The concept map was recorded at theme size 41% with visual concepts set at 96%.

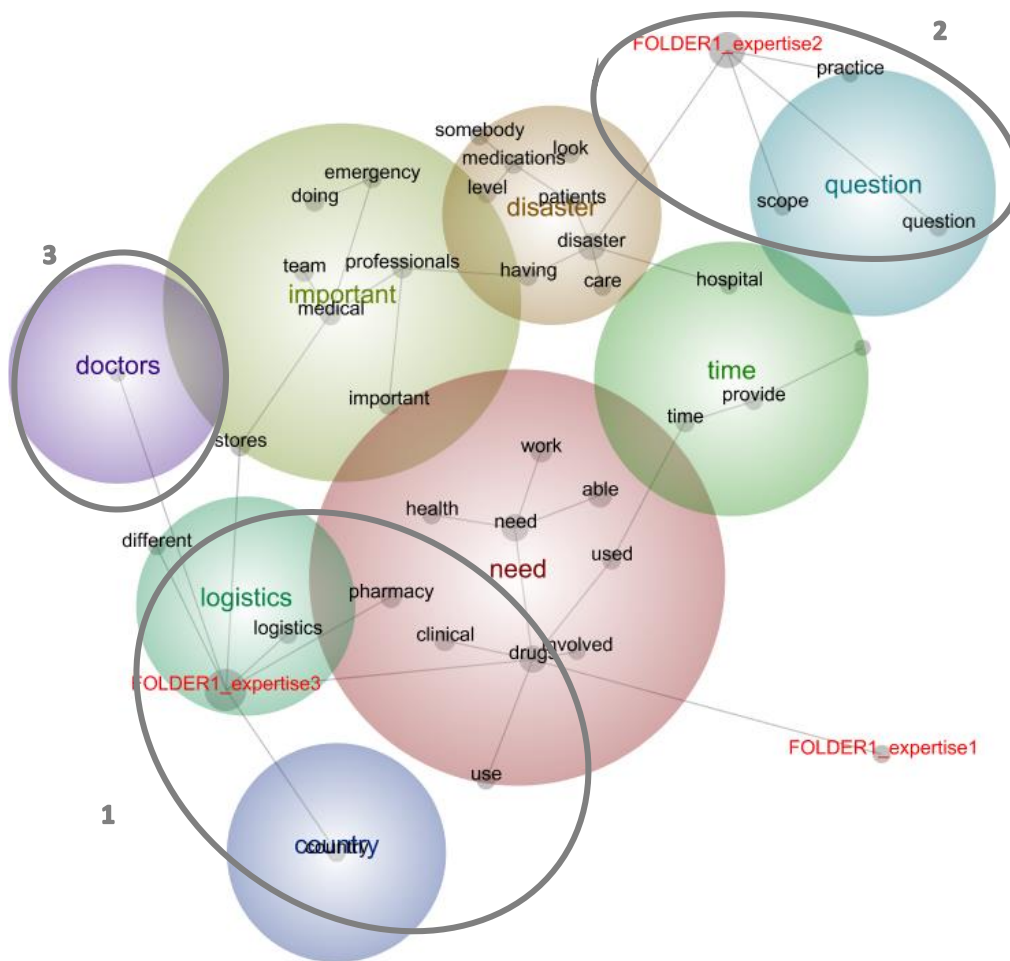


Figure 30: Leximancer® concept map of 'pharmacists' roles in disasters' section based on participants' personal experience of working in disasters (expertise 1, 2 and 3). Bubble 1 highlights the concepts most closely aligned with those most experienced, Bubble 2 the concepts most closely aligned with those of moderate experience and Bubble 3 the concept 'doctors'

The highest level of experience (expertise 3) category was strongly related to the theme 'logistics' and pharmacists' knowledge of the import and export laws including guidelines on donations and narcotics (Bubble 1). Bubble 2 recognises the concept 'question' which was closely aligned with the expertise 2 category. Those of moderate experience working in disasters (expertise 2) questioned how pharmacists

assisting in disasters is not already within their scope of practice as it should be a part of all health professional's skillset and education. Those with limited experience working in disasters (expertise 1) focused on the concept 'drugs' which was strongly linked in the text to pharmacists' role in logistics (Bubble 1). The concept 'doctors' circled in Bubble 3 refers to the ability of pharmacists to provide a level of healthcare services in the absence of doctors (e.g. medication reconciliation). This was highlighted in the comment excerpt in the Leximancer® analysis.

"The doctors are few and far between in disasters. Nurses aren't real [sic] good at doing those sorts of things." [I9]

A Leximancer® Insight Dashboard report was generated to compare participant's personal experience working in disasters and their opinions on pharmacists' roles in disasters (refer to 6.3.7.2.3 for explanation of report). The Insight Dashboard report allows for a quick comparison of the relationship between the concepts of each category (Figure 31). Concepts from participants with minimal experience are in red, concepts from participants with moderate experience are in green, and concepts from participants with the highest level of personal experience are in blue.

The most prominent concepts found in the magic quadrant were 'need', 'drugs', 'disaster', and 'able'. Those with moderate experience (expertise 2) were more cautious with their opinions - *"they [pharmacists] might be able to..."* suggesting their level of experience may have contributed to their confidence in their statements. Whereas, those with the most experience (expertise 3) made big picture statements and strong declarations of what roles pharmacists can undertake in disasters - *"there's a need for..."*, *"they're an important part of the team"*. The concept 'having' pertained to pharmacists having knowledge, both their unique pharmacist knowledge and the value they add in disasters.

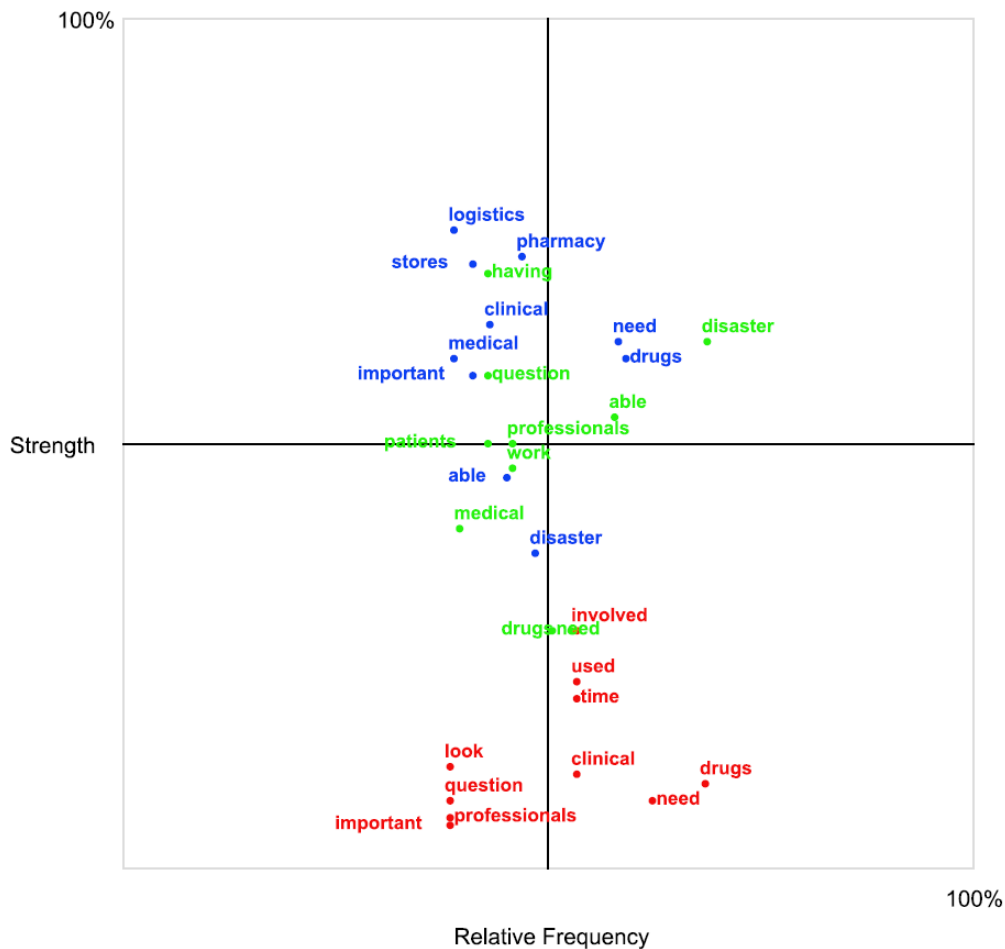


Figure 31: Leximancer® quadrant overview of participants’ personal experience working in disasters and their opinion of pharmacists’ roles in disasters (expertise 1 (red), expertise 2 (green) and expertise 3 (blue)).

6.4.2.1.3 Participants’ Experience Working with Pharmacists

The Leximancer® concept map of the ‘pharmacists’ roles in disasters’ section categorised by participants’ experience working with pharmacists in disaster (expertise 1, 2, or 3) is illustrated in Figure 32. The concept map was recorded at theme size 35% with visual concepts set at 100%.

Those with the most experience working with pharmacists (expertise 3) discussed pharmacists’ value based on their knowledge of logistics and posed the question as to how assisting in disasters could not be in a pharmacists’ scope of practice (Bubble 1). This is highlighted in the Leximancer® analysis comment excerpt.

“Why would it not be in - within our current scope of practice to be able to do - work in disasters? I mean, what does disasters need more in our scope of practice that we currently don’t have?” [A10]

Bubble 2 highlights the concept 'team' and the strong connection to expertise 2 category (those with moderate experience working with pharmacists in disasters). The concept 'team' refers to how pharmacists have always been considered a member of the team but are becoming more included as a clinical member.

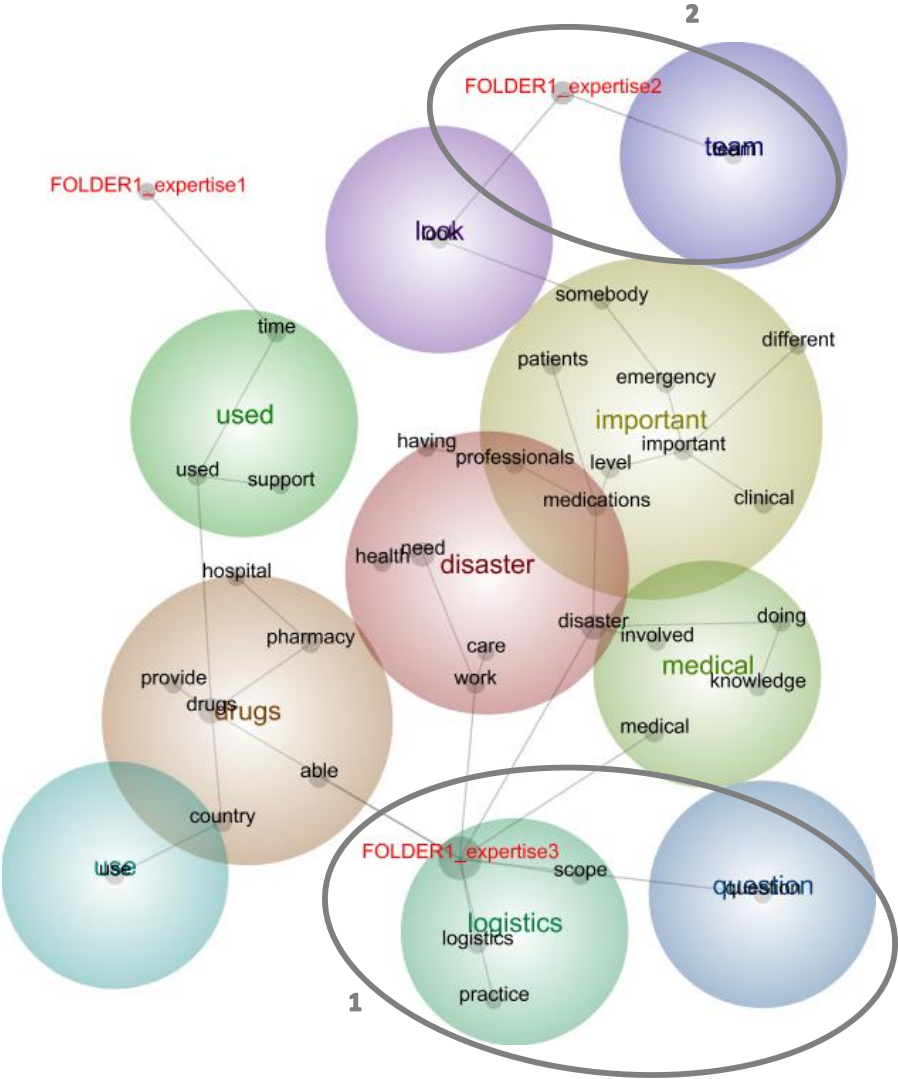


Figure 32: Leximancer® concept map of 'pharmacists' roles in disasters' section based on participants' experience working with pharmacists in disasters (expertise 1, 2 and 3). Bubble 1 highlights the concepts most closely aligned with those most experienced working with pharmacists and Bubble 2 the concepts most closely aligned to those with moderate experience.

A Leximancer® Insight Dashboard report was generated to compare participant's experience working with pharmacists in disasters and their opinions on pharmacists' roles in disasters (refer to 6.3.7.2.3 for explanation of report). The Insight Dashboard report allows for a quick comparison of the relationship between the concepts of each category (Figure 33). Concepts from participants with minimal

experience working with pharmacists in disasters are in red, participants with moderate experience are in green, and concepts closely aligned to participants with the highest level of experience working with pharmacists in disasters are in blue.



Figure 33: Leximancer® quadrant overview of participants' experience working with pharmacists in disasters (expertise 1 (red), expertise 2 (green) and expertise 3 (blue)) and their opinion of pharmacists' roles in disasters.

The most prominent concepts when combining the strength and relative frequency scores are found in the magic upper right quadrant. These concepts were 'drugs', 'disaster', 'need', and 'team'. The expertise 2 category was closely related to the concept 'team' which referred to statements suggesting pharmacists should be a part of the team and included as a clinical member. The concepts 'drugs' and 'disasters' were strongly related to the expertise 3 category and are the most important themes according to Leximancer® concept map (Figure 32).

6.4.2.2 PPRR Cycle

The participants were asked several questions about where pharmacists fit in the PPRR cycle and whether pharmacists' roles changed depending on the disaster phase. 'Pharmacists' as a concept was removed for the Leximancer® analysis and concept maps as the term 'pharmacists' formed the basis of the questions and showed a high occurrence without adding semantic content. These modifications to the Leximancer® default setting were kept consistent across the concept maps used in the 'PPRR cycle' section. Figure 34 illustrates the overall Leximancer® concept map of the participants' responses to the 'PPRR cycle' section. The concept map was recorded at theme size 46% with visual concepts set at 100%.

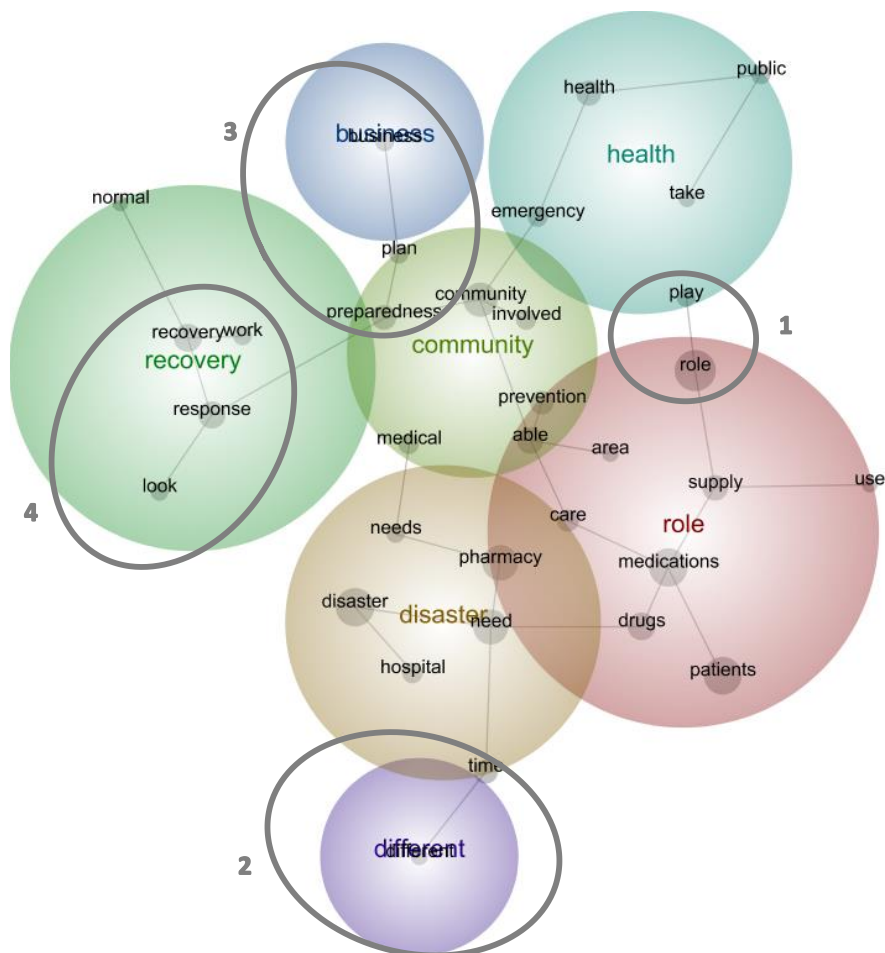


Figure 34: Leximancer® Concept map of all the participants responses for the 'PPRR cycle' section. Bubble 1 highlights concepts 'role' and 'play', Bubble 2 the concept 'different', Bubble 3 the concepts 'business' and 'plan' and Bubble 4 the concepts aligned with 'recovery'.

Bubble 1 highlights the roles pharmacists have across the entire PPRR cycle in a disaster. This is the most important theme according to the heat-mapping of Leximancer®. The theme 'different' in Bubble 2 refers to the idea pharmacists' roles evolve throughout the PPRR cycle based on the level of collapse of services and needs of the community. Bubble 3 encapsulates the theme 'business', this pertains to the discussions that pharmacists need to have BCP for their pharmacies to be adequately prepared in the event of a disaster. The theme 'recovery' in Bubble 4 refers to the task of learning and reflecting on actions taken in a disaster event to develop better plans for future disasters.

These Leximancer® themes align with the manual coding 'community' theme and its respective category 'business continuity'. They also align in the manual coding theme 'disaster management' and its respective category 'PPRR cycle'.

6.4.2.2.1 Participants' Disaster Perspective

The Leximancer® concept map for the 'PPRR cycle' section categorised based on participants' perspective (government, emergency services, and pharmacy) depicted in Figure 35. The concept map was recorded at theme size 43% with visual concepts set at 100%.

Bubble 1 outlines the government participants perspectives on where pharmacists fit in the PPRR cycle. The government category is closely aligned with the concepts 'business' and 'normal', referring to the pharmacy operations returning to normal as soon as possible after a disaster. The emergency services' participants focused on pharmacists' roles in the community in the preparedness phase and in public health messaging (Bubble 2). In contrast, the pharmacy participants when discussing their place in relation to the PPRR cycle discussed the broad range of roles pharmacists can offer across the entire disaster PPRR cycle (Bubble 3).

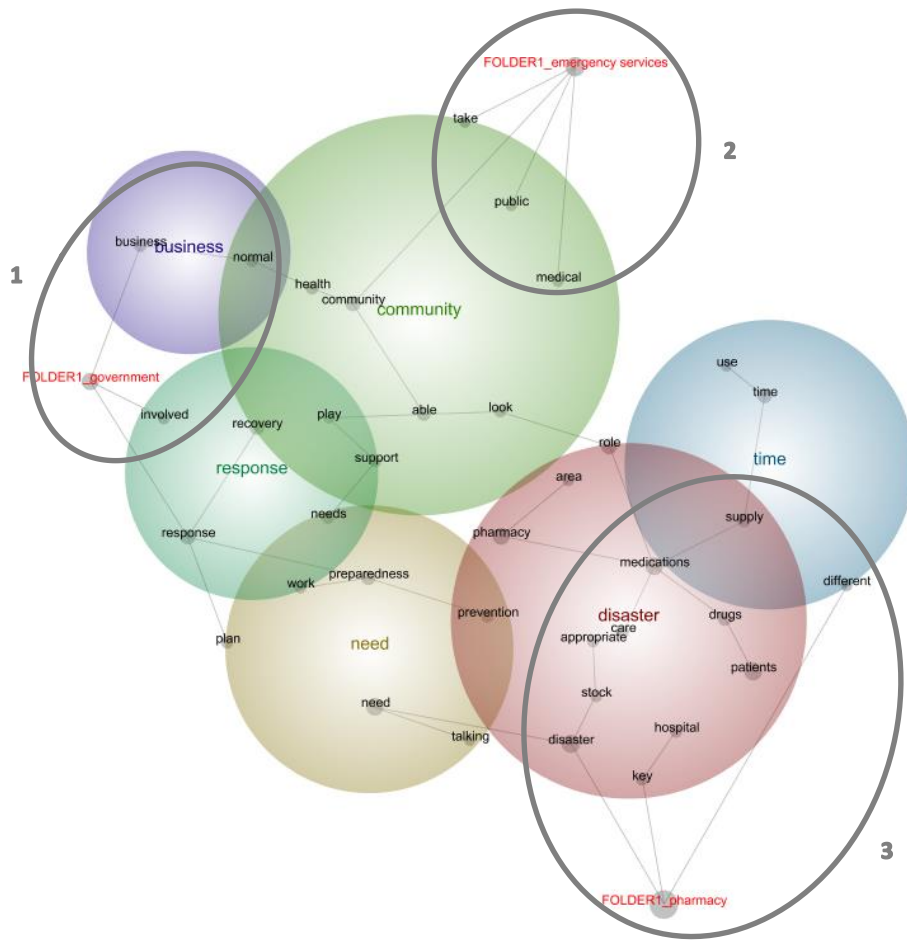


Figure 35: Leximancer® concept map of the ‘PPRR cycle’ section based on participants’ disaster perspective (pharmacy, government and emergency services). Bubble 1 highlights the concepts most closely aligned with the government category, Bubble 2 the concepts related to the emergency services category and Bubble 3 the concepts most closely aligned to the pharmacy category.

A Leximancer® Insight Dashboard report was generated to compare participants’ disaster perspective and their opinions on pharmacists’ place in the PPRR cycle (refer to 6.3.7.2.3 for explanation of report). The Insight Dashboard report allows for a quick comparison of the relationship between the concepts of each category (Figure 36). Concepts from participants in the emergency services are in red, concepts from government participants are in green, and concepts from pharmacy participants are in blue.

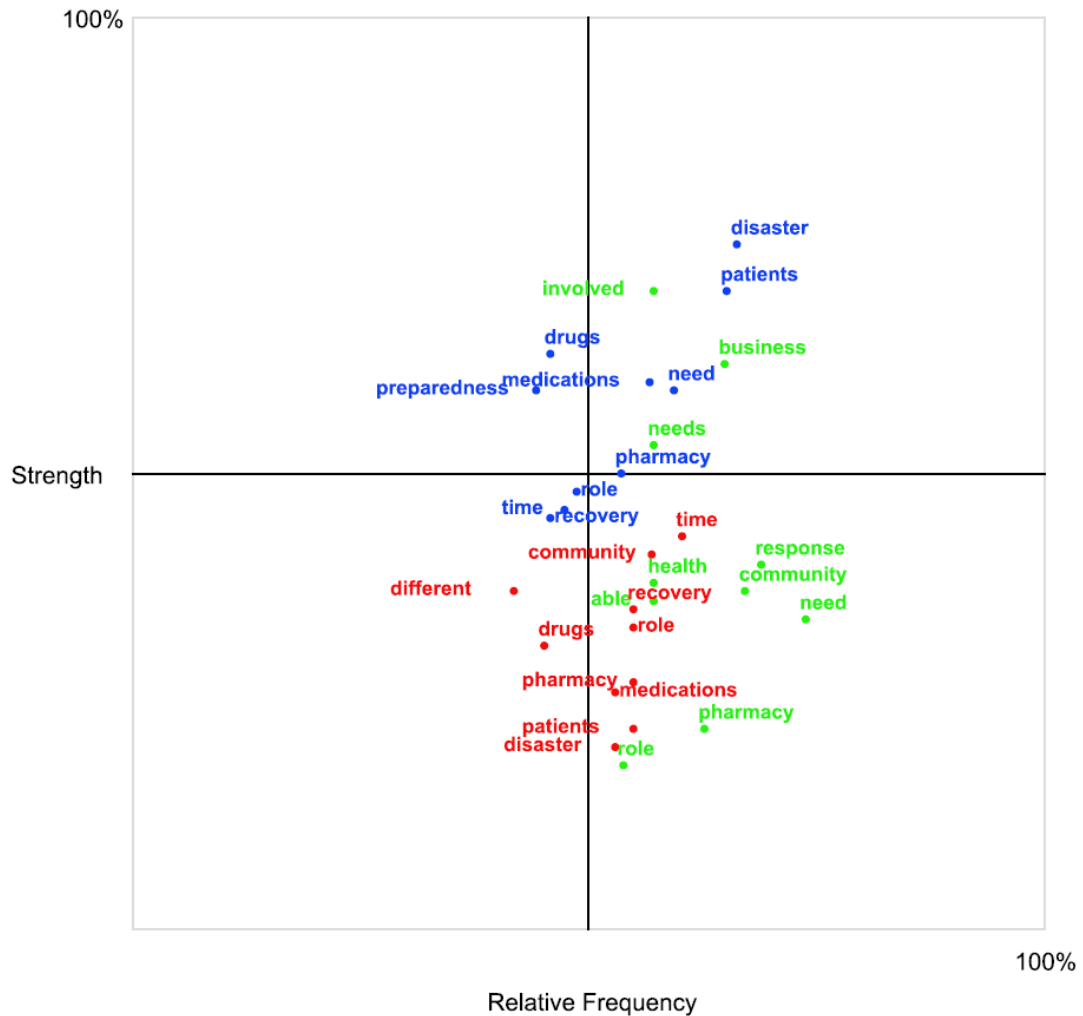


Figure 36: Leximancer® quadrant overview of participants' disaster perspective (emergency services (red), government (green) and pharmacy (blue)) and their opinion of where pharmacists' roles fit in the PRR cycle.

The most prominent concepts when combining the strength and relative frequency scores were found in the magic upper right quadrant. These concepts were 'disaster', 'patients', 'involved', 'business', 'need', 'medications', and 'needs'. The government category concepts referred to the need to involve pharmacists in the planning across the entire PRR cycle with BCP to adequately address the community's pharmaceutical needs. The most prominent concepts in the pharmacy category related to pharmacists having BCPs and providing medication management patients with chronic diseases. This is reiterated on the Leximancer® concept map (Figure 35), as the concepts closest to the pharmacy category are also the most prominent concepts for the category.

6.4.2.2.2 Participants' Personal Experience in Disasters

The Leximancer® concept map for the 'PPRR cycle' section categorised based on participants' personal experience working in disasters (expertise 1, 2, or 3) is shown in Figure 37. The concept map was recorded at theme size 46% with visual concepts set at 100%.

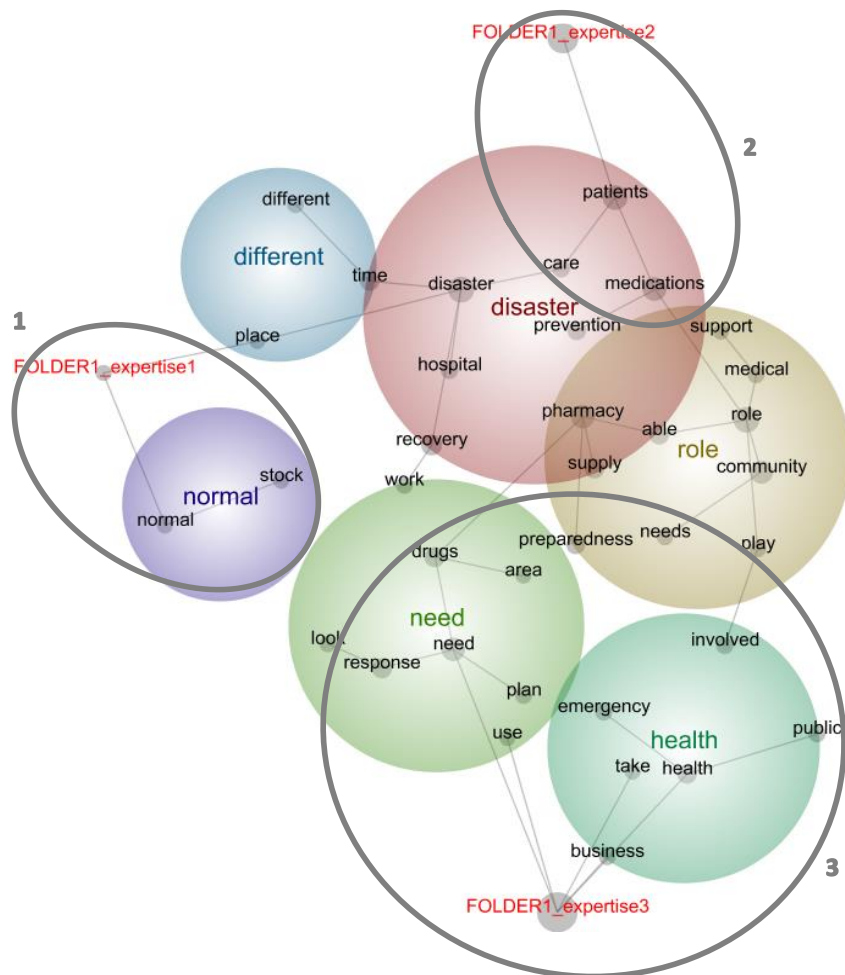


Figure 37: Leximancer® concept map of the 'PPRR cycle' section based on participants' personal experience of working in disasters (expertise 1, 2 and 3). Bubble 1 highlights the concepts most closely aligned with the participant responses with minimal personal experience. Bubble 2 the concepts most closely aligned with moderate experience and Bubble 3 highlights the concepts most closely aligned to those with the most experience in disasters.

Bubble 1 highlights the relationship between those with limited personal experience working in disasters (expertise 1) and pharmacists' role in stock management and ensuring its continuation outside of normal channels during disasters. Those with moderate personal experience working in disasters (expertise 2) were closely aligned with the concepts 'patients' and 'medications' (Bubble 2). Those most experienced working in disasters (expertise 3) discussed broader roles

for pharmacists in disasters and the need for pharmacists to be across the entire PRR cycle (Bubble 3).

A Leximancer® Insight Dashboard report was generated to compare participants’ personal experiences working in disasters and their opinions on pharmacists’ place in the PRR cycle (refer to 6.3.7.2.3 for explanation of report). The Insight Dashboard report allows for a quick comparison of the relationship between the concepts of each category (Figure 38). Concepts from participants with minimal experience are in red, concepts from participants with moderate experience are in green, and concepts from participants with the highest level of personal experience are in blue.

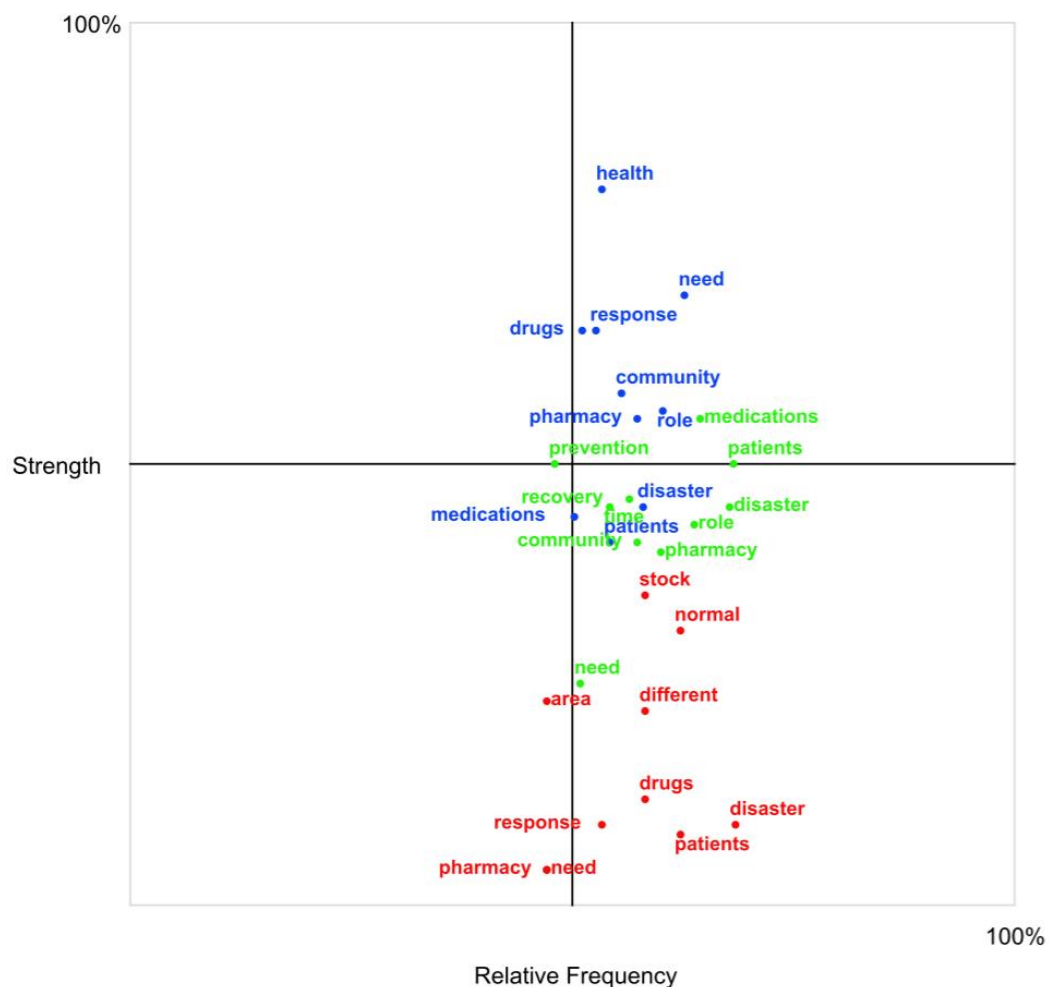


Figure 38: Leximancer® quadrant overview of participants’ personal experience working in disasters (expertise 1 (red), expertise 2 (green), expertise 3 (blue)) and their opinion of where pharmacists’ roles fit in the PRR cycle.

The most prominent concept when combining the strength and relative frequency scores were found in the magic upper right quadrant. These concepts were 'health', 'need', 'response', 'drugs', 'community', 'role', 'pharmacy', and 'medications'. The expertise 2 category was closely related to the concept 'medications' which referred to a pharmacist's role assisting patients and the community prepare for disasters through having their own personal reserve of chronic medications and a first aid kit at home. Those with the most experience in disasters (expertise 3) discussed how pharmacists have a role across the entire PRR cycle and the role evolves depending on the needs of the community in a specific disaster.

6.4.2.2.3 Participants' Experience Working with Pharmacists

The Leximancer® concept map for the 'PPRR cycle' section categorised based on participants experience working with pharmacists in disaster (expertise 1, 2, and 3) is illustrated in Figure 39. The concept map was recorded at theme size 41% with visual concepts set at 80%.

In the Leximancer® concept map, 'pharmacy' was the most important (hottest) theme linking pharmacists to the broader pharmacy profession/industry. Bubble 1 highlights the relationship between the participants with limited-moderate experience working with pharmacists in disasters and their opinions on the business of pharmacy, ensuring the pharmacy stays open for the community in a disaster. Those with the most experience working with pharmacists in disasters (expertise 3) are on the opposite side of the concept map. These participants discussed the bigger picture and how pharmacists have a role across the entire disaster PRR cycle. They also mentioned how pharmacists' roles are different depending on the specific disaster phase, context of the disaster, or level of collapse on healthcare services (Bubble 2).

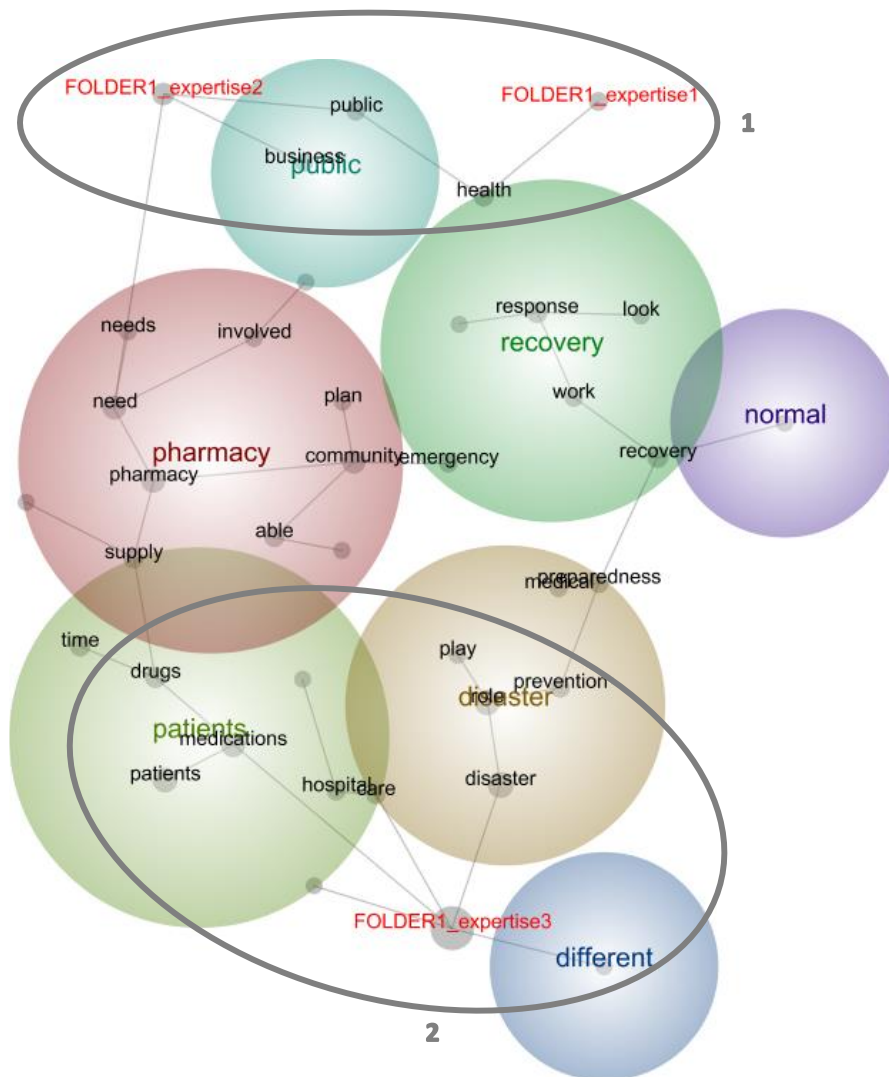


Figure 39: Leximancer® concept map of the ‘PPRR cycle’ section based on participants’ level of experience working with pharmacists in disasters (expertise 1, 2 and 3). Bubble 1 highlights the concepts most closely aligned with those of limited-moderate experience and Bubble 2 the concepts closely aligned with those most experienced working with pharmacists.

A Leximancer® Insight Dashboard report was generated to compare participants’ level of experience working with pharmacists in disasters and their opinions on pharmacists’ place in the PPRR cycle (refer to 6.3.7.2.3 for explanation of report). The Insight Dashboard report allows for a quick comparison of the relationship between the concepts of each category (Figure 40). Concepts from participants with minimal experience working with pharmacists in disasters are in red, concepts from participants with moderate experience are in green, and concepts from participants with the highest level of experience working with pharmacists in disasters are in blue.

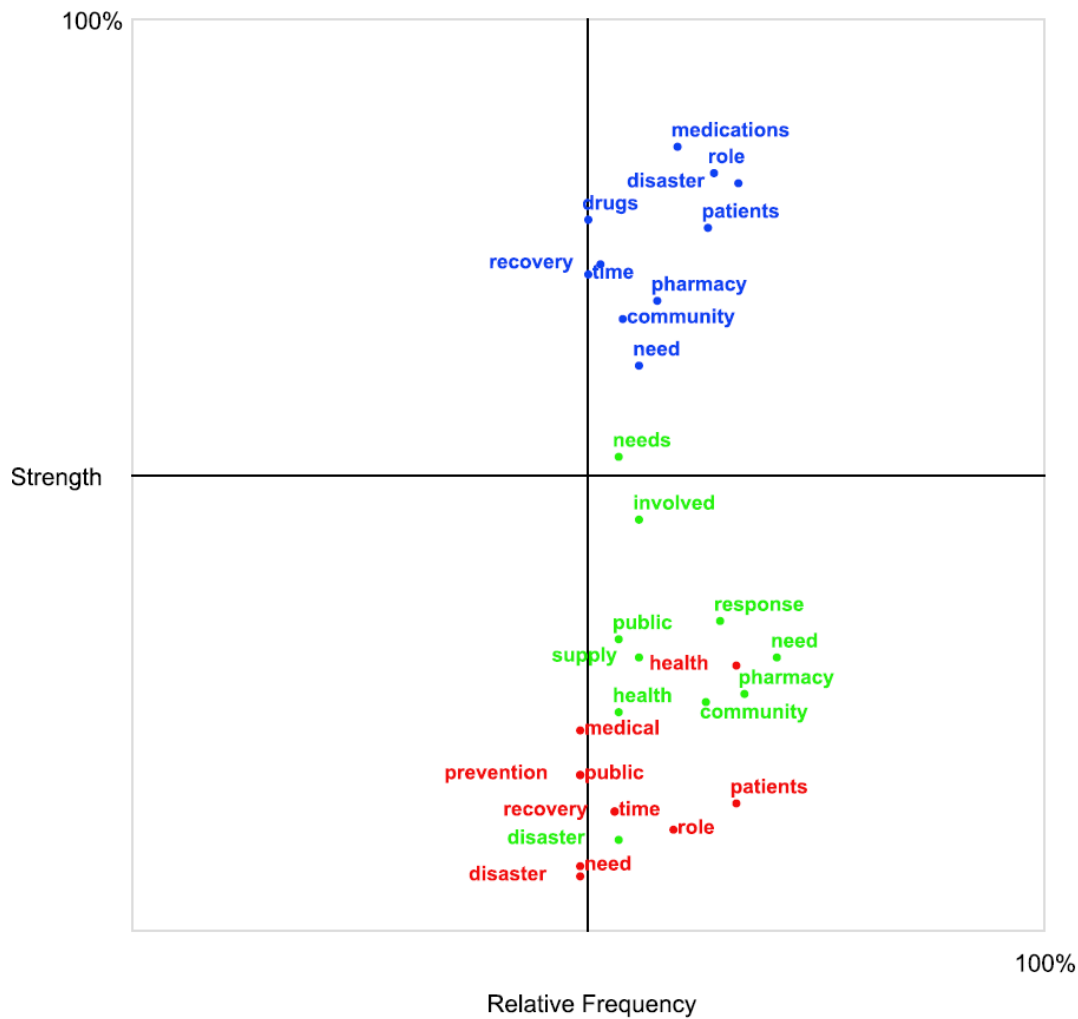


Figure 40: Leximancer® quadrant overview of participants' experience working with pharmacists (expertise 1 (red), expertise 2 (green) and expertise 3 (blue)) in disasters and their opinion of where pharmacists' roles fit in the PPRR cycle.

The most prominent concept when combining the strength and relative frequency scores are in the magic upper right quadrant. The concepts included are mostly from the expertise 3 category and the concept 'needs' from the expertise 2 category. The concept 'needs' refers to pharmacists' role in understanding the needs of their community and addressing them through having a BCP, ensuring they will be able to continue to provide medications and support to the community. The concepts strongly related to the expertise 3 category refers to the knowledge pharmacists can provide on drugs, in the caring for patients, and in other roles throughout the PPRR cycle.

6.4.2.3 Barriers and Facilitators

The participants were asked several questions regarding what they perceived to be the barriers and facilitators to pharmacists' roles in disasters. The concept 'pharmacists' was removed for the Leximancer® concept maps as it formed the basis of the question and showed a high occurrence without adding semantic content. The modifications to the Leximancer® default setting were kept consistent across the concept maps used in the 'barriers and facilitators' section. Figure 41 illustrates the overall Leximancer® concept map of the participants' responses to the 'barriers and facilitators' section of the interviews.

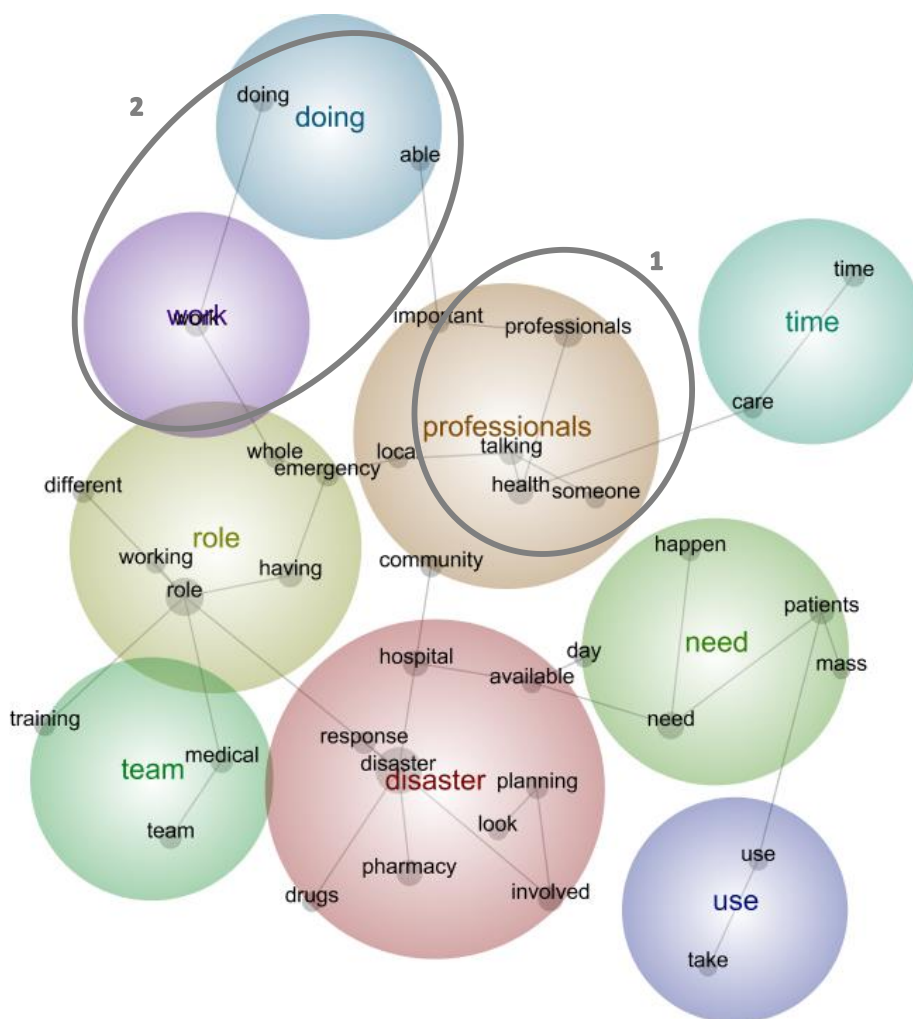


Figure 41: Leximancer® concept map of all the participants' responses in the 'barriers and facilitators' section. Bubble 1 highlights the theme 'professionals' and Bubble 2 the concepts 'work' and 'doing'

According to the Leximancer® heat-mapping (according to the colour wheel), 'disaster' is the most important theme. This theme was discussed two-fold – firstly,

as a barrier in the sense that pharmacists are not fully integrated into disaster management and disaster teams. Secondly, the concept 'disaster' was discussed as an enabler as with improved integration and collaboration between disaster health stakeholders, pharmacists can become a more utilised team member. Bubble 1 highlights the concept 'professionals'. The participants suggested a barrier was the prejudice and attitudes of other healthcare professionals to pharmacists being involved in disasters. This is highlighted in the comment excerpt from the Leximancer® analysis.

"You're talking about turf. I mean the whole thing with the immunisations."

[16]

In Bubble 2 the concepts 'doing' and 'able' are emphasised. These concepts are the recommendations by the participants for pharmacists to work at proving to others that they can undertake these roles and be able to prove their value to facilitate inclusion as a team member. Part of this idea is being able to prove the workload of a pharmacist on deployment. Often there is a single pharmacist and not a pharmacy team undertaking multiple tasks.

"So, I think the first barrier is just simply the availability to participate may be limited, and we often have stretched models as it is when we're covering a high clinical load. So being able to be pulled in to something may be challenging." [12]

The Leximancer® themes identified in this 'barriers and facilitators' section align with the limitations and enablers acknowledged in the manual coding. Healthcare professional attitudes matches a similar code in the 'external barriers' discussed in the manual coding in Section 6.4.1.5. The Leximancer® concept 'need' aligns with a similar code in the 'intrinsic facilitators'.

6.4.2.3.1. Participants' Disaster Perspective

The Leximancer® concept map for the 'barriers and facilitators' section categorised based on participants' perspective (government, emergency services, and pharmacy) depicted in Figure 42. The concept map was recorded at theme size 41% with visual concepts set at 100%. The differences in the stakeholder's

perspectives highlighted on this concept map reiterate the same argument previously discussed in the manual coding results (Section 6.4.1.1.5). A pharmacist’s skillset spans various practice areas involved in disaster management. Each participant’s perspective focuses on a different pharmacist attribute which is seen as valuable in a disaster.

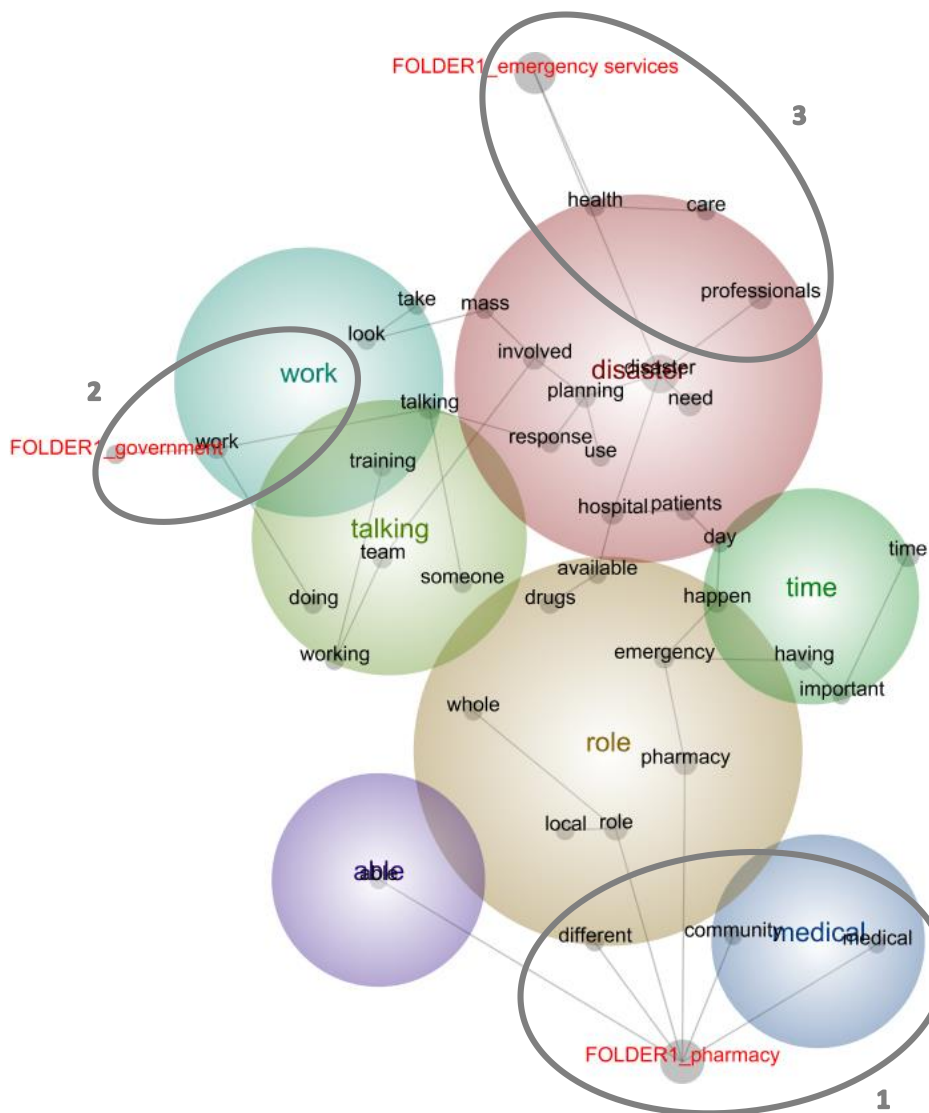


Figure 42: Leximancer® concept map of the ‘barriers and facilitators’ section based on participants’ disaster perspective (pharmacy, government and emergency services). Bubble 1 highlights the concepts most closely aligned to the pharmacy category, Bubble 2 the concepts related to the government category and Bubble 3 the concepts aligned to the emergency services category.

Bubble 1 highlights the concepts ‘medical’ and ‘community’, which were closely associated to participants with a pharmacy perspective. These participants saw community outreach as an enabler for increasing awareness of pharmacists’ roles in disasters. The concept ‘medical’ referred to the identified barrier of pharmacists

being pigeon-holed into the medical practice area which has its own notions of how to respond to disasters, often considered to be narrowly focused on acute care and emergency services. This is highlighted in the comment excerpt from the Leximancer® analysis.

“So, the idea's got to be done through the lead up to an event. I think that - part of the problem there is they probably sit tied to the medical sector who have such preconceived [notions] of what they're going to do in a disaster.”
[A1]

The participants made recommendations that pharmacists should engage with other practice areas (i.e. disaster welfare) which have a broader focus including community public health aspects.

“I think that - part of the challenge is actually integrating or liaising with the disaster welfare aspects of a disaster, who are more public focused, to get - is probably where the pharmacist is going to get greater understanding of their role.” [A1]

Bubble 2 recognises the relationship between the concept ‘work’ and the participants with a government perspective. The concept ‘work’ was used in the text as a barrier in reference to the challenges of getting different health professions to work collaboratively in a disaster. This is highlighted in the comment excerpt below.

“But when you're trying to get two government organisations to work together is sometimes hard and the rest of it.” [I13]

The concept ‘work’ was also used in the text as an enabler referring to the pharmacist’s logistics role in disasters, providing support to the health teams and building on this established relationship to prove the value of pharmacists in disasters.

The participants with an emergency services perspective and their relationship to the concepts ‘health care’ and ‘professionals’ are highlighted in Bubble 3. These concepts suggested a barrier that might be ‘the competition for a healthcare professional’s time’ and disaster preparedness is only one area competing for their interest and contributions.

“So that's the challenge is there's just so many areas that young health care professionals can contribute, disaster preparedness is just one of them. But if the industry or the movement is not well developed, it's certainly one where you could put your mark.” [13]

A Leximancer® Insight Dashboard report was generated to compare participant’s disaster perspective and their opinions on the barriers and facilitators (refer to 6.3.7.2.3 for explanation of report). The Insight Dashboard report allows for a quick comparison of the relationship between the concepts of each category (Figure 43). Concepts from participants in the emergency services are in red, concepts from government participants are in green, and concepts from pharmacy participants are in blue.

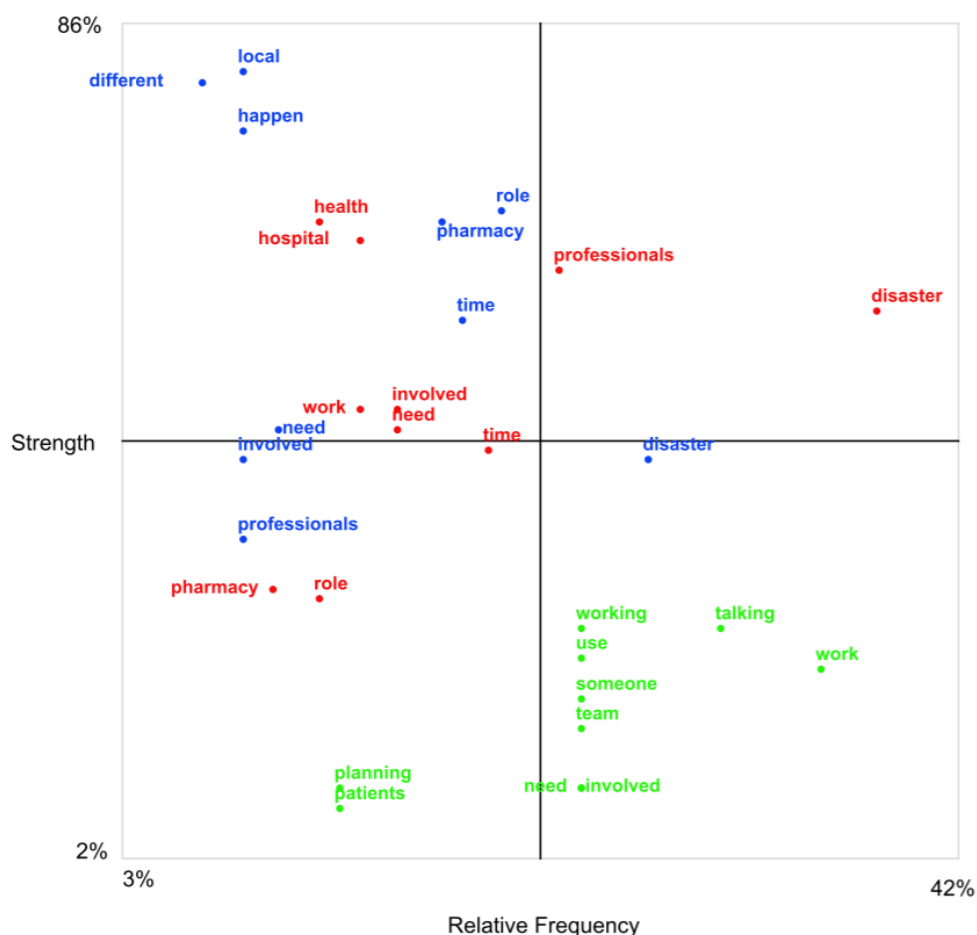


Figure 43: Leximancer® quadrant overview of participants’ disaster perspective (emergency services (red), government (green) and pharmacy (blue)) and their opinion of the barriers and facilitators for pharmacists’ roles in disasters.

The most prominent concepts when combining the strength and relative frequency scores were found in the magic upper right quadrant. These concepts ‘professionals’ and ‘disaster’ were from the emergency services participants. The competition for a health professionals time was perceived as a challenge and pharmacies need BCPs to work out how they will service the community during a disaster. These most prominent concepts were also the most important according to the Leximancer® heat-mapping on the concept map in Figure 42.

6.4.2.3.2 Participants’ Personal Experience in Disasters

The Leximancer® concept map for the ‘barriers and facilitators’ section categorised based on participants’ personal experience working in disasters (expertise 1, 2 or 3) is shown in Figure 44. The concept map was recorded at theme size 42% with visual concepts set at 100%.

Bubble 1 highlights one of the barriers identified by those participants with limited-moderate experience in disasters (expertise 1 and expertise 2) was that pharmacists are often thought of as an extension of the pharmacy (bricks and mortar). The text excerpts identified in this theme refers to the pharmacists’ roles in getting the pharmacy operational after the event in a disaster.

“But what always happens is you get your pharmacy open as soon as possible, preferably the day after and you will get patients that - you will get those emergency supply situations.” [A12]

In Bubble 2, the expertise 3 category was closely related to the concept ‘professionals’. This concept refers to the competition for a healthcare professionals time with there being many other competing goals. Bubble 3 emphasises the concept ‘medical’. Pharmacists were identified as being pigeon-holed into the medical practice area when perhaps that is not the perfect fit for them (also discussed in Section 6.4.1.1.5). The concepts connected to this theme of ‘medical’ on the concept map are ‘nurses’, ‘doctors’, ‘team’, and ‘role’. The relationship between these concepts on the concept map, suggests they frequently co-occur in the text.

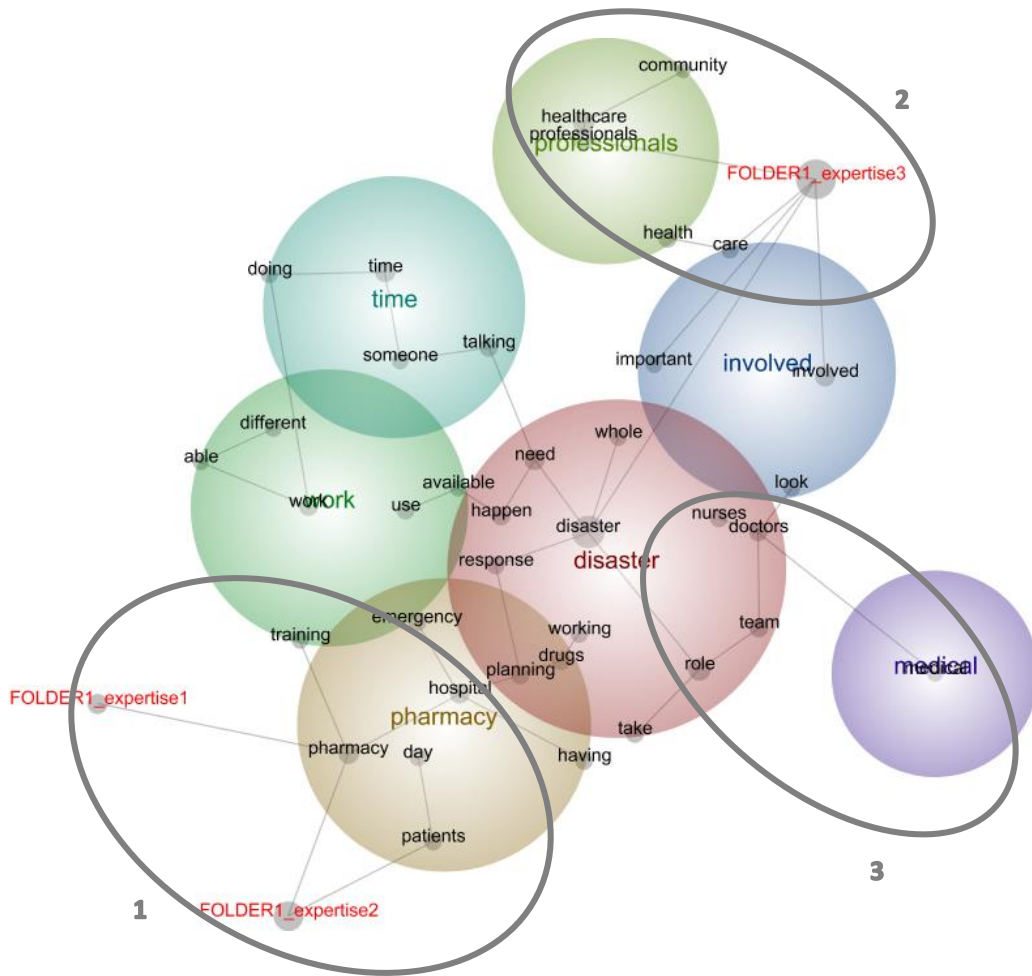


Figure 44: Leximancer® concept map of the ‘barriers and facilitators’ section based on participants’ personal experience working in disasters (expertise 1, 2 and 3). Bubble 1 highlights the concepts most closely aligned with those participants of limited-moderate experience. Bubble 2 the concepts closely aligned to the most experienced in disasters and Bubble 3 the concepts associated with the theme ‘medical’

A Leximancer® Insight Dashboard report was generated to compare participant’s personal experience working in disasters and their opinions on the barriers and facilitators (refer to 6.3.7.2.3 for explanation of report). The Insight Dashboard report allows for a quick comparison of the relationship between the concepts of each category (Figure 45). Concepts from participants with minimal experience are in red, concepts from participants with moderate experience are in green, and concepts from participants with the highest level of personal experience are in blue.

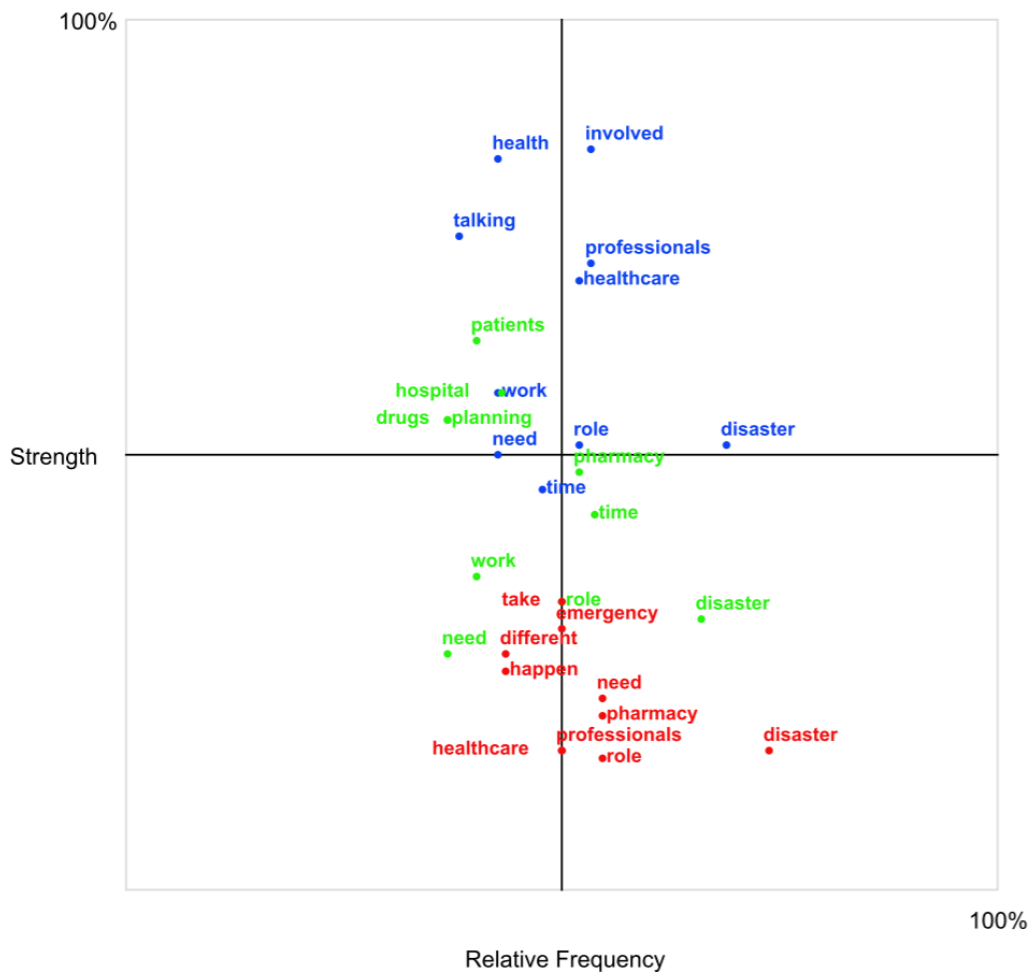


Figure 45: Leximancer® quadrant overview of participants’ personal experience working in disasters (expertise 1 (red), expertise 2 (green) and expertise 3 (blue)) and their opinion of the barriers and facilitators for pharmacists’ roles in disasters.

The most prominent concept when combining the strength and relative frequency scores was found in the magic upper right quadrant. These concepts were ‘involved’, ‘professionals’, ‘healthcare’, ‘role’, and ‘disaster’. Those with the most experience (expertise 3) discussed how pharmacists should be involved with disaster teams and they should demonstrate their value in disaster management. The concepts ‘healthcare’ and ‘professionals’ related to the competition for a healthcare professionals time and attitudes of other healthcare professionals can be a stumbling block to pharmacists’ roles in disasters. The concept ‘role’ referred to pharmacists stepping into roles to assist when necessary in the absence of other qualified professionals.

6.4.2.3.3 Participants' Experience Working with Pharmacists

The Leximancer® concept map for the 'barriers and facilitators' section categorised based on participants' experience working with pharmacists in disaster (expertise 1, 2, or 3) is illustrated in Figure 46. The concept map was recorded at theme size 39% with visual concepts set at 80%.

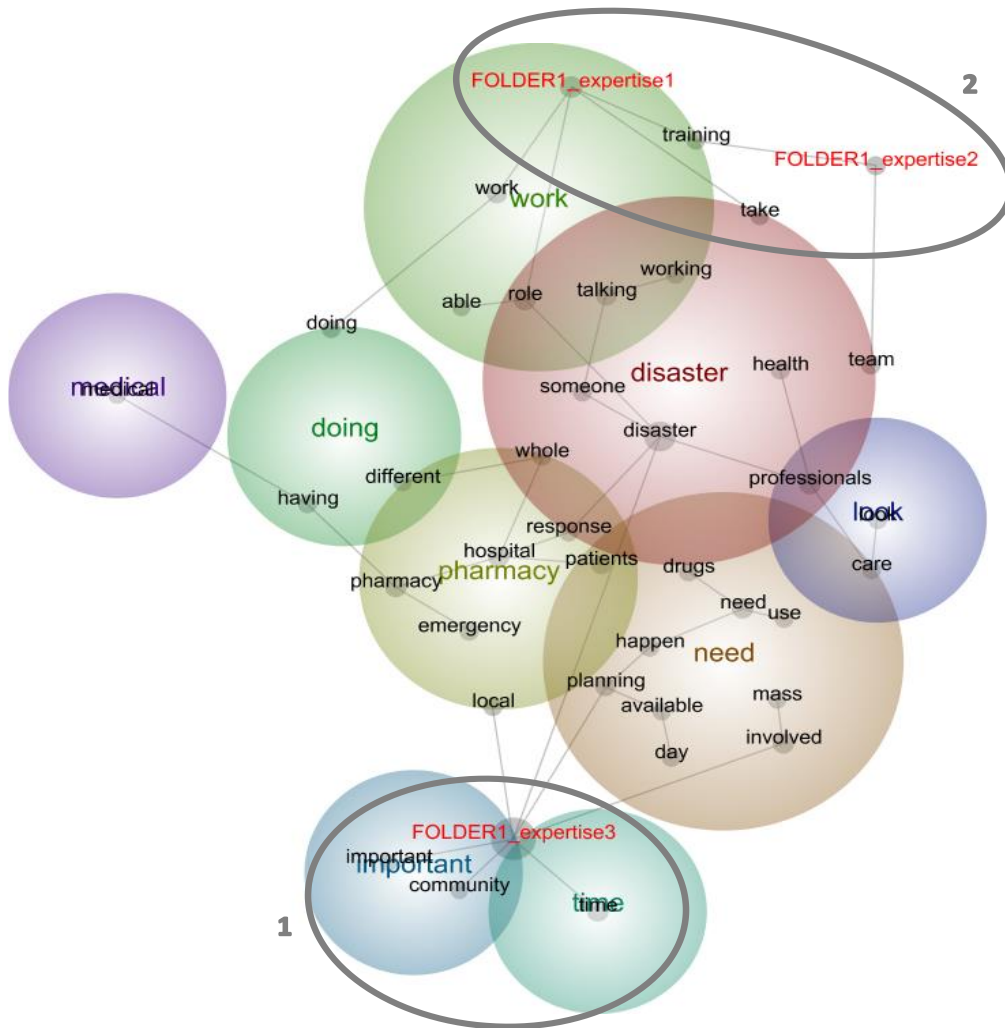


Figure 46: Leximancer® concept map of the 'barriers and facilitators' section based on participants' experience working with pharmacists in disasters (expertise 1, 2 and 3). Bubble 1 highlights the concepts closely aligned with those most experienced working with pharmacists and Bubble 2 the concepts associated with those participants of limited-moderate experience.

Bubble 1 highlights the relationship between the expertise 3 category and the concepts 'important', 'community', and 'time'. Those with the most experience working with pharmacists in disasters see the most important enabler for pharmacists' roles in disasters as knowing the local community and investing time in getting to know local healthcare providers and building collaborative relationships.

On the opposite side were the expertise 1 and expertise 2 categories. Those with limited-moderate experience working with pharmacists in disasters believed the barrier to pharmacists' roles in disasters was 'training'. The concept of 'training' acknowledged pharmacists' need to increase their involvement and knowledge in disaster management.

A Leximancer® Insight Dashboard report was generated to compare participant's experience working with pharmacists in disasters and their opinions on the barriers and facilitators (refer to 6.3.7.2.3 for explanation of report). The Insight Dashboard report allows for a quick comparison of the relationship between the concepts of each category (Figure 47). Concepts from participants with minimal experience working with pharmacists in disasters are in red, concepts closely aligned to participants with moderate experience are in green, and concepts from participants with the highest level of experience working with pharmacists in disasters are in blue.

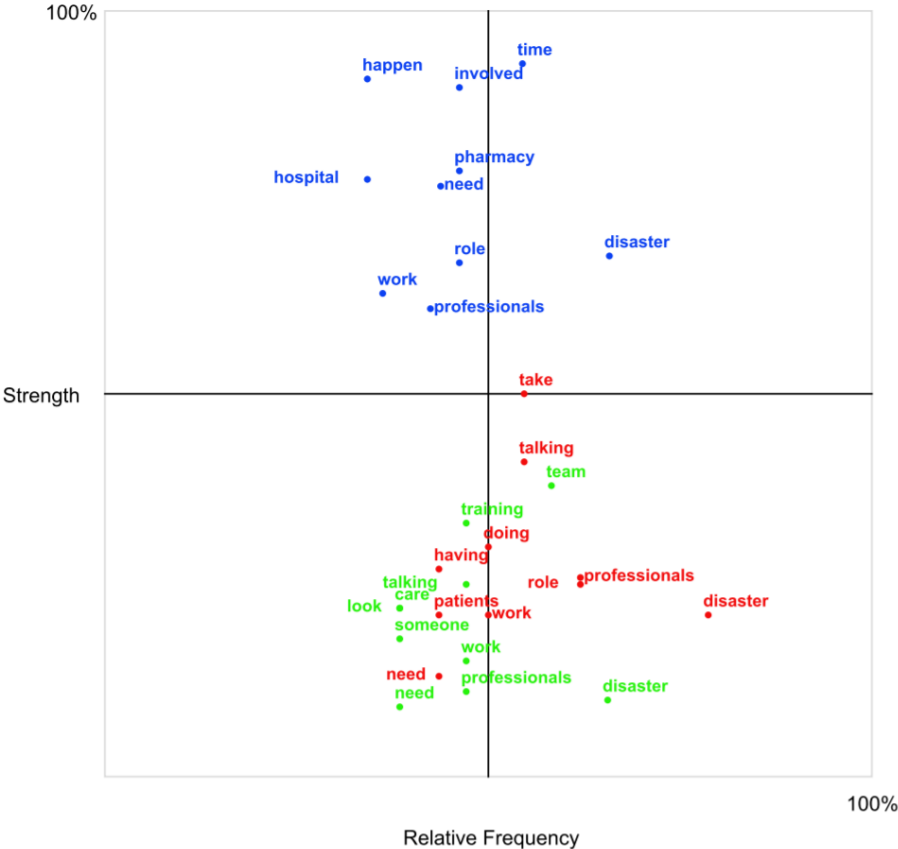


Figure 47: Leximancer® quadrant overview of participants' experience working with pharmacists in disasters (expertise 1 (red), expertise 2 (green) and expertise 3 (blue)) and their opinion of the barriers and facilitators for pharmacists' roles in disasters.

The most prominent concept when combining the strength and relative frequency scores are shown in the magic upper right quadrant. These concepts were 'time' and 'disaster', which refer to the need to increase the education and exposure of healthcare professionals to the basic principles of disaster management.

6.5 Discussion

The findings of this study present a strong argument from the participants for the inclusion of pharmacists across the entire disaster PRR cycle. The participants believe pharmacists are an essential team member in disasters and their roles evolve across the PRR cycle. They also identified pharmacists are capable of fulfilling roles across multiple individual practice areas operating in a disaster. However, there is an isolated nature to the operation of these practice areas and organisations, each with their own management systems and structures. Disaster management organisations need to operate at a higher level of abstraction utilising systems thinking^{140,143} and chaos theory¹⁶⁵ (refer Section 2.4-2.6), to work harmoniously together to achieve the best outcomes for the disaster-affected community. To optimise disaster management, these organisations need to work as branches all stemming from the same tree, feeding from the same soil. It was identified in this study that pharmacists are currently pigeon-holed in the logistics practice area but have the skillset to be of assistance across four key practice areas – logistics, public health, patient care, and governance.

The role of pharmacists in ensuring medications are available in disasters throughout the different stages of the logistics supply chain is essential.³⁰⁵ NGOs work in both disasters and humanitarian crises and have developed complex systems in which to access maintainable medication supplies utilising the expertise of pharmacists.³⁰⁵ This study found the most common role referred to for pharmacists in disasters was logistics and supply chain management. Logistics has been a long established and accepted role for pharmacists in disasters since the 1960s.¹

Instead of being included as an essential team member in disaster health teams, pharmacists continue to be treated as a support service to other healthcare professionals. One rationale for this is pharmacists are the only healthcare

professional fulfilling roles in public health without being recognised as a primary provider.¹³³ Nurse practitioners and physician assistants perform similar roles in relation to public health but have the recognition as healthcare practitioners.¹³³ Public health is the cornerstone of the Australian National Medicines Policy of ‘timely, and affordable access to medicines’ for which pharmacists follow to meet the quality, safety, and efficacy standards of providing pharmacy services to the community.³⁰⁶ Pharmacists’ roles in the area of public health include patient safety, pharmacovigilance, medication management, therapeutic substitution programs, harm minimisation, affordable medicines, rational drug use initiatives, vaccination programs, contraceptive services, prevention of illness or chronic disease exacerbations, prevention campaigns (e.g. importance of wearing a sunscreen, smoking cessation), and disaster preparedness or management.^{306,307} A systematic review, conducted in 2011, discovered pharmacists struggle with the time constraint of implementing public health services into their everyday practice with the current pharmacy models.³⁰⁸ Further, whilst patients benefited from receiving these public health services, many were not aware that pharmacists provided these services.³⁰⁸ This review found the public believed pharmacists are an appropriate provider of public health services, however, pharmacists feel they need additional training on how to apply their public health knowledge.³⁰⁸

Pharmacists have begun to be recognised as a first responder in everyday practice with the international opioid epidemic.³⁰⁹ Naloxone, the antidote for suspected opioid overdoses, was down-scheduled in Australia, allowing pharmacists to dispense the medication to members of the public.³⁰⁹ In 2015, Australia became the second country after Italy (in 1995) to formally supply naloxone as an over-the-counter medication.³¹⁰ In the US, pharmacists are able to prescribe the medication directly to the patient or under collaborative practice agreements.³¹¹ Pharmacists are vital in providing emergency access to life-saving medications in everyday settings as well as in disasters. Pharmacists can positively improve patient care when included as a team member.³¹²⁻³¹⁴ The Australian state government IGEM review in 2016 after the thunderstorm asthma event in Australia suggested pharmacists should be included on health teams to improve outcomes.²³¹ The disaster health stakeholders

also mentioned including pharmacists in more roles in disasters as a means of improving patient safety and outcomes.

In 2009 Leape³¹² proposed that the health system needs to change to be more collaborative and multidisciplinary with its healthcare teams focusing on patient-centred care. He argued that the inclusion of pharmacists in health teams would reduce medication errors and improve patient safety.³¹² He also suggested the hierarchy needs to change to collaborative team-based care with pharmacists rather than physicians leading teams depending on the situational expertise required.³¹² A systematic review conducted in 2010, found that including pharmacists as team members in the provision of direct patient care improved various patient outcomes across different disease states and in different healthcare settings.³¹⁴ However, despite the findings of this systematic review in 2010, this research found that pharmacists are still often left out of discussions that affect the health management of disasters.

One of the most recognised ways mentioned by the disaster health stakeholders that pharmacists can assist in disasters is by providing medication management for chronic disease patients. Ensuring patients have sufficient supplies of their ongoing chronic disease medications to last the duration of a disaster and the collapse of local community services has significant health system benefits. It can reduce burden on public health services and free up resources for high acuity patients. Currently, ensuring ongoing medication supply is achieved by providing a three-day emergency medication supply, or, if legislation allows, providing an increased number of days of emergency supply (e.g. 30 days), or, by contacting the patient's physician for a prescription. A systematic review found most patients when displaced or evacuated leave their homes without their medications or prescriptions and thus in the immediate aftermath of a disaster, are in need of their regular medications.⁵⁹ A US study conducted in 2013, found that insurance companies believe it is pharmacists' responsibility to ensure patients have access to ongoing supplies of their medications.¹²⁰ The physicians in this same US study were supportive of writing prescriptions for increased quantities to assist pharmacists in preparing patients for disasters.¹²⁰ By giving pharmacists more authority in disasters to

adequately address the needs of chronic disease patients, doctors and nurses can focus their attentions and resources on more critically ill patients.¹³³ This has historically been the case in improving hospital systems and reducing the number of medication errors.³¹²

Previous literature reviews have identified the contributions of pharmacists towards patient-centred care and optimising the quality, safety, and efficacious use of medications could reduce the cost of care, reduce the number of patients experiencing adverse events, and prevent illnesses or disease progression.²⁰⁶ Even in light of this evidence presented in the literature, a UK study found there was a lack of translation to policy implementation regarding extending pharmacists roles.²⁰⁶ Traulsen and Almarsdóttir argue that policymakers have two conflicting views when it comes to the pharmacy profession.³¹⁵ The first view is pharmacy is a commercial enterprise and pharmacists are business people contributing to the economic growth of the community.³¹⁵ The second view is pharmacy is a healthcare service for a community and pharmacists are healthcare professionals contributing to the overall public health of the community.³¹⁵ They suggest the relevance of the research to policy is inconclusive and may explain the lack of expansion of the pharmacists' roles since the 1960s in disasters.³¹⁵ Traulsen and Almarsdóttir go on to state that previous advances to pharmacists' roles have been pharmacist-led initiatives and not led by other health care professionals or organisations.³¹⁵ More pharmacist-led initiatives are needed which document the policy implications and cost saving measures of pharmacists' roles and interventions. Over the span of four months in 2007 in a single US hospital in Detroit, pharmacists working in the ED saved the healthcare system over \$1 billion in cost avoidance interventions.³¹⁶ This therefore leads to the conclusion that with the surge capacity expected during a disaster improved integration of pharmacists into disaster management teams could potentially increase this cost savings further.

Some of the key stakeholders that were approached to be included in this study were unable to commit to participating in the study due to disaster deployments or time constraints. However, data saturation was reached with the 28 key stakeholders that participated in this study. Another limitation was the interviews

were conducted in English which limited the expression of some of the participants for which English is their second language and potentially excluded some key stakeholders from taking part.

6.6 Conclusion

The isolated culture of organisations currently operating in disaster management highlights a need for an approach which considers learnings from systems thinking theory and chaos theory. Disaster stakeholders have identified numerous benefits to the health system from the inclusion of pharmacists across the multiple practice areas involved in disaster management. The roles pharmacists could be undertaking in disasters need to be further defined to provide clarity to all stakeholders involved.

Chapter 7: Delphi Study with Key Opinion Leaders

This chapter presents a Delphi study conducted with key disaster and pharmacy opinion leaders. Section 7.1 provides a brief introduction of the study and Section 7.2 outlines the aims and objectives. Section 7.3 describes the methods used and Section 7.4 presents the results of the Delphi study. Section 7.5 discusses the findings and Section 7.6 provides a conclusion.

7.1 Introduction

The disaster health management community in this research project's previous studies (Chapters 5 and 6) have acknowledged pharmacists have a place in disaster management, and their roles evolve and change as the PRR cycle progresses. What has yet to be investigated is the specific roles pharmacists are capable of undertaking within each of the PRR phases. The case studies presented in Section 2.8.2 highlighted the roles pharmacists have undertaken in responding to previous disasters. Lack of clarity of pharmacists' roles and responsibilities in a disaster was identified as a significant barrier by the disaster health stakeholders in the previous studies in this research project. These roles are often undertaken without pre-planning or including the coordinated efforts of other disaster healthcare professionals.

7.2 Aims and Objective

The aim of this study was to convene an expert panel of key opinion leaders to discuss pharmacists' roles in disasters. Specifically, the aim was to identify roles pharmacists could be undertaking within each of the disaster PRR phases and to prioritise these roles in order of importance. The objective was to acquire consensus from the expert panel on a list of roles pharmacists could undertake in each of the

PPRR phases. This list was developed from the literature review and the previous studies within this research project.

7.3 Methods

7.3.1 Study Design

A Delphi study consists of the process of gathering information through a series of survey rounds and is commonly used to obtain consensus on matters.³¹⁷ There are currently no universally accepted parameters for completing a Delphi study.³¹⁷ However, rounds should continue until an adequate consensus level is reached or the survey results reach stability with panellists no longer revising their rankings.³¹⁷ The Delphi process should involve controlled feedback providing the panellists a summary of the comments made and a simple statistical summary of the entire panel's position.^{317,318} The purpose of feedback and including both the statistical measure and qualitative comments allows individual panellists to determine where their response sits relative to the overall group's and can assist in their revision of their ranking in future Delphi rounds.³¹⁷ The Delphi technique employed should be systematic and transparent in its steps to reach consensus.

The rationale for using a Delphi study to reach consensus on this topic allows for the inclusion of international opinion leaders across multiple locations and timezones.³¹⁷ Due to the diversity of the experts invited to be on the panel, a modified-Delphi study utilising a focus group to develop the survey or to collate the results in the final round was not feasible. The use of online surveys allowed the panellists to complete the survey rounds in their own time avoiding the issues of conflicting schedules and circumvented any potential domination of the consensus process by individual panellists during a focus group.³¹⁷

7.3.2 Participant Recruitment

Key opinion leaders from international disaster and emergency management organisations and pharmacy organisations were systematically identified by the research team as experts on health aspects of disaster management and pharmacists' roles. Initially, 24 opinion leaders were contacted on two separate occasions to invite them to participate on the panel. They were provided with the participant

information sheet and asked if they were willing to be on the panel. Of the 24 opinion leaders contacted, 15 consented and completed the three rounds of surveys. The 24 opinion leaders were identified and recruited through the international networks of the research team. The experts were from a range of backgrounds including NGOs, government, pharmacy, military, public health, and disaster management.

7.3.3 Participant Information and Informed Consent

Verbal consent was assumed with the completion and submission of the surveys as outlined in the participant information sheet provided *via* email to all the panellists. The participant information sheet which was given to all prospective panellists detailed the commitments of the Delphi study and the verbal consent agreement.

7.3.4 Data Storage and Security

The data files from the Delphi study were stored electronically and backed up on QUT password-protected computers to ensure data security is maintained. The data files will be kept securely for five years upon completion of the research project.

7.3.5 Ethics

Ethics for this study was included in the overall ethics for the research project obtained from the QUT ethics committee, approval number 1700000106.

7.3.6 Data Collection

7.2.6.1 Round 1

A Delphi study method was employed using three rounds of surveys. The first round contained a list of 45 roles presented to the expert panellists for ranking on a five-point Likert scale. It is common for the first round in Delphi studies to be a collective brainstorming focus group activity to develop the ideas in which to assess consensus with the panellists.^{318,319} However, there is published literature on Delphi studies, approving the appropriateness of the use of a pre-existing list of recommendations.^{320,321} This was the method used in this study. For this study, the literature review, surveys, and interviews conducted previously in this research project were used in the development of a list of 45 possible pharmacists' roles. Each of the 45 roles were categorised according to where in the PRR cycle they would be

best suited. Roles in round one which received a rating of 'agree or strongly agree' by at least 80% of the expert panel was accepted as having reached consensus that pharmacists can undertake these roles in a disaster. The consensus benchmark was set at 80% as per previous Delphi Studies on health outcomes and disaster management.^{322,323} Based on feedback from panellists, new roles were able to be added for the following rounds. A role was added to the second round after feedback was given in the first-round survey.

7.2.6.2 Round 2

The results from round one were presented back to the panellists as controlled feedback.^{317,318} The expert panel were asked to revise their rankings of the 45 roles and provide comments on the roles, with an additional new role added to the response phase. Roles which fell below 69% were queried to be removed with a dichotomous 'yes' or 'no' question and the panellists were asked to provide a rationale as to why they believed pharmacists could not undertake this role. Roles which fell in the range of 70%-79% were presented back to the panel with a four-point Likert scale. This removed the option of allowing participants to choose a neutral response, forcing them to agree or disagree with pharmacists undertaking the role in a disaster.

7.2.6.3 Round 3

The results from the first two rounds of 46 roles were collated and given as controlled feedback.^{317,318} The results were presented as simple statistics from the Likert scales and included all the comments made by the participants. This study followed the similar qualitative Delphi study approach outlined by Sekayi.³¹⁸

7.3.7 Data Analysis

The survey Likert scales were exported from KeySurvey® into IBM® SPSS® Statistical software version 25. Frequencies of each role in the Likert scales were analysed. The five-point Likert scales were trichotomized into a three-point Likert scale (1-2= disagree, 3= neutral and 4-5= agree). Consensus was reached if 80% of the participants agreed (scored 4-5). This was similar in the second survey round which utilised a four-point Likert scale. However, the option of a neutral response was removed. The four-point Likert scales were reduced to two options –disagree (1-2) or

agree (3-4). Consensus was reached on the four-point Likert scale if 80% of the participants agreed (scored 3-4). In the later rounds, to allow the panellists to revise their rankings, roles which had yet to reach consensus were re-queried using a dichotomous 'yes' or 'no' question. To reach consensus on the dichotomous questions, 80% of the participants had to select 'yes'.

The qualitative comments provided by the experts were presented back to the panellists in the subsequent rounds and in the final results as arguments for and against pharmacists' undertaking the particular role in disasters. This allowed the panellists to revise their rankings based on the controlled feedback provided. Refer to Appendix E for the specific survey questions given to the panellists.

7.3.8 Measurement Reliability and Validity

The experts were asked their opinions on pharmacists' roles categories in the disaster PRRR phases. The panellists were provided the roles three times, once in each round, to give them the opportunity to revise their rankings if required and provide qualitative feedback.

The survey rounds and feedback continued until either consensus was reached or the panellists stop revising their answers.³¹⁸ Stability was reached for this Delphi Study within the three rounds, as the experts no longer continued to revise their rankings and consensus was reached on 43 roles.

7.4 Results

The expert panel consisted of key opinion leaders from international organisations considered experts in disaster health management and pharmacy. Originally 24 people were contacted to be on the expert panel with an even split of 33% pharmacy background, 33% disaster management and medical background, and 33% experts with extensive experience in both backgrounds. Two pharmacists who work heavily within the disaster management field when asked to select their background acknowledged they were answering not as pharmacists but as disaster management experts. Table 19 outlines the backgrounds and self-identified perspectives of the 15 panellists. There was a change in the denominator in the experts' background and self-identified perspective. This was because the experts

provided their background but were also given the opportunity to select their perspectives in which they were approaching the survey questions. The panellists were given the opportunity to tick as many perspectives as applied to them, increasing the denominator from the 15 panellists to 20 different perspectives. This provides the further breakdown of the panellist’s self-identified perspectives of 15% (3/20) from disaster and emergency services, 30% (6/20) from government and policy perspective, 10% (2/20) were other (disaster management and consultancy), and 45% (9/20) were from pharmacy (Table 19).

Table 19: Delphi Study expert panel composition from their background and their self-identified perspective in which they approached and answered the survey questions

Expert Panel Categories	Self-identified Background		Self-identified Perspective	
Disaster Management, Government and Medical	6/15	40%	9/20	45%
Pharmacy	5/15	33%	9/20	45%
Other	-	-	2/20	10%
Both Pharmacy & Disaster Management Background	4/15	27%	-	-

Of 14 experts who provided their age, the median age of the expert panel was 50.5 years (IQR 16.25 years), with the oldest participant being 72 years and the youngest 36 years old. There were seven females and eight males.

Appendix E outlines the survey questions as viewed by the panellists. The round three survey provides the results from the previous two rounds which were presented to the panellists for final comments on consensus.

7.4.1 Round 1

The roles obtained from the literature review and the previous studies of this research project were divided into the PPRR phases. Table 20 outlines the responses from the expert panel to the Likert scale on the roles provided in round one survey. There were 35 roles which reached the predetermined consensus benchmark of 80% after the first round.

Table 20: Round 1 Delphi study survey results utilising a five-point Likert scale, roles were divided into the PPRR disaster phases taking an all-hazard approach

Roles	Strongly Disagree & Disagree	Neutral	Strongly Agree & Agree
Prevention/Mitigation - reduce the health risks posed by hazards (n=15)			
Administer vaccinations	0	1	14
Educate the public on reducing the spread of communicable diseases/infections	0	0	15
Tailored 'point of care' messaging to chronic disease patients	0	0	15
Ensuring patients are aware of their increased risk of adverse health outcomes in a disaster	0	1	14
Optimising medication supplies for chronic disease management	0	1	14
Preparedness - ensure timely and effective response systems are in place			
Ensuring uninterrupted supply of medications in a disaster	0	1	14
Knowing how to access national stockpiles if necessary	1	2	12
Develop business continuity plans that include disaster management to ensure sustainability of service	0	1	14
Developing drug algorithms and treatment guidelines to determine drug choice based on co-morbidities in the event of bio terrorism (e.g. Anthrax, Plague, Tularaemia - requiring antibiotics/prophylaxis measures)	3	2	10
Being a part of local/state/national disaster preparedness health meetings - providing medication management advice	0	1	14
Being a part of the local community disaster management teams to involve pharmacy in coordinated response	0	1	14
Develop educational tools for health professionals on preparedness, signs and symptoms and drug treatments for CBRN (chemical, biological, radiological and nuclear) weapons	3	2	10
Maintain systems and process for the reconciliation and security of controlled drugs (e.g. morphine, oxycodone)	1	0	14
Have systems in place to secure cold chain lines	0	3	12
Develop a list of at-risk patients in their community	1	1	13
Response - action in disaster/emergency			
Coordinating logistics of medications and medical supplies for patients with chronic diseases	1	1	13
Rationing limited supplies of medications	0	3	12
Assisting with the release and allocation of national stockpiles if required in pandemic or emergency	1	1	13
Triage of low-acuity patients. (e.g. medication reconciliation, patient medical history, referring to physician for further assessment or to pharmacist for refill of lost medications)	1	1	13

Institute cardiopulmonary resuscitation (CPR)	3	3	9
Provide wound care and first aid for minor ailments	2	2	11
Providing one off medication emergency supply refills for up to 30 days during the declared disaster	1	1	13
Continue provision of chronic disease medications	1	0	14
Dispense medications and other necessary medication-related items to affected members of the community (prescription, over-the-counter medications, inhalers)	0	0	15
Dispense general health pharmacy items to affected members of the community (toiletries, nappies, bandages, incontinence pads, water)	0	0	15
Making therapeutic substitutions for drugs available on limited formularies without prior authorisation	2	1	12
Making dose adjustments to existing therapeutic regimens where clinically necessary	3	1	11
Counselling patients on how to use and take medications	0	0	15
Prescribing and administering vaccinations (e.g. tetanus, antidote/prophylaxis to bio-terrorism agent following state public health disaster protocols)	2	1	12
Attend clinical ward rounds to provide pharmacist expertise on medical patients	0	1	14
Prescribe medication needs of low-acuity patients in hospital	2	1	12
Medication identification and safety assessment	0	0	15
Monitoring the chronic disease(s) of at-risk individuals to minimise exacerbation	1	4	10
Advocate pharmacy's role during an event	0	1	14
Maintain media liaison on medication issues	1	1	13
Decide on the appropriateness of donated medications and other supplies	1	1	13
Recovery - returning to 'normal' business and beyond			
Provide Mental Health support	3	3	9
Check on the health needs of the local community	0	3	12
Re-establish normal stock levels, destroy contaminated stock appropriately	0	1	14
Restock emergency/ disaster kits for next disaster event	0	1	14
Identify and prioritise vulnerable patients in local community	0	2	13
Restore order to patient records and drug records, if manually written due to power outages	1	1	13
Document what worked and what did not in the disaster response and change disaster plans accordingly	0	0	15
Participate in post-disaster research/reports	0	0	15
Inform local disaster management reports on pharmacy response improvements	0	0	15

The expert panel were asked to place the roles pharmacists could undertake in a disaster in each phase in order of priority (where 1= the role of highest priority for pharmacists in a disaster). The top five roles for each phase are listed in Table 21 as ranked by the panellists.

Table 21: Role prioritisation of pharmacists' roles for the disaster PPRR phases obtained in round 1 of the Delphi study by the expert panel

Priority	Prevention	Preparedness	Response	Recovery
1 st	Optimising medication supplies for chronic disease management	Ensuring uninterrupted supply of essential medications in a disaster	Dispense medications and other necessary medication-related items to affected members of the community (prescription, over-the-counter medications, inhalers)	Re-establish normal stock levels, destroy contaminated stock appropriately
2 nd	Administer vaccinations	Have systems in place to secure cold chain lines	Counselling patients on how to use and take medications	Restock emergency/ disaster kits for next disaster event
3 rd	Educate the public on reducing the spread of communicable diseases/infections	Knowing how to access national stockpiles if necessary	Coordinating logistics of medications and medical supplies for patients with chronic diseases	Check on the health needs of the local community
4 th	Ensuring patients are aware of their increased risk of adverse health outcomes in a disaster	Being a part of the local community disaster management teams to involve pharmacy in coordinated response	Providing one off medication emergency supply refills for up to 30 days during the declared disaster	Identify and prioritise vulnerable patients in local community
5 th	Tailored 'point of care' messaging to chronic disease patients	Being a part of local/state/national disaster preparedness health meetings - providing medication management advice	Assisting with the release and allocation of national stockpiles if required in pandemic or emergency	Restore order to patient records and drug records, if manually written due to power outages

7.4.2 Round 2

The round two survey provided the results back to the panellists including the 43 listed roles which had reached consensus. Roles which did not reach 69% agreement by the panel were queried for removal (yes) or to keep (no). The panellists were asked to provide comments on why they believed the role should be removed and pharmacists could not undertake that role in a disaster. Any role which did not

reach consensus but was above 69% was reassessed by the panel with a four-point Likert scale – removing the option of a ‘neutral’ response. After the second round, 42 of the roles had reached the predetermined 80% consensus benchmark. Table 22 outlines the results from the second round of the Delphi study, indicating which roles had reached consensus and the qualitative comments provided by the panellists. Any role which did not reach consensus during the second round has been shaded in grey.

Table 22: Round 2 Delphi survey utilising a four-point Likert scale and the panellists’ comments, roles were divided into the PPRR disaster phases taking an all-hazard approach and consensus is indicated against each role

Roles	Consensus Reached	Comments
Prevention/Mitigation - reduce the health risks posed by hazards (n=15)		
Administer vaccinations	✓	"Not sure how to 'read' the word administering here. In terms of managing ok but in terms of dispensing/applying I would say no" "This is a clearly a critically role and is shared with other members of the healthcare team." "Yes, this is a role that pharmacists are already fulfilling in non-disaster times. It is important though to ensure adequate training and clear procedures for commissioning." "This depends on the pharmacist’s other duties and the level of support they receive. When they are the only pharmacist, they may be too busy doing other roles which can't be done by other professions."
Educate the public on reducing the spread of communicable diseases/infections	✓	"Depending on the time on deployment and the other competing demands" "Pharmacists often spend much face-to-face time with their patients. This is a perfect opportunity to provide this type of information"
Tailored 'point of care' messaging to chronic disease patients	✓	"Pharmacy professionals are well-placed to undertake such role." "As a part of medication counselling" "Pharmacists often spend much face-to-face time with their patients. This is a perfect opportunity to provide this type of information."
Ensuring patients are aware of their increased risk of adverse health outcomes in a disaster	✓	"Pharmacists often spend much face-to-face time with their patients. This is a perfect opportunity to provide this type of information." "As a part of medication counselling" "Important role to increase resilience of the health system in disasters and emergencies"
Optimising medication supplies for chronic disease management	✓	"no question about this one."

Preparedness - ensure timely and effective response systems are in place		
Ensuring uninterrupted supply of medications in a disaster	✓	"To attempt to ensure it, anyway" "where possible"
Knowing how to access national stockpiles if necessary	✓	No comments made
Develop business continuity plans that include disaster management to ensure sustainability of service	✓	No comments made
Developing drug algorithms and treatment guidelines to determine drug choice based on co-morbidities in the event of bio terrorism (e.g. Anthrax, Plague, Tularaemia - requiring antibiotics/prophylaxis measures)	✓	No comments made
Being a part of local/state/national disaster preparedness health meetings - providing medication management advice	✓	No comments made
Being a part of the local community disaster management teams to involve pharmacy in coordinated response	✓	No comments made
Develop educational tools for health professionals on preparedness, signs and symptoms and drug treatments for CBRN (chemical, biological, radiological and nuclear) weapons	x	"In many disaster deployments, pharmacists have frequently been turned to for expertise in CBRN situations. It is imperative that disaster pharmacists are knowledgeable and know how to access antidotes in all these areas." "possible drug interactions, administration issues" "But this is a role for specialist pharmacist, not general pharm" "Pharmacist should be included in group responsible for these tools - but not sole responsibility for the development of them" "Specifically, around the use of medicines" "Whilst pharmacists COULD do this with appropriate training, I think it is a lesser priority and would be considered EXTENDED scope (additional to the recognised scope of practice for the profession) for pharmacists rather than expanded scope (working at top of licence)"
Maintain systems and process for the reconciliation and security of controlled drugs (e.g. morphine, oxycodone)	✓	"Pharmacists might supply expertise in the subject"

Have systems in place to secure cold chain lines	✓	"Systems must be in place and absolute limits of each medication in the cache must be documented" "Not a pharmacist role"
Develop a list of at-risk patients in their community	✓	"only highly knowledgeable ones" "Privacy is an issue. Not sure about having a list of individuals prior to an emergency" "They could add to this list, but I don't think that this would be done by the pharmacist in isolation." "In collaboration with health providers" "but must comply with agreed data protection and privacy laws and practices"
Response - action in disaster/emergency		
Coordinating logistics of medications and medical supplies for patients with chronic diseases	✓	No comments made
Rationing limited supplies of medications	✓	No comments made
Assisting with the release and allocation of national stockpiles if required in pandemic or emergency	✓	"Yes, in context that this aspect is one for specialist pharmacists" "The national commissioning body has a role in this, but pharmacists can play an advisory role"
Triage of low-acuity patients. (e.g. medication reconciliation, patient medical history, referring to physician for further assessment or to pharmacist for refill of lost medications)	✓	"depending on local policies and practices" "No sure pharmacists have those skills unless training has been provided"
Institute cardiopulmonary resuscitation (CPR)	✘	"Pharmacists should be qualified first aiders and be competent in CPR" "but pharmacist should be able to perform CPR if no other qualified personal is available" "Would hope most/all have First aid training and already should be doing this." "everybody should be able" "Sad. Everyone should be trained in CPR" "I think every individual should be trained in this and then there is no difference if one is a pharmacist or not. the education of being a pharmacist doesn't make a difference here" "Again, this is a role that the pharmacist could do if needed, but probably should sit with another health care professional."
Provide wound care and first aid for minor ailments	✓	No comments made
Providing one off medication emergency supply refills for up	✓	"Subject to conditions"

to 30 days during the declared disaster		
Continue provision of chronic disease medications	✓	"Subject to conditions"
Dispense medications and other necessary medication-related items to affected members of the community (prescription, over-the-counter medications, inhalers)	✓	No comments made
Dispense general health pharmacy items to affected members of the community (toiletries, nappies, bandages, incontinence pads, water)	✓	"anyone can do it" "particularly payment for this is available for pharmacists via whatever source might exist in local arrangements" "Unless this is not available elsewhere."
Making therapeutic substitutions for drugs available on limited formularies without prior authorisation	✓	No comments made
Making dose adjustments to existing therapeutic regimens where clinically necessary	✘	This role still had not reached consensus with the use of a 4-point Likert scale. It will be re-queried in the final round with a 'yes or no' option for removal and comments
Counselling patients on how to use and take medications	✓	"Need for some specific CPD [continuing professional development] preparation" "There is some evidence in literature on pharmacists undertaking such role"
Prescribing and administering vaccinations (e.g. tetanus, antidote/prophylaxis to bio-terrorism agent following state public health disaster protocols)	✓	"Following protocols" "a primary role on most disaster deployment" "But only if there are enough pharmacists employed." "Need to be careful not to overburden pharmacy professionals with too many roles in disasters and emergencies and to be realistic in what can be done within A health system"
Attend clinical ward rounds to provide pharmacist expertise on medical patients	✓	"if trained to do so" "This fits with the role of hospital pharmacists"
Prescribe medication needs of low-acuity patients in hospital	✓	"clear guidelines and procedures are needed" "May need this in non-disaster. Introducing NEW procedures can add new problems and not achieve hoped for savings"
Medication identification and safety assessment	✓	No comments made
Monitoring the chronic disease(s) of at-risk individuals to minimise exacerbation	✓	"This seems to be part of the 'list of at-risk patients' actions" "not certain here - difficult - depends on local circumstances and policies and practices"

		<p>"Pharmacists can be useful in this - especially with point of care diagnostic tools now available"</p> <p>"Pharmacy professionals are well placed to advise on medications and side effects"</p> <p>"Pharmacists' role in chronic disease management is standard practice regardless of whether this is focused on minimising exacerbations in the event of a disaster or not."</p>
Advocate pharmacy's role during an event	✓	"Including to pharmacists"
Maintain media liaison on medication issues	✓	"But don't need 100 different experts with differing opinions"
Decide on the appropriateness of donated medications and other supplies	✓	"Believe this is a WHO recommendation. Needs to comply with WHO and National policies"
Pharmacists should engage the pharmacy student workforce to backfill duties (dispensing, inventory), freeing up pharmacists to perform more clinical roles in a disaster.	✓	4-point Likert scale used as was a new role added into the second round. Comments were asked in the final round for this role.
Recovery - returning to 'normal' business and beyond		
Provide Mental Health support	✘	<p>"rather than remove it I think we should look to upskill the profession in this area in general and specifically with respect to post-emergency population needs"</p> <p>"No strong feeling. Feel is a responsibility for staff"</p> <p>"Many pharmacists have strong relationships with their patients and can certainly provide emotional support as well."</p> <p>"Further training would be needed to provide this."</p> <p>"leave it to professionals"</p> <p>"Not a pharmacist's core training - other specialist better suited to this - but pharmacists working in these settings should be trained and aware of basic mental health support mechanisms"</p>
Check on the health needs of the local community	✓	<p>"Pharmacists are the third largest healthcare workforce and are well placed to assist public health professionals in identification of population health needs"</p> <p>"Whatever this means"</p>
Re-establish normal stock levels, destroy contaminated stock appropriately	✓	"not their role - use techs [technicians]"
Restock emergency/ disaster kits for next disaster event	✓	"not their role - use techs [technicians]"
Identify and prioritise vulnerable patients in local community	✓	<p>"particularly if I compliance with ethical and data protection agreements, policies and practices"</p> <p>"in collaboration with other health providers"</p>

		"partially" "If this feeds into a broader management protocol"
Restore order to patient records and drug records, if manually written due to power outages	✓	No comments made
Document what worked and what did not in the disaster response and change disaster plans accordingly	✓	"Absolutely"
Participate in post-disaster research/reports	✓	No comments made
Inform local disaster management reports on pharmacy response improvements	✓	No comments made

The roles which had yet to reach consensus after the first two round were re-queried for a third time with the panel in the final round with a dichotomous question to keep the role (yes) or to remove the role (no). This was to allow panellists to revise their position when viewed within the overall group’s opinion and comments. Asking the questions three times, confirmed the panellists had not misinterpreted the change in the wording whereby the dichotomous questions potentially altered the results – ‘The panel agreed to this role...should it be retained?’ and ‘this role did not reach consensus...do you believe it should be removed?’.

The results of the prioritisation of the top five roles from the first round was provided back to the panel for them to review and revise their position. Table 23 shows the changes made by the panel in each of the PPRR phases for the top five roles for pharmacists in a disaster.

Table 23: Changes made to the role prioritisation in round 2 for pharmacists' roles in the disaster PRR phases obtained in round 1 of the Delphi Study by the expert panel

Priority	Prevention	Preparedness		Response		Recovery	
Changes made	Round 1 top 5 did not change	Round 1 result	Round 2 changes – Priority 3 and 4 swapped	Round 1 result	Round 2 changes – Priority 2 and 3 tied 2 nd	Round 1 result	Round 2 changes – Priority 3 and 4 tied 2 nd
1 st	Optimising medication supplies for chronic disease management	Ensuring uninterrupted supply of essential medications in a disaster		Dispense medications and other necessary medication-related items to affected members of the community		Re-establish normal stock levels, destroy contaminated stock appropriately	
2 nd	Administer vaccinations	Have systems in place to secure cold chain lines		Counselling patients on how to use and take medications	Tied 2 nd	Restock emergency/disaster kits for next disaster event	
3 rd	Educate the public on reducing the spread of communicable diseases/infections	Knowing how to access national stockpiles if necessary	Being a part of the local community disaster management teams to involve pharmacy in coordinated response	Coordinating logistics of medications and medical supplies for patients with chronic diseases	Tied 2 nd	Check on the health needs of the local community	Tied 3 rd
4 th	Ensuring patients are aware of their increased risk of adverse health outcomes in a disaster	Being a part of the local community disaster management teams to involve pharmacy in coordinated response	Knowing how to access national stockpiles if necessary	Providing one off medication emergency supply refills for up to 30 days during the declared disaster		Identify and prioritise vulnerable patients in local community	Tied 3 rd
5 th	Tailored 'point of care' messaging to chronic disease patients	Being a part of local/state/national disaster preparedness health meetings - providing medication management advice		Assisting with the release and allocation of national stockpiles if required in pandemic or emergency		Restore order to patient records and drug records, if manually written due to power outages	

7.4.3 Round 3

For the final round, the concluding results and consensus were provided back to the panellists as controlled feedback. The panellists were invited to make any final qualitative comments regarding the results (Table 24). After the final round, the panellists came to consensus on 43 roles pharmacists are capable of undertaking in disasters across the PPRR cycle.

Table 24: Final round Delphi study qualitative comments on roles which had reached consensus for pharmacists' roles across the disaster PPRR phases utilising an all-hazard approach

Roles	Final comments made
Prevention/Mitigation - reduce the health risks posed by hazards	
Administer vaccinations to prevent diseases in disasters	<p>"It depends on the vaccination. There is no reason that these should not be done by medically trained staff i.e. the pts GP"</p> <p>"Clearly effective use of resources would be important. If lots of dispensing needed and no other personnel able to do this, but others available to vaccinate, safe use of resources would suggest PhC [primacy health care] dispensing."</p> <p>"The comments may reflect confusion over what the researchers expected re: the timing of pharmacists giving such vaccinations. For example, is the question meant to imply pharmacists administering vaccinations prior to any possible future disaster to prevent disease OR giving vaccinations at the immediate time of a disaster to prevent disease outbreak."</p> <p>"I agree. This is an important role and one that pharmacists already undertake."</p> <p>"I believe this will be an important contribution that appropriately trained pharmacists can offer in these situations."</p>
Educate the public on reducing the spread of communicable diseases/infections	<p>"OK"</p> <p>"Role seems clear. Clarifying consistent source of info is critical."</p>
Tailored 'point of care' messaging to chronic disease patients	<p>"OK as well as the GP."</p> <p>"None [comments]. Agree."</p>
Ensuring patients are aware of their increased risk of adverse health outcomes in a disaster	<p>"OK as well as the GP."</p> <p>"Pharmacist's regular contact with patients when they are well or relatively well should mean a good basis for this type of communication. (This statement, of course assumes that the Pharmacist does actually speak to the patient when they are in the pharmacy, and not completely isolated and only contact is when a script is dispensed.)"</p> <p>"It would be important to ensure patients are aware of the pharmacist role in this area."</p>
Optimising medication supplies for chronic disease management	<p>"OK"</p>

	<p>"Does seem clear, but some specific training is likely to be needed to assist with anticipating how prolonged shortages are likely to be and consistently prioritising."</p>
<p>Preparedness - ensure timely and effective response systems are in place</p>	
<p>Ensuring uninterrupted supply of medications in a disaster</p>	<p>"Ok."</p> <p>"Many aspects are outside the ability of an individual pharmacist to control. They need adequate information and information pathways to know what is achievable."</p> <p>"Obviously this is absolutely a goal at all times, but practical realities of maintaining supply in a disaster may mean this is unachievable... stock availability even in normal times is often difficult! e.g. EpiPen supply problems."</p> <p>"This should absolutely be a role of pharmacists - being part of the local and national planning processes will be imperative for pharmacist's ability to deliver on this."</p> <p>"Pharmacists should make efforts to avoid interruption to supplies of essential medicines' would be better - some things will be out of our control."</p>
<p>Knowing how to access national stockpiles if necessary</p>	<p>"Essential."</p> <p>"They need to know how any stockpile system would work and how it is activated."</p> <p>"Yes of course - but in partnership with the emergency plan managers and response networks."</p> <p>"Surprised that there is a comment of 'strongly disagree'."</p>
<p>Develop business continuity plans that include disaster management to ensure sustainability of service</p>	<p>"Ok."</p> <p>"This seems like a risk mitigation and quality management must. But training and guidance are needed."</p> <p>"This is mentioned in most guidance."</p>
<p>Developing drug algorithms and treatment guidelines to determine drug choice based on co-morbidities in the event of bio terrorism (e.g. Anthrax, Plague, Tularaemia - requiring antibiotics/prophylaxis measures)</p>	<p>"This is a medical issue and should be left to clinicians."</p> <p>"This seems a specialised role. Clearly one for a, but not necessarily all pharmacists. For the expert pharmacist/s to liaise with other pharmacists would be important."</p> <p>"I see this as a specialised role that pharmacists could do but may not be a first priority or a skill-set of all pharmacists."</p> <p>"Surprised at the 20% negatives. Pharmacists should clearly part of the team creating treatment algorithms. It is also critical that the pharmacists are experienced in disaster field operations."</p> <p>"therapeutic guidance on treatment choices (particularly medication related) in the presence of co-morbidities is a key area that pharmacists can add value, so it is important that they are involved in work such as this."</p> <p>"This role is unlikely to be feasible for pharmacists to do in existing resources of training, expertise and funding."</p> <p>"There is no reason pharmacists can't apply an algorithm to a clinical problem - dosage calculation is the primary example of this."</p>
<p>Being a part of local/state/national disaster preparedness health meetings -</p>	<p>"Agree."</p> <p>"Agree."</p>

providing medication management advice	
Being a part of the local community disaster management teams to involve pharmacy in coordinated response	<p>"Agree."</p> <p>"Yes, agree."</p>
Maintain systems and process for the reconciliation and security of controlled drugs (e.g. morphine, oxycodone)	<p>"Ok."</p>
Have systems in place to secure cold chain lines	<p>"Essential for any facility."</p> <p>"They need systems to be able to ATTEMPT to secure cold chain. Some aspects are likely to be outside their control. Possible equally important is a process to be able to differentiate which substances will remain active for how long in case of cold chain failure."</p> <p>"technician role."</p> <p>"Surprised to see comment 'not a pharmacist role'?? Maintaining the cold chain for vaccine stock is a critical and fundamental role of pharmacists responsible for supply."</p> <p>"In addition to this being the right thing to do, and pharmacists are relied upon by others in the healthcare team to be in charge of cold chain (they are relying on pharmacy to be looking after this regardless of whether it is an emergency situation or not - regardless this is a good sensible business decision/action."</p> <p>"Agree, yes."</p> <p>"Medical logistics are an integral part of the pharmacist's role."</p>
Develop a list of at-risk patients in their community	<p>"In collaboration with GP's and other clinicians."</p> <p>"disagree - labour intensive and not key role."</p> <p>"Clearly a multidisciplinary role. Privacy concerns people have alluded to need to be considered. Some examples of type of situation/person would help rationalise discussion. May be that a "conditions" list may be more practical than persons list. Does a list of "risk patients" include being aware of who is likely to try to hold up the pharmacy if drugs are in short supply? (i.e. risk to the pharmacy)."</p> <p>"I agree privacy is an issue - but if done in partnership with others from the disaster risk reduction and management community and most importantly with patient (or family) consent and with proper data confidentiality then this would be very helpful."</p> <p>"not pharmacy role – administrative."</p> <p>"Can see the intent of this, but I think the comments highlight the practical realities of this. "</p> <p>"many may have a role in this - but pharmacists are a key part for example in New Zealand those patients who are registered on the community pharmacy LTC [long term conditions] service would be an excellent starting point."</p>

	<p>"Ideally so but there are many challenges to overcome to do this in practice."</p> <p>"Part of a team effort."</p>
Response - action in disaster/emergency	
Coordinating logistics of medications and medical supplies for patients with chronic diseases	"Ok."
Rationing limited supplies of medications	<p>"In collaboration with clinicians only."</p> <p>"Need to participate in a coordinated system."</p> <p>"political decision."</p> <p>"Would likely need to be guidelines in place to ensure equitable and prioritised supply in accordance with need."</p> <p>"Critical role in early stages of major disasters."</p> <p>"This is an extremely important role, it worries me that some people might disagree with this - if local pharmacists don't assist with this, I'm not sure who could. whilst the national systems work to push medicines into local areas there will be a need for someone to carry out that prioritisation/rationing role locally."</p> <p>"Agree."</p> <p>"This sometimes happens when short-term medicine shortages occur - a week's supply at a time may be given instead of a month's supply."</p>
Assisting with the release and allocation of national stockpiles if required in pandemic or emergency	<p>"Ok."</p> <p>"Potential role for some pharmacists."</p> <p>"I think there is a role for the commissioning body, specialised pharmacists and generalist pharmacists."</p> <p>"Agree. Specialist pharmacists could advise national commissioning bodies on this."</p> <p>"We've done it before with Tamiflu and MMR vaccine - totally support."</p>
Triage of low-acuity patients. (e.g. medication reconciliation, patient medical history, referring to physician for further assessment or to pharmacist for refill of lost medications)	<p>"In collaboration with clinicians."</p> <p>"I think this is what pharmacists should already be able to do - it worries me that some respondents think pharmacists would need extra training to do this."</p> <p>"Training needs to be provided and some form of quality control."</p>
Provide wound care and first aid for minor ailments	<p>"Only if minor."</p> <p>"Nursing role."</p> <p>"This is a natural extension/continuation of a role that community pharmacists already perform, and this could assist in minor wounds and ailments exacerbating and putting extra pressure on higher level health services."</p> <p>"Pharmacists would need training and a mandated role to do so."</p> <p>"Strongly agree."</p>

Providing one off medication emergency supply refills for up to 30 days during the declared disaster	<p>“Ok.”</p>
Continue provision of chronic disease medications	<p>“Only if as per #24 above [Pharmacists role in providing one off medication emergency supply refills for up to 30 days during the declared disaster].”</p> <p>“Yes but depends on maintaining updated registers of chronic disease patients.”</p>
Dispense medications and other necessary medication-related items to affected members of the community (prescription, over-the-counter medications, inhalers)	<p>“OK if bound by #24[Pharmacists role in providing one off medication emergency supply refills for up to 30 days during the declared disaster].”</p> <p>“How does this differ from the normal situation? Is this situation making it clear the pharmacist is expected not to abandon ship in a disaster?”</p>
Dispense general health pharmacy items to affected members of the community (toiletries, nappies, bandages, incontinence pads, water)	<p>“Ok.”</p> <p>“The comment regarding source of funding seems particularly relevant.”</p> <p>“Technician role (or supermarket).”</p> <p>“Agree that this need not need to be a pharmacist but can be, especially if usual community pharmacy channels are available.”</p>
Making therapeutic substitutions for drugs available on limited formularies without prior authorisation	<p>“Doctors don't want this and the argument to free up drs [doctors] is fallacious.”</p> <p>“Subject to agreement to such a system prior to the emergency.”</p> <p>“Pharmacists have exactly the skill set required to deliver on this role, and it would assist in freeing up local medical practitioners and nursing staff to spend more time on the wound triage and diagnosing roles/emergency hands on roles that they are more expert in.”</p> <p>“Governance procedures are needed for quality control and monitoring right substitutions for drugs were made.”</p> <p>“Strongly agree.”</p>
Counselling patients on how to use and take medications	<p>“Ok.”</p> <p>“I don't agree with previous comments made that pharmacists might need specific CPD preparation - counselling patients on how to use and take medications is core business for pharmacists. I agree that pharmacists should do CPD preparation about what's different in an emergency/how to manage in an emergency - but is different to this question I think.”</p> <p>“Training is needed to do so.”</p>
Prescribing and administering vaccinations (e.g. tetanus, antidote/prophylaxis to bio-terrorism agent following state public health disaster protocols)	<p>“Only in collaboration with doctors and only for e.g. ADT [diphtheria and tetanus vaccine].”</p> <p>“Realistic use of available limited resources is important.”</p> <p>“Pharmacists trained to give vaccination now should be able to provide vaccination services in a disaster situation.”</p> <p>“This is another team effort. At the least, the disaster pharmacy should oversee the viability, dosage, etc.”</p>

	<p>"Agree."</p> <p>"After training has occurred."</p>
Attend clinical ward rounds to provide pharmacist expertise on medical patients	<p>"Ok."</p> <p>"No, they will be busy enough on priority matters."</p> <p>"Training is needed. Hospital pharmacists can do so."</p> <p>"If trained."</p>
Prescribe medication needs of low-acuity patients in hospital	<p>"No - only if as per #24 [Pharmacists role in providing one off medication emergency supply refills for up to 30 days during the declared disaster] and only in collaboration with clinicians."</p> <p>"Particularly useful in the situation of an exacerbation of an on-going condition or primary care level acuity - guidelines would be useful."</p> <p>"This should become a role in non-disaster situations to ensure the procedures and infrastructure needed are there for it to happen in disaster situations."</p>
Medication identification and safety assessment	<p>"Ok."</p>
Monitoring the chronic disease(s) of at-risk individuals to minimise exacerbation	<p>"In collaboration with pts [patients] doctor(s)."</p> <p>"where resources are available and as part of the main emergency plan of the health care and emergency responders as agreed in advance."</p> <p>"difficult to do."</p> <p>"Agree with comment: "Pharmacists' role in chronic disease management is standard practice regardless of whether this is focused on minimising exacerbations in the event of a disaster or not."."</p> <p>"The role that pharmacists already play in this area can have a significant positive impact on the resilience of local communities and help people to self-manage and thereby reduce the pressure on more specialised health services."</p> <p>"Pharmacists can offer advice if requested from patients but a difficult one in practice due to confidentiality and data sharing pharmacists may not be able to keep registers of high-risk patients."</p> <p>"As part of a team."</p>
Advocate pharmacy's role during an event	<p>"Ok."</p> <p>"Glad this one got consensus!"</p> <p>"Completely agree."</p>
Maintain media liaison on medication issues	<p>"Ok."</p> <p>"Their media liaison probably needs to be limited to areas where they will be recognised as experts - i.e. in relation to medicines (etc)."</p> <p>"where requested and in partnership with the emergency plan managers and implementers."</p> <p>"Where directly applicable but in times of disaster there should be central points of communication to ensure consistency and accuracy of message."</p>

	<p>“they certainly need to be in the loop and I agree with the comment that we don't need 100 different experts - it would need to be well managed, agreed spokes people and good communication out to all practitioners so that the messaging is consistent (local pharmacists need to be part of those national planning meetings so they know how to make sure they are kept in the loop).”</p> <p>“Local PGA/PSA [pharmacy guild of Australia/pharmaceutical society of Australia] reps [representatives] have probably been trained and would be the ideal focus.”</p>
Decide on the appropriateness of donated medications and other supplies	<p>“In collaboration with clinicians.”</p> <p>“Agree need guidelines to ensure appropriateness.”</p> <p>“There are specific national bodies which should do so.”</p>
Pharmacists should engage the pharmacy student workforce to backfill duties (dispensing, inventory), freeing up pharmacists to perform more clinical roles in a disaster.	<p>“Ok.”</p> <p>“Providing standards can be maintained. It doesn't matter how good the pharmacists' clinical input is if the prescribed medicine doesn't get to the patient.”</p> <p>“Agree.”</p> <p>“As stated in my previous response... this is dependent on the year level and student competence. I don't think one can simply say, 'all students'.”</p> <p>“There are plenty of roles that pharmacy students, technicians, pharmacy assistants could fulfil - we should have a good honest look at what really needs the pharmacist expertise. Those members of these groups who already have work experience of how the supply chain works/records required could add huge value around supporting processes and procedures.”</p> <p>“Complicated in practice.”</p> <p>“Strongly agree.”</p>
Recovery - returning to 'normal' business and beyond	
Check on the health needs of the local community	<p>“In collaboration with clinicians.”</p> <p>“The role would need to be clarified prior to a disaster.”</p>
Re-establish normal stock levels, destroy contaminated stock appropriately	<p>“Responsibility for role should sit with the pharmacist. Tech may be useful on logistic process. For techs to undertake some roles would require change to legislation.”</p> <p>“tech [technician] role.”</p> <p>“Agree that this need not necessarily be a role of pharmacists, and the technician workforce could do this.”</p>

	"I agree pharmacists have a role to play but so too do techs and other pharmacy staff."
Restock emergency/ disaster kits for next disaster event	"Responsibility should sit with pharmacist. If the role can safely be delegated to appropriately trained techs, that is fine." "tech [technician] role." "Agree that this need not necessarily be a role of pharmacists, and the technician workforce could do this."
Identify and prioritise vulnerable patients in local community	"In collaboration with other health care providers." "Yes but need to comply with data protection guidance."
Restore order to patient records and drug records, if manually written due to power outages	"Only for dispensed medications."
Document what worked and what did not in the disaster response and change disaster plans accordingly	No additional comments
Participate in post-disaster research/reports	No additional comments
Inform local disaster management reports on pharmacy response improvements	No additional comments

Roles which had not reached consensus from the previous two rounds were given a third pass by the panellists to ensure they understood the wording of the question and that the role was going to be removed if it did not reach the 80% consensus benchmark. The questions were rephrased to ensure there was clear distinct wording. Clarity on what removing the role meant and pharmacists were deemed not capable of undertaking the role in disasters. Table 25 outlines the final ranking and comments made by the panellists on these roles. Roles shaded in grey in Table 25 reached consensus in the final round.

Table 25: Final round Delphi study survey on roles which had not yet reached consensus in the previous two rounds and included the comments from the panellists

Role	Consensus reached	Keep /Remove	Comments for and against role
Develop educational tools for health professionals on preparedness, signs and symptoms and drug treatments for CBRN (chemical, biological,	✘	Keep = 9 (60%)	"They are medicines - we need to know about their use and provision." "It is an important role for SOME (not all) pharmacists. May fit well with pharmacists working for example in Poisons Information Centres, and clearly important for those in Defence Department positions."

<p>radiological and nuclear) weapons</p>			<p>“In partnership with others in preparing emergency plans and in collaboration with the overall training programme where linked.”</p> <p>“I reiterate what I think was my own comment in last round: “Whilst pharmacists COULD do this with appropriate training, I think it is a lesser priority and would be considered EXTENDED scope (additional to the recognised scope of practice for the profession) for pharmacists rather than expanded scope (working at top of licence)”.”</p> <p>“agree with the comments about having more specialised pharmacists involved in this, but also for them ensuring that the knowledge is disseminated out to other pharmacists.”</p> <p>“But in collaboration with other health professionals.”</p> <hr/> <p>Remove = 6 (40%)</p> <p>“Community Pharmacists would require considerable training to undertake this role.”</p> <p>“not pharmacist role.”</p> <p>“Pharmacists could be included in specialist committees which develop such guidance (for example, NICE).”</p>
<p>Making dose adjustments to existing therapeutic regimens where clinically necessary</p>	<p>✘</p>	<p>Keep = 10 (66.67%)</p>	<p>“This is a POTENTIAL role, but training and agreement from other professions needed.”</p> <p>“If agreed in principle in advance depending on training and expertise.”</p> <p>“Cognitive role.”</p> <p>“This is a broad statement and guidance on what circumstances this might apply needs to be provided. e.g. dose adjustment of aminoglycosides/anticoagulants in response to TDM [therapeutic drug monitoring].”</p> <p>“Part of requirement to be an effective disaster pharmacist.”</p> <p>“Would need therapeutic guidance to be disseminated - this would be a good thing to disseminate in any event i.e. to support routine practice.”</p> <p>“In conjunction with work protocols.”</p> <p>“But within clear protocols.”</p> <p>“Protocols and calculations - primary pharmacist skills.”</p>

		Remove = 5 (33.33%)	<p>“Community Pharmacist require further training to fully interpret Lab test results and the impact on dose adjustments.”</p> <hr/> <p>“This is a doctor's role.”</p>
Institute cardiopulmonary resuscitation (CPR)	✓	Keep = 13 (86.67%)	<p>“All Australians should know how to do CPR.”</p> <p>“I thought there was earlier agreement to First Aid provision. I could be wrong, but last time I did a first aid course it included CPR. NT [Northern Territory] legislation REQUIRES any trained first aider to provide first aid.”</p> <p>“Pharmacist should be able to perform CPR if no other qualified personal is available.”</p> <p>"Pharmacists should be qualified first aiders and be competent in CPR"</p> <p>“No doubt at all!”</p> <p>“If a pharmacist is working in a public facing role especially where they are the highest qualified present (i.e. community pharmacy) they should be able to do this. There is some clinical institution based advisory roles where those pharmacists are specifically excluded from hands on roles - I would view these differently if others are present. But overall bottom line is that regardless of whether someone is a health professional or otherwise we would expect assistance, wouldn't we?”</p> <p>“As previously said, everybody should have a role in CPR, however more likely to be performed by the crash team.”</p> <p>“Training is essential.”</p> <p>“Only if no other health Professionals available.”</p> <p>“Training needed.”</p>
		Remove = 2 (13.33%)	No comments made
Pharmacists role in providing behavioural and mental health support following a disaster to their patients, customers and staff	✘	Keep = 8 (53.33%)	<p>“feeding back to the skilled workforce.”</p> <p>“I feel this is currently outside scope of existing training, but aware increasing number of pharmacists taking interest. I would prefer to abstain from this answer. If I have to respond, is qualified yes depending on training, other roles needed etc.”</p> <p>“if agreed and trained in advance and documents.”</p>

	<p>“Frequently, patients with behavioural challenges have been separated from their medications. Pharmacist is important in supporting stabilizing”</p> <p>“Further training is needed.”</p>
Remove = 7 (46.67%)	<p>“Pharmacists have insufficient clinical knowledge and training to undertake such roles.”</p>

After this third opportunity, the panellists revised their position on the pharmacists’ role in ‘instigating CPR’, reaching consensus in the final round at 86.67%. The other three roles re-evaluated by the panellists for inclusion did not reach consensus and were removed in the final list of roles pharmacists are capable of undertaking in a disaster.

One of the panellists made this final general comment:

“Appreciate the opportunity to participate. Please keep up the good fight. It is not only critical that pharmacy has a major role, but it must be recognized that it requires special people with special training.”

7.4.4 Final Consensus

The final 43 roles pharmacist are capable of undertaking in a disaster which reached consensus according to the expert panel of key opinion leaders are listed below, categorised into each disaster phase. The prevention phase roles are listed in Table 26. For the preparedness phase, the pharmacist roles which reached consensus by the panel are listed in Table 27. The pharmacist roles which reached consensus according to the expert panel and are in the response phase are listed in Table 28. For the recovery phase, the pharmacist roles which reached consensus by the panel are listed in Table 29.

Table 26: Final consensus on roles pharmacists are capable of undertaking in the prevention phase of a disaster as accepted by the 15 key opinion leaders

Prevention/Mitigation - reduce the health risks posed by hazards
Administer vaccinations
Educate the public on reducing the spread of communicable diseases/infections
Tailored 'point of care' messaging to chronic disease patients

Ensuring patients are aware of their increased risk of adverse health outcomes in a disaster
Optimising medication supplies for chronic disease management

Table 27: Final consensus on roles pharmacists are capable of undertaking in the preparedness phase of a disaster as accepted by the 15 key opinion leaders

Preparedness - ensure timely and effective response systems are in place
Ensuring uninterrupted supply of medications in a disaster
Knowing how to access national stockpiles if necessary
Develop business continuity plans that include disaster management to ensure sustainability of service
Developing drug algorithms and treatment guidelines to determine drug choice based on co-morbidities in the event of bio terrorism (e.g. Anthrax, Plague, Tularemia - requiring antibiotics/prophylaxis measures)
Being a part of local/state/national disaster preparedness health meetings - providing medication management advice
Being a part of the local community disaster management teams to involve pharmacy in coordinated response
Maintain systems and process for the reconciliation and security of controlled drugs (e.g. morphine, oxycodone)
Have systems in place to secure cold chain lines
Develop a list of at-risk patients in their community

Table 28: Final consensus on roles pharmacists are capable of undertaking in the response phase of a disaster as accepted by the 15 key opinion leaders

Response - action in disaster/emergency
Coordinating logistics of medications and medical supplies for patients with chronic diseases
Rationing limited supplies of medications
Assisting with the release and allocation of national stockpiles if required in pandemic or emergency
Triage of low-acuity patients. (e.g. medication reconciliation, patient medical history, referring to physician for further assessment or to pharmacist for refill of lost medications)
Institute cardiopulmonary resuscitation (CPR)
Provide wound care and first aid for minor ailments
Providing one off medication emergency supply refills for up to 30 days during the declared disaster
Continue provision of chronic disease medications
Dispense medications and other necessary medication-related items to affected members of the community (prescription, over-the-counter medications, inhalers)
Dispense general health pharmacy items to affected members of the community (toiletries, nappies, bandages, incontinence pads, water)
Making therapeutic substitutions for drugs available on limited formularies without prior authorisation

Counselling patients on how to use and take medications
Prescribing and administering vaccinations (e.g. tetanus, antidote/prophylaxis to bio-terrorism agent following state public health disaster protocols)
Attend clinical ward rounds to provide pharmacist expertise on medical patients
Prescribe medication needs of low-acuity patients in hospital
Medication identification and safety assessment
Monitoring the chronic disease(s) of at-risk individuals to minimise exacerbation
Advocate pharmacy's role during an event
Maintain media liaison on medication issues
Decide on the appropriateness of donated medications and other supplies
Pharmacists should engage the pharmacy student workforce to backfill duties (dispensing, inventory), freeing up pharmacists to perform more clinical roles in a disaster.

Table 29: Final consensus on roles pharmacists are capable of undertaking in the recovery phase of a disaster as accepted by the 15 key opinion leaders

Recovery - returning to 'normal' business and beyond
Check on the health needs of the local community
Re-establish normal stock levels, destroy contaminated stock appropriately
Restock emergency/ disaster kits for next disaster event
Identify and prioritise vulnerable patients in local community
Restore order to patient records and drug records, if manually written due to power outages
Document what worked and what did not in the disaster response and change disaster plans accordingly
Participate in post-disaster research/reports
Inform local disaster management reports on pharmacy response improvements

Consensus was not reached on the below three roles and therefore they were removed from the overall list of roles pharmacists are capable of undertaking in disasters.

- 1) develop educational tools for health professionals on preparedness, signs and symptoms and drug treatments for CBRN (chemical, biological, radiological and nuclear) weapons
- 2) making dose adjustments to existing therapeutic regimens where clinically necessary
- 3) providing behavioural and mental health support following a disaster to patients and staff

7.5 Discussion

A Delphi study should follow a systematic approach to ensure its outcomes are rigorous and of high quality, so the recommendations can be considered valid.³²⁴ Having followed the guidelines outlined in a systematic review by Sinha et al.,³²⁴ the results of this Delphi study can be considered transparent and authentic. Sinha et al.³²⁴ called for transparency when presenting the methods used and the results obtained to maintain validity of the Delphi study. In this study, all comments from each of the Delphi surveys were collated and fed back to the panel verbatim along with the statistical results of the consensus outcome *via* a controlled feedback mechanism.

This Delphi study begins the process of defining the roles of pharmacists in disasters. The international key opinion leaders recommended 43 roles out of a possible 46 that they believe pharmacists are capable of undertaking in a disaster across the PRR cycle. Any roles suggested in the qualitative comments of this study from the panellists were included in subsequent rounds to eliminate the risk of bias. Sinha et al.,³²⁴ suggested involving all different types of stakeholders. Using surveys instead of focus groups in this study enabled a wider range of international key opinion leaders. The use of open-ended questions is also advisable to reduce the introduction of bias from the researcher's views.³²⁴ Open-ended questions were used with the Likert scale item responses and in the development of the list of roles. Published Delphi studies have used literature to develop a list of recommendations prior to undertaking their respective Delphi studies^{320,321} to obtain consensus and this method was employed in this study.

Using a Delphi study to evaluate pharmacists' performance capabilities is not new. In 2012, Kennie-Kaulbach et al.³²⁵ utilised a modified-Delphi study to appraise pharmacists' competencies in their provision of primary health care. Their study comprised three rounds of surveys.³²⁵ Delphi Studies have also been used widely in disaster management research.^{321,323,326} The Delphi study conducted by Zhong et al.³²¹ developed key indicators using the disaster PRR phases as the theoretical framework.

The discussion by the experts of pharmacist roles in mental health during disasters was divided, with some believing it should be left up to the professionals. However, pharmacists are ideally placed as potential first responders for the screening and referral of those requiring professional assistance for mental health crises.³²⁷ The treatment for mental health conditions often involves medications that require ongoing management. Pharmacists assist patients with mental health conditions as part of their daily practice.³²⁷ The undergraduate pharmacy curriculum in Australia has even begun incorporating the Mental Health First Aid® training program to equip pharmacy students and build their confidence in recognising the signs of a mental health crisis and how to best help the patient.³²⁸ In disasters, due to the specific nature of the trauma, mental health support is often provided as psychological first aid or behavioural support.²⁵⁷ Interestingly, from the comments in this study the apparent acceptance of this important pharmacist's role in providing mental health support in the community on a daily basis does not transpose to a disaster with the expected increase in psychological trauma expected. Pharmacists were recognised as a member of the mental health crisis teams following a tsunami disaster in Thailand.³²⁹

Another role which did not reach consensus by the panel was the role of pharmacists providing CBRN educational and treatment tools to the public and other healthcare professionals. Pharmacists have been working with the Office of Public Health Preparedness in the US for the last 10 years in teams developing medication management guidance for CBRN disasters.³³⁰ The Canadian government includes pharmacists as one of the first professionals to potentially be faced with a CBRN incident and thus includes them in the CBRN first responder basic training program.³³¹ Being a CBRN first responder is being able to recognise the signs and symptoms of a CBRN disaster and respond appropriately.³³¹ Specifically, the signs and symptoms of a biological attacks may be seen in community pharmacies first with the unusual acceleration of people coming in with similar 'flu-like' symptoms. The treatment for chemical and biological agents is often medications – antidotes, antibiotics, antivirals.^{106,107,331} Terriff and Tee reported in 2001 that pharmacists have a role in the rapid dispersal of antidotes and information for both the treatment and

prophylaxis measures taken in a bioterrorism event.²¹⁵ It has been suggested many of the medications used in the treatment and prophylaxis of bioterrorism agents are stocked in pharmacies.²¹⁵ It has been highlighted that pharmacists have a role in the planning for these events by keeping the information on the medications and vaccines used in these types of events up-to-date for other health professionals.^{215,223} The potential rationale of why this role did not reach consensus in this study based on the comments received from the panellists was that many of the experts believe CBRN is a specialist pharmacist's role and therefore does not relate to all pharmacists.

The expert panel revised their ranking and came to consensus in the final round on pharmacists' role in instigating CPR. Physicians and nurses' perceptions were evaluated in 1983 and were found in favour of having pharmacists as members of the CPR team.³³² Pharmacists as members on CPR teams are often not the professional doing the compressions, with the skillsets of other health professionals better equipped to perform the task. Pharmacists on CPR teams provide drug information, dose calculations, drug preparation, and record keeping of administered drugs.³³³ However, there may be instances where pharmacists may be the most qualified healthcare professional to instigate CPR and thus should be competent to perform the task. To become registered healthcare professionals in Australia, pharmacists need to have a current certification in CPR and first aid. This certificate must be maintained for any pharmacist qualified to administer vaccinations.^{268,269,334}

The 43 roles identified by the key opinion leaders begin to define the roles and responsibilities of pharmacists in disasters. However, not all the roles listed are able to be enacted by all pharmacists when the next disaster impacts their community. Support from legislation, disaster management and pharmacy organisations are required to collaboratively instigate these roles across the PRR cycle. These pharmacists' roles are intended to be undertaken in partnership with other stakeholders in disasters to better integrate and utilise pharmacists into disaster teams. This Delphi study provides evidence to policymakers of the acceptance of pharmacists' roles in disasters by key opinion leaders from the disaster health community. A limitation of this Delphi study was the time commitment of key opinion leaders. Many of these key opinion leaders lead very busy lives and jobs and therefore

some of them could not commit to partaking in a three-round Delphi panel. However, of the key opinion leaders approached, 62.5% (15/24) completed all three rounds.

7.6 Conclusion

The international key opinion leaders who participated in this Delphi study identified pharmacists have specific roles to undertake across the PRR cycle. To move forward with these roles, policymakers will need to be informed to ensure legislation supports these new roles, and pharmacy organisations will need to provide adequate training to equip pharmacists with the requisite skills to undertake these roles.

Chapter 8: Discussion

This chapter provides an overall discussion of the research project. Section 8.1 provides a summary of the topic, Section 8.2 states how the research questions were addressed, Section 8.3 provides a conceptual framework model, and Section 8.4 the overall conclusion.

8.1 Summary

Including pharmacists in local, state, and national disaster plans would assist in achieving the Sendai Framework's target of decreasing the disruption to basic health services.¹² Access to medications can have a significant impact on the overall outcome for a patient and the health care system in terms of adequate response and recovery. This research project has identified that pharmacists need to be included in the planning and development of policies to ensure the health response and recovery actions are appropriate and adequate to meet the changing needs of the community during disasters. The Sendai Framework made the commitment to build resilience into healthcare facilities to ensure continuity of services.¹² This includes accommodating the healthcare needs of patients with chronic diseases, putting strategies in place to manage their specific needs, and maintaining their access to life-saving services.¹² Pharmacists manage chronic disease patients on a daily basis providing medication management and ensuring continuity of care. They also "triage" and "prescribe" daily in the community setting, recommending over-the-counter medications and referring to other health care providers where necessary. Pharmacists employ their professional expertise and provide these services daily which lends voice to the argument for extending these pharmacists' roles into disasters.

Depending on which country or state the disaster occurs in, the legal restrictions on pharmacists to render assistance to their community changes. Some countries allow pharmacists to supply a disaster-specific increased quantity of the everyday emergency supply or refill rule (commonly known as in most places as the

emergency three-day supply rule) of ongoing chronic disease medications.²⁶² However, in 2014, more than 50% of US states did not have disaster-specific emergency supply legislation in place.²⁶² This is still the case in the pharmacy legislation review conducted in this research project with 66.67% still not having specific legislation. Following Hurricane Katrina in Alabama, US, when the hurricane was labelled a state-declared disaster, pharmacists were able to provide evacuees increased quantities of emergency medication supplies to help alleviate the burden on the healthcare system.^{70,202} This pharmacy legislation review demonstrated that the odds of a country or jurisdiction having disaster specific legislation which allows pharmacists to relocate or operate a mobile pharmacy and supply emergency medications increases as the number of disasters rises. It is imperative that government legislation supports the roles of pharmacists to ensure the continuity of care and supply of medications in times of crisis.

8.2 Research Questions

This research project took an all-hazard approach and included pharmacists as qualified healthcare professionals, irrespective of the context of employment or the individual pharmacist's scopes of practice. Each research question will be discussed in turn demonstrating how the associated study addressed and answered the question.

RQ1: Identify the opinions of the international and Australian disaster health communities on pharmacists' roles in disasters and where pharmacists' roles fit across the PPRR cycle

This research project has provided the opinions from the disaster health community on pharmacists' roles in disasters. The literature has shown the role of pharmacists in disasters has not progressed since the 1960s beyond acknowledging their role in logistics and supply chain management.¹ However, two of the studies included in this research project conducted with disaster health stakeholders (surveys and interviews) concluded pharmacists have a place in disaster health teams. The disaster health community acknowledged pharmacists have the skills and knowledge to be essential team members with their roles evolving across the PPRR cycle. The disaster health community involved in this research project believed that

better integration of pharmacists' roles in disasters can lead to optimisation of patient safety. Literature demonstrates pharmacists' ability to reduce medication errors and thus improve patient safety.^{335,336}

RQ2: Identify barriers and facilitators to pharmacists being more involved in disasters

The surveys and interviews conducted with the disaster health stakeholders found that pharmacists remain removed from discussions regarding the health management of disasters. Instead of being included as a main player in disaster health teams they continue to be considered a support service. An explanation for this could be that pharmacists are the only healthcare professional fulfilling roles in public health without being recognised as a primary provider.¹³³ Nurse practitioners and physician assistants perform similar roles in relation to public health but are recognised as primary care providers.¹³³

The concern over turf encroachment has been a long-standing contentious issue with other healthcare professionals.³³⁷ A participant in the survey suggested there is a conflict of interest for pharmacists as 'shopkeepers' to provide evidence-based care, work collaboratively with other healthcare professionals whilst balancing the commercial needs of a business. The suggestion of pharmacists succumbing to commercial pressures was also made in a survey of opinions of GPs in 1998.³³⁷ This study found GPs were concerned over possible 'turf encroachment' and although in general the GPs were in favour of the extension of pharmacists roles, they did not agree with pharmacists' roles in screening and providing therapeutic drug monitoring clinics.³³⁷

A recommendation to overcome the differences between healthcare professionals identified in this research project was for interprofessional education and training. Interprofessional education was achieved in a Canadian study where the core competencies for different health science disciplines were mapped and formed the basis for interprofessional teaching, beginning at the undergraduate level.^{338,339} This set the tone for cross-pollination of language as students from the different disciplines learned the same terminology and the value of working in interprofessional teams from the beginning of their careers.^{338,339}

Another barrier identified in this research project was the burden placed on a single pharmacist working on a disaster health team. The participants spoke anecdotally of how overworked their deployed pharmacists can be in undertaking the roles of an entire field pharmacy. Roles include logistics and procurement of medications (in some cases medical consumables), providing clinical advice, attending ward rounds, and being on call. These roles are typically divided amongst several pharmacists and pharmacy personnel in everyday practice but are often the responsibility of a single pharmacist in a disaster. This situation was also highlighted in a 2011 systematic review, which found that pharmacists struggle with the time constraints of implementing public health services into their everyday practice.³⁰⁸ In addition, whilst patients benefit from receiving public health services (such as vaccinations, education, counselling, health screening and promotion, and drug testing) from pharmacists, many were not aware of public health services available from the pharmacists.³⁰⁸ A suggestion to increase pharmacists capacity in disasters from the studies conducted as part of this research project was to involve pharmacy students and dispensary technicians to backfill pharmacist roles (i.e. dispensing, logistics, procurement, and health promotion). This ensures someone with intimate pharmacy knowledge still performs basic pharmacy tasks in the disaster but frees up the pharmacist to perform more clinical roles within the disaster health team. This role reassignment is common practice in community pharmacy models to maximise pharmacists opportunities to engage with the public and provide clinical services.^{340,341}

RQ3: Obtain consensus from key opinion leaders on the roles and responsibilities pharmacists could undertake in disasters and where these identified roles fit within the PPRR phases.

Key opinion leaders identified and agreed upon 43 pharmacists' roles which they believe pharmacists are capable of undertaking in a disaster. It is up to the respective countries' governments, academic institutes, and pharmacy organisation to ensure they provide the necessary support, legislation, continuing education and training to equip pharmacists to undertake these roles. Pharmacists are often not provided the opportunity to train and upskill in areas of disaster management and preparedness. The disaster trainings currently available are generic in nature and do

not support the specific needs of pharmacists. Consequently, pharmacists do not feel competent and prepared to adequately respond and assist their communities during a disaster. Some suggest this disaster training should be implemented in the undergraduate pharmacy curriculum.^{201,213} This idea was trialled in pharmacy students at the University of Louisiana.³⁴² They conducted a table-top exercise with their students on potential infectious disease scenarios and pharmacists' roles. The students' confidence, knowledge, and understanding were increased following the table-top exercise.³⁴²

8.3 Theoretical Framework

For pharmacists to be able to undertake the 43 roles identified by the disaster health community, a policy commitment to support pharmacists in providing these services is required. At present, policymakers have two conflicting views regarding the pharmacy profession.³¹⁵ The first view is that pharmacy is a commercial enterprise and pharmacists are business people.³¹⁵ The second view is pharmacy is a community healthcare service and pharmacists are healthcare professionals.³¹⁵ They suggest previous policy changes to pharmacists' roles have come from pharmacist-led initiatives.³¹⁵ Therefore, pharmacists should lobby for policy change regarding their roles in disasters.

A systems thinking approach examining health consequences of disasters identifies the need for the inclusion of the wider healthcare community in disaster health management.¹⁴⁴ It has been postulated in the literature that the time has come to include other health professionals such as veterinarians, GPs, and pharmacists on disaster teams in the PRR cycle.^{69,119,173} The disaster health community involved in the research project of this thesis observed the value of including pharmacists on disaster teams and identified that current disaster health models often have a narrow view of potential stakeholders. Additionally, it is known that organisations tend to operate independently of one another with their own management systems and structures. The literature has identified organisations which work independently of others and struggle to share resources are operating as individual practice areas of the larger disaster management system.³⁴³ However, the

complexities of disasters cannot be adequately managed within individual practice areas. A collaborative coordinated effort utilising system thinking^{343,344} is needed to achieve the best outcomes for the disaster-affected community, instead of competing for resources and overlapping in services.

8.3.1 Conceptual Framework

This research project identified multiple independently operating practice areas in disaster management where pharmacists can contribute their expertise and knowledge (Figure 48). Pharmacists' roles in disasters as identified in this research project fit within four different practice areas operating in disasters – logistics, governance, patient care, and public health. However, due to the fragmented nature of disaster management and the organisations closely involved therein, pharmacists are currently placed within the logistics practice area of the framework. Currently, these practice areas do not operate at a systems thinking level, sharing resources and services. These organisations are not able to see how pharmacists' expertise and skills transcend the individual practice area boundaries.

The pharmacy profession successfully transcends the individual practice boundaries in daily practice, working collaboratively to provide best-practice patient care.^{198,199,306,314,345} However, when a disaster arises, this level of multidisciplinary partnership is generally lost and pharmacists are allocated to disaster teams as logisticians. Pharmacists need to be accepted and acknowledged for their ability to bring a unique skillset and knowledge to disaster management and be allowed to transcend the boundaries of the restrictive individual practice areas.

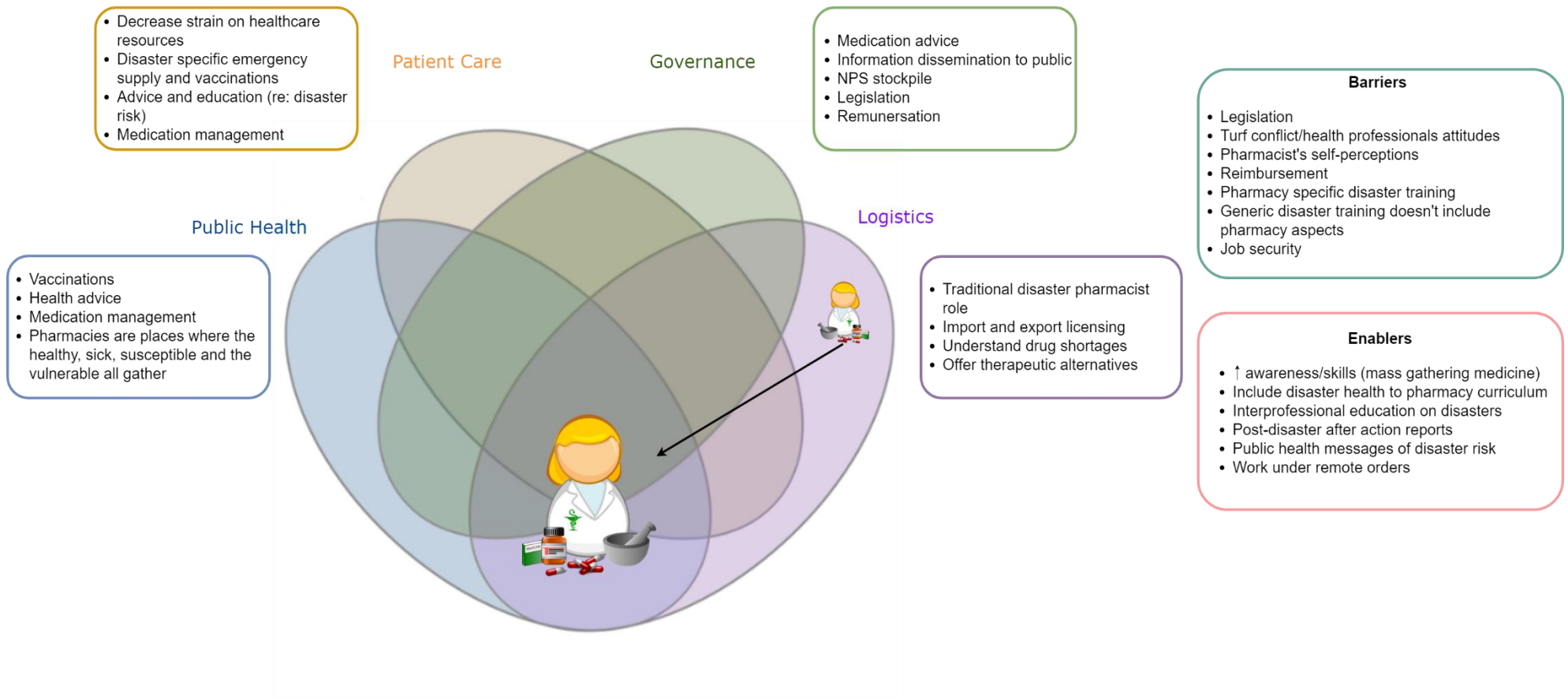


Figure 48: Conceptual framework model of pharmacists' current location logistics practice area and how they should transcend the boundaries of the multiple practice areas. Barriers and enablers to pharmacists' roles in disasters are highlighted. Venn diagram created using InteractiVenn^{®346}

8.3.1.1 Public Health Practice Area

Pharmacists work across both the medical and public health sectors looking after the welfare of patients and the community in everyday circumstances and in times of disasters. Many patients tend to seek out pharmacists for public health advice in community pharmacies before considering making an appointment with another healthcare professional or going to overcrowded EDs.^{226,235} The participants involved in this research project identified that disasters quickly become public health emergencies due to the loss of public health infrastructure. Thus, it is imperative for responding health professionals to have the appropriate skill set.

The concept of public health underwrites the core principle of the Australian National Medicines Policy of 'timely, and affordable access to medicines for all', in which to meet the quality, safety, and efficacy standards.³⁰⁶ Pharmacists currently undertake several roles within the domain of public health:^{306,307}

- patient safety,
- pharmacovigilance,
- medication management/therapeutic substitution programs,
- harm minimisation,
- affordable medicines,
- rational drug use initiatives,
- vaccination programs,
- contraceptive services,
- prevention of illness/disease or chronic disease exacerbations,
- prevention campaigns (e.g. importance of wearing a sunscreen, smoking cessation), and
- disaster preparedness or management.

8.3.1.2 Patient care Practice Area

This research project highlighted that pharmacists' roles in disasters can potentially improve patient safety and outcomes. A systematic review conducted in 2010 found that including pharmacists as team members in the provision of direct patient care improved various patient outcomes (such as reduced adverse drug events and patient education) across different disease states and in different healthcare settings.³¹⁴ The review of health professionals' response to the thunderstorm asthma event in 2016 in Australia by the Australian Victorian state government IGEM suggested pharmacists be included on health teams to improve outcomes.²³¹ The literature suggest the contribution pharmacists could make to patient-centred care and in optimising the quality, safety, and efficacious use of medicines could reduce the cost of care, the number of patients experiencing adverse events and prevent illnesses or disease progression.²⁰⁶ However, the lack of evidence for policy implication to support these claims could be limiting the extension of pharmacists' roles.²⁰⁶

8.3.2.3 Governance Practice Area

This research project has identified that government and health departments tend to have a narrow view on healthcare services and the professionals necessary to provide them, often overlooking community services (i.e. pharmacies) and focusing on emergency services and government funded hospitals. This thesis found pharmacists need to be more active in government roles and be given the opportunity to contribute on health policy decisions especially in terms of disaster management. Pharmacists are a significant portion of the private sector assisting the community. The participants involved in these studies suggested pharmacy professional organisations could be advocates for this change in how the roles of pharmacists are viewed in relation to disasters.

A systematic review found most patients when displaced or evacuated leave without their medications or prescriptions and thus in the immediate aftermath of a disaster, are in need of their regular medications.⁵⁹ From this research project, one of the most recognised ways pharmacists can assist in disasters is by providing medication management for chronic disease patients. Pharmacists can ensure

patients have sufficient supplies of their ongoing chronic disease medications to last the duration of a disaster and the collapse of local community services. Currently, this is achieved in many countries and states by providing a three-day emergency supply or by contacting the patient's physician for a prescription. A US study conducted in 2013 highlighted that insurance companies believe it is the pharmacist's responsibility to ensure patients have access to ongoing supplies of their medications.¹²⁰ In recognition that disasters and the disruption to community services typically lasts longer than three days, some US states legislation has been extended to increase the emergency supply quantity up to 30 days.^{262,263} This has begun to address the overcrowding of EDs for non-emergencies and chronic disease prescriptions.^{69,71} By giving pharmacists more authority in disasters to adequately look after the needs of chronic disease patients, doctors and nurses can focus their attention and resources on more critically ill patients.¹³³ This has been the case historically, in improving hospital systems and reducing the number of medication errors.³¹² More pharmacist-led initiatives which provide cost saving measures to the healthcare system need to be documented. Over the span of four months in 2007 in a single US hospital in Detroit, pharmacists working in the ED saved the healthcare system over \$1 billion in cost avoidance interventions.³¹⁶ By extension, with the surge capacity expected during a disaster in a hospital ED, including pharmacists would potentially increase this cost saving.

8.3.2.4 Logistics Practice Area

This research project highlighted pharmacists are typically only included when the need for medications is considered and, further, that logistics management is the most common role for pharmacists in disasters. This has been historically identified as the current state of affairs since the 1960s.¹ Pharmacists professionally straddle multiple entities including both the logistics and the medical fields, speaking both languages but not fully belonging to either. The role of pharmacists in ensuring medications are available in disasters throughout the different stages of the logistics supply chain is essential.³⁰⁵ NGOs working in both disasters and humanitarian crises have developed complex systems in which to access maintainable medication supplies, utilising the expertise of pharmacists.³⁰⁵

8.3.2.5 Barriers and Enablers

Pharmacy legislation can enable or hinder pharmacists' ability to assist in a disaster. This holds true in advancing other aspects of pharmacists' scope of practice such as prescribing.³⁴⁷ A review of international pharmacy legislation reveals the discrepancies between countries' expanded scope of pharmacy practice.¹¹⁵ Steyer et al.³⁴⁸ describes the advancement of vaccination legislation across the US states. By allowing pharmacists to provide this public health service, vaccination rates were higher in states which allowed pharmacists to vaccinate.³⁴⁸

Other health professionals' attitudes and perceptions of pharmacists were identified as a potential barrier to pharmacists' roles in disasters in this research project. To overcome the misconceptions of other healthcare professionals, it was suggested that it might be advantageous to raise awareness of pharmacists' capabilities in disasters. In a study of Australian pharmacists opinions, attitudes of the wider health community have been identified as a barrier to other pharmacists roles (i.e. prescribing).³⁴⁷

8.4 Conclusion

The Sendai Framework calls for measures to achieve better Disaster Risk Reduction in countries, thus reducing the impact of disasters on communities.¹² In terms of healthcare, pharmacists may be the answer to achieving these Sendai Framework goals. Pharmacists are the third largest and the most easily accessible healthcare provider.^{133,198,199,206-208} They are on the front-line of continuity of care and have the support from the disaster health communities. The international key opinion leaders have identified pharmacists have specific roles to undertake across the PRR cycle. However, pharmacists cannot fully undertake these roles without the legislative support from policymakers and governments. Organisations and academic institutions should incorporate disaster management into pharmacy education to ensure there is adequate training to equip pharmacists to become competent in disaster management and their extensive roles.

Chapter 9: Future Directions

This chapter is the final chapter for the dissertation and provides the future directions for this research project and this research field.

9.1 Future Directions

Pharmacists have been found to have roles spanning across multiple practice areas. Their roles evolve as a disaster unfolds and depend on the needs of the community and the extent of the collapse of normal healthcare services.

9.1.1 Cost-effectiveness of pharmacist interventions during disasters

This research project suggested better integration of pharmacists in disaster management could lead to optimising patient safety. There is evidence of pharmacists improving patient safety in daily practice through the reduction of medication errors.^{335,336} A study conducted in 2009, found including pharmacists on medical teams reduced potential medication errors.³¹²

Pharmacists could optimise patient safety in disasters by providing continuity of care and reducing nonadherence. Nonadherence with respect to chronic disease medications has resulted in increased hospitalisations and mortality rates.³⁴⁹⁻³⁵¹ A literature review suggested the economic cost of non-adherence for renal transplant patients was an additional \$900 in hospitalisation costs for each non-adherent patient per year.³⁴⁹ However, the review article suggests this underestimates the true cost of non-adherence as it does not account for work productivity losses, ambulatory care costs, nursing home care costs, and the patients' out-of-pocket expenses.³⁴⁹

To further investigate improving patient safety in disaster through pharmacists' actions in disasters, studies could be conducted to assess the cost-effectiveness of pharmacists' actions in disasters in reducing non-adherence by having pharmacists triage in evacuation centres. Performing a cost-utility analysis on the misadventures avoided compared between sites with pharmacists and those without pharmacists

providing chronic disease continuity of care. Potential research questions to study this could be: 1) pharmacists triaging in evacuation centres leads to less potential medication errors and misadventures, and, 2) chronic disease medication nonadherence in disaster evacuees is reduced with pharmacists providing continuity of care and medication management.

9.1.2 Pharmacists' willingness to work in disasters

This research project highlighted how pharmacists feel undervalued in disasters but also how they feel a sense of duty of care to their community to respond during a disaster.

There is an assumption in the health industry that when catastrophic events occur, the healthcare workforce will respond to meet the increase in surge capacity.³⁵²⁻³⁵⁴ However, research has revealed there are several contributing factors to a healthcare professional's willingness to work during disasters.^{352,354,355} The type of disaster event, education/training, personal safety/protective equipment, concerns over family safety, child and pet care, length of response, value of personal effectiveness in response, sense of duty of care, basic needs of workers met, and transportation can all impact on a healthcare professional's decision to work.^{352,354,355} However, it is unknown whether the same contributing factors affect a pharmacist's willingness to work during disasters.

Possible research questions which could be explored include: 1) identify what factors affect a pharmacist's willingness to work in disasters, 2) identify if upskilling pharmacists in disasters (improving their knowledge of disaster management and increasing their self-value in their disaster roles) changes their willingness to work during disasters.

9.1.3 Backfilling pharmacist roles with pharmacy students and dispensary technicians

Building on the findings of this research project and the FIP guidelines,² research could be conducted to determine the level of expansion these findings have for the wider pharmacy profession. Utilising pharmacy students and dispensary technicians to backfill pharmacists' roles could allow for further expansion of pharmacists' clinical skills.³⁵⁶

It was suggested that the pharmacy student workforce might be engaged during disasters, as this would prepare them in aspects of disaster management for when they are registered pharmacists. Two recommendations were made in this research project on how to achieve this - firstly, include disaster management into the pharmacy curriculum and secondly, use mass gathering events (i.e. sporting events, music festivals) as a chance for practising similar skills required during disaster events. With the number of disasters experienced in Japan, disaster management has begun to be incorporated into one of their university's undergraduate pharmacy curriculum as an entirely separate division or speciality of the school of pharmacy.³⁵⁷ A study conducted in 1995, found sports was an emerging area particularly in the US where pharmacists could provide their expertise in managing the medication therapy needs of athletes and treating or preventing injuries.³⁵⁸ This idea was expanded on by the participants in this research project, suggesting pharmacists and pharmacy students can develop and practice disaster management skills by participating in mass gathering events like college sporting games and providing healthcare services along with the EMS and paramedics.

A potential research study could evaluate and map the identified pharmacists' roles in disasters from this project to the differing competency levels of pharmacy personnel (pharmacists, students and dispensary technicians). If the cost-effectiveness analysis provides evidence of the cost-saving measures of having pharmacists more involved in disasters, further studies could be undertaken including more of the pharmacy personnel and freeing up the pharmacists to perform more clinical tasks to prevent misadventures and medication errors.

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Appendices

Appendix A - Pharmacy Legislation Review Data and References

Table 30: Pharmacy legislation review data and references

State/ Province	Abbe	Types of disasters	# of disasters since 2007 (May 2018)	Emergency Prescription Refill - Normal	Emergency Prescription Refill - Disaster	Vaccinations Rules for Disasters	Emergency Dispensing	Comments	Reference
Data collected and correct as of 30th May 2018									
United States (US)								Oral order for CD in emergency	21 CFR § 1306.11 (d)
Alabama	AL	Hurricane Nate, Hurricane Irma, Severe Storms/Tornadoes/Winds/Flooding, Hurricane Isaac, Tropical storm Ida, Hurricane Gustav	17	72 hrs	up to 30 days - state declared	n/a	n/a		Ala. Code § 34-23-75 (2017)

Alaska	AK	Storms, flooding, Ice jams, landslide/mudslide	13	No laws allowing	No laws allowing	if completed immunisation training and other related emergency medication training	n/a		Alaska Admin. Code tit. 12, § 52.992
Arizona	AZ	Severe storms and flooding, severe storm and flooding	4	No laws allowing	Up to 30 days - state declared	CDC listed vaccines schedule	Pharmacy can temporarily relocate if notifies board and meets requirements		32 Ariz. Rev. Stat. § 18-32-1910, Ariz. Admin. Code §4-23-617
Arkansas	AR	Storms/Tornadoes/Winds/Flooding, severe winter storm, Severe storms and flooding, Tropical storm Ike, Hurricane Gustav	21	7-day supply, not Sch II, notifies doctor	No laws expanding	n/a	n/a		Ark. Code § 17-92-102 (2017)
California	CA	California wildfires, California Flooding, Storms, flooding and Mudslides, winter storm, Earthquake, severe freeze	19	deemed emergency, notify doctor afterwards	Deemed an emergency and every effort to notify before and after is made	n/a	Mobile pharmacy from current licensed premise		Cal. BPC. Code § 4062, Cal. BPC. Code § 4064
Colorado		2015- Storms, flooding and Mudslides, Fire (black forest and Royal Gorge and waldo canyon),	6	72 hrs	No laws expanding	n/a	n/a		Colo. Rev. Stat. §12-42.5-120 (2016)

		storms and tornado							
Connecticut	CT	Severe winter storm and Snow Storm, Hurricane Sandy, Tropical storm Irene, severe storms and flooding,	8	No laws allowing	No laws expanding	n/a	n/a		no laws currently allowing
Delaware	DE	Severe Winter Storm and Flooding, Hurricane Sandy, Hurricane Irene	4	enough for emergency period, patient from pharmacy, notify prescriber	No laws expanding	n/a	n/a		Del. Code tit. 24, §2550
Florida	FL	Hurricane Irma, Hurricane Nate, Hurricane Matthew, Hurricane Hermine, Storms, tornados, wind and flooding, Hurricane Isaac, Tropical storm Debby, Hurricane Gustav, Tropical Storm Fay, Hurricane Ike,	15	72-hour	up to 30 days - state declared not Sch II	n/a	n/a		Fla. Stat. § 465.0275

Georgia	GA	Hurricane Irma, Storms, tornadoes and straight-line wind, Hurricane Matthew, Storms and Flooding, Severe Winter Storm,	13	72-hour day supply, not Sch II, notifies doctor within 7 days	No laws expanding	n/a	n/a		Ga. Code Ann. § 26-4-80 (j)
Hawaii	HI	2016 - Severe storms, flooding, landslides and mudslides 2014 - Volcanic eruption and lava flow 2014 - Tropical storm Iselle, tsunami waves,	8	No laws allowing	No laws expanding	n/a	n/a		no laws currently allowing
Idaho	ID	2017 - flooding, flooding, landslides and mudslides, Severe winter Storms and Flooding, Severe Storms and Straight-line winds,	9	enough for emergency period, notify prescriber	up to 30 days - state declared	n/a	establish temporary or mobile pharmacies		Idaho Admin. Code r. 27.01.01.060-02

Illinois	IL	Severe Storms, Straight line winds and Tornadoes, Severe Storms, Straight line winds and Flooding, winter storm and snowstorm,	12	No laws allowing	No laws expanding	n/a	Mobile pharmacy from current licensed premise		Ill. Admin. Code tit. 68, pt.1330.420
Indiana	IN	Severe Winter storm and Snowstorm, severe storms and flooding, severe storms winds and tornadoes,	10	qty to next practitioner's business day or sufficient reason qty is >, not CD, notify doctor	No laws expanding	Any vaccine in accordance with state department of health or homeland security	n/a		Ind. Code § 25-26-13-31.2 , Ind. Code § 25-26-13-25
Iowa	IA	Winter storms, severe storms and flooding, severe storms flooding and tornadoes,	25	enough for emergency period, notify prescriber	enough for emergency period, notify prescriber	> 6 for any vaccines in response to public health emergency	n/a		Iowa Code § 155A.29 , Iowa Code § 155A.44
Kansas	KS	Severe storm, straight line winds and Flooding, snowstorm and Flooding, Severe winter storm, Severe Storms and Flooding, Severe storm, Tornadoes, straight line	21	7-day supply, not Sch II	No laws expanding	Flu for >6 or >12yrs for any vaccine	n/a		Kan. Stat. Ann. § 65-1637 , Kan. Stat. Ann. § 65-1635a (2017)

		winds and Flooding,							
Kentucky	KY	Severe storm, Tornadoes, Flooding, landslides and mudslides, Severe storm, Snowstorm, Tornadoes, Severe Winter storm,	20	72-hour supply, not Sch II	up to 30 days - state declared, not Sch II and maintenance therapy	Administer immunizations to children pursuant to protocols established by the Centres for Disease Control and Prevention, the National Institutes of Health, or the National Advisory Committee on Immunization Practices or determined to be appropriate by the commissioner of public health or his or her designee;	Operate temporarily, a pharmacy in an area not designated on the pharmacy permit;		Ky. Rev. Stat. Ann. § 315.500
									201 Ky. Admin. Regs. 2:175
Louisiana	LA	Tropical Storm Harvey, Severe Storms, Tornadoes and Straight-Line Winds, Severe Storms and Flooding, Hurricane Isaac,	14	72 hrs	up to 30 days - state declared	n/a	n/a		La. Admin. Code tit. 46, §519. La. Admin. Code tit. 46 §2521

		Tropical Storm Lee, Hurricane Ike, Hurricane Gustav, Tropical Storm Nate,							
Maine	ME	2015 - Severe Winter Storm, Snowstorm and Flooding, Tropical Storm Irene, Severe storms and flooding, inland and coastal flooding	14	No laws allowing	No laws expanding	n/a	n/a		no laws currently allowing
Maryland	MD	2016 - Severe Storm and Flooding, Severe Winter Storm and Snowstorm, Hurricane Sandy, Tropical Storm Lee, Hurricane Irene,	9	up to 14 days, notifies doctor in 72hrs, not Sch II	up to 30 days - state declared, not Sch II and notifies doctor in 7 days	>13 - state declared, no protocol	Relocation of dispensing without permit or license necessary		DHMH Emergency Protocols
									Md. Health Occupations Code Ann. § 12-506 (2015)

Massachusetts	MA	Severe winter storm, Snowstorm and Flooding, Hurricane Sandy, Tropical Storm Irene, severe storms, Massachusetts Explosion, Hurricane Irene, Severe storms and tornadoes, Hurricane Earl, inland and coastal flooding,	11	No laws allowing	No laws expanding	n/a	n/a	Bill in the committee for finance awaiting judgement for ensuring availability of prescription medications during emergency	Bill H. 1178, The 190th General Court of the Commonwealth of Massachusetts (Mass. 2018)
Michigan	MI	Severe Storms and Flooding, contaminated water, tornadoes	5	No laws allowing, can give extra repeats if available	up to 30 days - state declared	n/a	n/a		Mich. Comp. Laws § 333.17751
									Disaster Executive order to temporarily suspend Mich. Comp. Laws § 333.17751 during Hurricane Katrina
Minnesota	MN	2016 - Severe Storms and Flooding, Severe Storms, Straight line winds, flooding, landslides, and mudslides, Severe Winter Storm, bridge collapse, tornadoes	16	No laws allowing	No laws expanding	State declared vaccines or drugs and persons allowed to administer with any training required. Normally over 13 for all vaccines and	n/a		Minn. Stat. § 144.4197 (2015)

						over 6 for influenza			
									Minn. Stat. § 151.01.27
Mississippi	MS	Hurricane Nate, Severe Storms, Tornadoes, Straight Line winds and Flooding, Hurricane Isaac, Flooding, Hurricane Gustav	17	72 hours not Sch II, notifies doctor in 7 days	No laws expanding	n/a	n/a		Miss. Pharmacy Practice Regulations Article XII - 10
Missouri	MO	Severe Storms, Tornadoes, Straight Line winds and Flooding, winter storms, flooding	22	enough for emergency period, not Schedule II no more than 7 days unless prescriber death/incapacity (30days) patient from pharmacy, notify prescriber	No laws expanding	n/a	n/a		Mo. Rev. Stat. § 338.200.1 (2016)
Montana	MT	Tornado, Severe winter storm and straight-line winds, Severe Storms, Tornadoes, Straight Line winds and Flooding, Ice	9	enough for emergency period, notify prescriber - not Sch II	enough for emergency period, notify prescriber - not Sch II	n/a	n/a		Mont. Admin. R. 24.174.836 (2015)

		Jams and Flooding, fires							
Nebraska	NE	Severe Storms, Tornadoes, Straight Line winds, Flooding, Severe Storms, Tornadoes, Winter Storms and Flooding, Ice jam,	22	No laws allowing	No laws expanding	n/a	n/a		no laws currently allowing
Nevada	NV	Severe Winter Storms, Flooding and Mudslides, Severe Storms and Flooding	4	No laws allowing	No laws expanding	n/a	n/a		no laws currently allowing
New Hampshire	NH	Severe Storms and Flooding, Severe Winter Storm, Severe Winter Storms and Snow Storm, Severe Storms, Flooding and Landslides, Tornadoes and flooding, Hurricane Sandy, Hurricane Irene	18	72 hours	No laws expanding	n/a	n/a		N.H. Rev. Stat. Ann. § 318:47 (i) (2014)

New Jersey	NJ	Severe Winter Storm and Snow Storm, Severe Storm, inland and coastal flooding, Hurricane Irene, Hurricane Sandy, Tropical Storm Lee,	14	72 hours, not Sch II	No laws expanding	n/a	n/a	30-day supply, not Sch II, patient known to pharmacy - Changing legislation 2018 - with the SENATE	N.J. Admin. Code § 13:39-7.4
									Senate No. 1135, Referred to Senate Health, Human Services and Senior Citizens Committee (N.J. 2018)
New Mexico	NM	Severe storms and flooding, mudslides, tornadoes,	13	72 hours notify Dr	No laws expanding	n/a	n/a		N.M. Stat. § 61-11-7
New York	NY	Flooding, Severe Winter Snow and Snow Storm, inland and coastal flooding, tornadoes, Hurricane Sandy, Tropical Storm Lee, Hurricane Irene, Storm and flooding from Tropical depression Ida,	19	No laws allowing	No laws expanding	n/a	n/a		no laws currently allowing

North Carolina	NC	Hurricane Matthew, Severe Winter Storm, Severe Storms, Flooding, tornadoes, mudslides and landslides, Tropical Storm Hanna, Hurricane Earl, Storms and flooding from Tropical Storm Nicole, Hurricane Irene,	11	30-day supply, not Sch II, notifies doctor	during a state of emergency or disaster a waiver or override may be issued to provide exemption from the "refill too soon" prohibition so that a one-time refill or replacement fill may be issued.	n/a	n/a		21 N.C. Admin. Code 46 .1809 (2017)
									N.C. Gen. Stat. § 58-3-228
North Dakota	ND	Flooding, Severe Storms and Flooding, Severe Winter Storms, tornadoes,	14	72 hours, not Sch II, notify Dr	No laws expanding	>11 yrs. all vaccines, > 5 for influenza	n/a		N.D. Cent. Code § 43-15-01
Ohio	OH	Severe storms, landslides, mudslides, Hurricane Sandy, storms from Tropical Depression Ike, flooding, tornadoes	6	72 hours, not Schedule II, known to pharmacy, for chronic disease or 30-day supply (must notify doctor, keep record)	up to 30 days - state declared, notifies doctor	n/a	n/a		Ohio Rev. Code Ann. § 4729.281 (2016)

Oklahoma	OK	Severe Storms, Tornadoes, Straight Line winds and Flooding, Severe Winter Storms, Wildfires,	34	No laws allowing	up to 30 days - state declared, 10 days CD with DEA and OBN approval	yes, A D.Ph. shall administer immunizations on the order of a prescribing licensed practitioner	n/a		Okla. Admin. Code § 535:13-1-4
									Okla. Admin. Code § 535:10-11-3
Oregon	OR	Severe Winter Storms, Tornadoes, Landslides and Flooding, Severe Winter Storm and Flooding, Tsunami wave surge,	9	72 hours notify Dr	up to 30 days - state declared, 10 days CD with DEA approval	>3 yrs.	temporary or mobile pharmacy permit for disaster		Or. Admin. R. 855-007-0090 , Or. Admin. R. 855-007-0100 , Or. Admin. R. 855-041-1120
									Or. Rev. Stat. § 689.645
Pennsylvania	PA	Severe Storms and Flooding, Severe Winter Storms and Snowstorm, Severe Storms, Tornadoes and Flooding, Hurricane Sandy, Tropical Storm Lee, Hurricane Irene	8	72 hours, not Sch II, chronic disease, notify Dr within 72 hrs	No laws expanding	>9 for influenza and >18 for all vaccines	n/a		PA Pharmacy Act Section 8 , PA Pharmacy Act Section 9.2

Rhode Island	RI	Severe Winter Storm and Snowstorm, inland and coastal flooding, Hurricane Irene, Hurricane Sandy,	6	72 hours not Sch II, chronic disease, notifies prescriber, believes harm will come from not supplying	No laws expanding	>9 for influenza and parent consent	n/a		5 R.I. Gen. Laws Ann. § 5-19.1-24, 5 R.I. Gen. Laws Ann. § 5-19.1-31
South Carolina	SC	Hurricane Irma, Hurricane Matthew, Storms, and flooding, winter storm	4	10 days, not CD, notifies prescriber, once in 12 months,	up to 15 days, state declared, not CD, pharmacist engaged in relief efforts	>12 for influenza and >18 for all vaccines, written protocols	n/a	Recent change pending decision by Committee on Medical Affairs in Senate in Jan 2017 from 72hrs with 30 days	S0243 General Bill. Referred to Committee on Medical Affairs (S.C. 2017)
									S.C. Code Ann. § 40-43-170, S.C. Code Ann. § 40-43-190
South Dakota	SD	Severe Winter Storm, Severe Storms, straight line winds and flooding, Severe Storms, Tornadoes, straight Line Winds and Flooding,	22	No laws allowing	No laws expanding	*In an emergency and pending the arrival of a qualified practitioner, the pharmacist may apply first aid treatment;	n/a		S.D. Codified Laws § 20:51:16:04

Tennessee	TN	Severe Storms, Straight Line winds and flooding, Wildfires, Severe Winter Storm and Flooding, Severe Storms, Tornadoes,	18	72 hours, maintenance therapy, not CD, can dispense additional 72hr supply if unable to contact doctor	No laws expanding	n/a	n/a		Tenn. Code Ann. § 63-10-207 (West)
Texas	TX	Hurricane Harvey, Severe Storms and Flooding, Tornadoes, Severe Winter Storms, Explosion, Wildfires, Hurricane Alex, Hurricane Ike, Hurricane Dolly, Tropical Storm Erin, Hurricane Gustav, Hurricane Dean	19	72 hours, not Sch II, notifies doctor, not supplying is believed to result in harm	up to 30 days - state declared, excluding Sch II CD, notifies prescriber,	n/a	n/a		22 Tex. Admin. Code § 291.34.8 (2017)
Utah	UT	Severe Winter Storms and Flooding, severe storm and flooding,	5	3-day emergency supply & notify doctor	No laws expanding	n/a	n/a		Utah Code § 58-17b-608
Vermont	VT	Severe Storms and Flooding, Severe Winter Storm, tornadoes, Hurricane Irene,	20	No laws allowing	No laws expanding	>18 years	n/a		Vt. Pharmacy Admin. R 10.35

Virginia	VA	Hurricane Matthew, Severe Winter Storm and Snowstorm, Hurricane Sandy, Severe storm and straight-line winds, Tropical storm Lee, Earthquake, Hurricane Irene, storms from Tropical depression Ida	10	Sch 6 - notify prescriber after, deemed necessary,	Waiver of requirements to permit the provision of needed drugs, pharmacy services if deemed necessary by board	If trained can administer/ dispense anything necessary under authorised by state health commissioner	n/a		Va. Code Ann. § 54.1-3307.3
									Va. Code Ann § 54.1-3411
Washington	WA	Severe Winter Storms, Flooding, Landslides and Mudslides, Wildfires and Mudslides, Severe Windstorm, tornado	13	72 hours notify doctor	No laws expanding	n/a	n/a		Wash. Admin. Code § 246-869-100

West Virginia	WV	Severe Storms, Flooding, Landslides and Mudslides, Severe Storms, Straight-line winds, chemical spill, tornadoes, Hurricane Sandy, severe winter storm and snowstorm	21	up to 10 days, document, inform Dr	No laws expanding	n/a	n/a		W. Va. Code R. § 15-1-26
Wisconsin	WI	Severe Storms, Straight-line winds, Flooding, Landslides and Mudslides, severe winter storm and snowstorms, tornadoes	10	No laws allowing	No laws expanding	n/a	n/a		Wis. Admin. Code Phar § 8.09
Wyoming	WY	Flooding, Severe Winter Storm and Straight-Line Winds, Severe Storms and Flooding, landslides	5	72 hrs, not Sch II,	No laws expanding	>7 for influenza and HPV and >18 for all vaccines	n/a		Wyo. Stat. Ann. § 33.24-136, Wyo. Stat. Ann. § 33.24-157
District Columbia	DC	Snowstorm, Hurricane Sandy, Severe storms, Earthquake, Hurricane Irene, severe winter storms	7	No laws allowing	No laws expanding	>12yrs with parent consent and >18 with ID includes epidemic vaccines	n/a		D.C. Mun. Regs. tit. 17, § 6512.7

Canadian Provinces									Canadian Pharmacists Association. Pharmacists' Scope of Practice in Canada. 2016 [cited 2018 7th August]; Available from: https://www.pharmacists.ca/cpha-ca/assets/File/pharmacy-in-canada/Scope%20of%20Practice%20in%20Canada_JAN2016.pdf .
Alberta	AB	Epidemic (TB outbreak), Flood, Severe Thunderstorms, wildfires, floods, rail (freight train derailed) accident, storms, pandemic, drought,	37	Can renew/extend prescription for continuity of care	Can initiate a schedule I prescription	Can administer any drug or vaccine (SC or IM)	n/a		
British Columbia	BC	severe thunderstorms, Wildfires, Flood, Severe storms, chemical spill, epidemic, pandemics, rioting	32	Can renew/extend prescription for continuity of care	No laws allowing	Can administer influenza and travel vaccines	n/a		
Manitoba	MB	chemical spill, Tornadoes, severe thunderstorms, Wildfires, floods, pandemic and epidemic,	29	Can renew/extend prescription for continuity of care	Can initiate a schedule I prescription	Can administer any drug or vaccine (SC or IM)	n/a		

New Brunswick	NB	Winter Storm, Severe Thunderstorm, Flood, Hurricane Arthur, Hurricane Irene, storm surge, pandemic and epidemic, Tropical Storm Kyle, Tropical Storm Hanna, post-tropical storm Noel, freight train derailment and chemical spill	24	Can renew/extend prescription for continuity of care	Can initiate a schedule I prescription	Can administer any drug or vaccine (SC or IM)	n/a		
Newfoundland Labrador	NL	Flood, Winter Storm, wildfires, storms and thunderstorms, pandemic, landslide, Hurricane Irene, Hurricane Igor, Tropical Storm Kyle, post-tropical storm Chantel	15	Can renew/extend prescription for continuity of care	No laws allowing	Can administer any drug or vaccine (SC or IM)	n/a		

NoVo Scotia	NS	Winter Storm, Flood, Severe Thunderstorms, airplane crash, pandemic, wildfires, chemical spill, Hurricane Irene, Hurricane Earl, Hurricane Bill, Tropical Storm Kyle, post-tropical storm Noel	24	Can renew/extend prescription for continuity of care	Can initiate a schedule I prescription	Can administer influenza and travel vaccines	n/a		
Northwest Territories	NWT	Wildfire, floods, pandemic	4	Can renew/extend prescription for continuity of care	No laws allowing	No laws allowing	n/a		
Nunavut	NU	Pandemic, flood, Airplane crash	3	No laws allowing	No laws allowing	No laws allowing	n/a		
Ontario	ON	Floods, Severe Thunderstorms, Landslides, Winter Storms, Tornadoes, train derailments, terrorist shooting, fire, wildfires, pandemic, gas explosion,	47	Can renew/extend prescription for continuity of care	No laws allowing	Can administer influenza vaccines	n/a		
Prince Edward Island	PEI	Winter Storms, Floods, pandemic,	11	Can renew/extend prescription	Can initiate a schedule I prescription	Can administer any drug or	n/a		

		thunderstorms, Hurricane Irene, Tropical storm Kyle		for continuity of care		vaccine (SC or IM)			
Quebec	QC	Winter Storms, Floods, Train derailment, terrorist kidnapping, fire, epidemics (legionnaires' disease and listeria) and pandemic, earthquake, wildfire, tornado, severe thunderstorms, Hurricane Irene,	28	Can renew/extend prescription for continuity of care	No laws allowing	No laws allowing	n/a		
Saskatchewan	SK	Epidemic (TB outbreak), Severe Thunderstorms, Floods, Wildfires, chemical spill, tornado, pandemic, drought, epidemic,	29	Can renew/extend prescription for continuity of care	Can initiate a schedule I prescription	Can administer any drug or vaccine (SC or IM)	n/a		
Yukon	YT	Floods and pandemic	3	No laws allowing	No laws allowing	No laws allowing	n/a		
United Kingdom	UK	http://emdat.be/emdat_db/							The National Health Service (Pharmaceutical and Local Pharmaceutical Services) Regulations 2013 - Regulation 29, (2013).

		Earthquake, Fires, floods, Air accidents, electrical storm, tropical storm, heatwave, cold wave, extra-tropical storms	25	On request by doctor, cannot be scheduled drug (Schedule I or II conditional) or a CD, written order in 72 hrs. Independent and supplementary prescribing pharmacists. Pilot program 30 days for chronic disease medications	Clause allowing for changes for flexible provision of local pharmaceutical services during declared disaster		Relocation temporarily can be approved		The National Health Service (Pharmaceutical and Local Pharmaceutical Services) Regulations 2013 - Regulation 111, (2013).
									The National Health Service (Pharmaceutical and Local Pharmaceutical Services) Regulations 2013 - Part 2 Paragraph 6, (2013).
New Zealand	NZ	http://emdat.be/emdat_db/	https://nzhistory.govt.nz/culture/new-zealand-disasters/timeline						
		Ex tropical Cyclone Gita, Cyclone Fehi, severe storms, Flooding, Earthquakes, electrical storm,	18	72 hr supply	Civil defence act whatever is needed		Suspension of license and sharing on dispense history with other pharmacies until reinstated		Medicines Regulations 1984, Part 7 r 44 (2015).

		Cyclone Cook, Cyclone Debbie, Cyclone Lusi, Tornado, Cyclone Pam, Fires, mining accident							
Australia	AUS	https://knowledge.aidr.org.au/disasters/							Hope D, Yeates G, King M. Vaccinations: Fragmented federation: Inconsistent interstate requirements for pharmacist vaccine administration. AJP: The Australian Journal of Pharmacy 2016;97(1157):18-22.
									National Health (Continued Dispensing) Determination 2012. Office of Parliamentary Counsel. Canberra; 2013.
									National Health Act 1953, current as of October 2018, s 91A. (Relocation rules)
	QLD	bushfires, cyclone Yasi, cyclone Oswald, floods, storms, cyclone It, cyclone Marcia, cyclone Debbie, tornado, outbreak, drought, heatwave	24	3 days	No laws allowing	18 yrs. +, Pandemic Influenza program			Health (Drugs and Poisons) Regulation 1996, current as of 1 October 2017 (QLD) s 171, 194.
	NSW	Bushfires, storms, floods, landslide, transport accidents, terrorism, air pollution, heatwaves,	27	3 days	PBS quantity for OCP pill & Statins - continued dispensing, once in 12 months	18 yrs. +, • IM Influenza	temporary relocation allowed using existing PBS approval # for up to 6 months		Poisons and Therapeutic Goods Regulation 2008 (NSW) s 45, 45A.

		outbreaks, drought							
	ACT	Storms, outbreaks, heatwave	4	3 days	PBS quantity for OCP pill & Statins - continued dispensing, once in 12 months	18 yrs. +, • IM Influenza	temporary relocation allowed using existing PBS approval # for up to 6 months		Medicines, Poisons and Therapeutic Goods Regulation 2008 (ACT) s 251-252, 255 352.
	VIC	Bushfire, flood, storms, tornado, transport accidents, industrial accidents, heatwaves, terrorism, outbreaks	23	Oral prescription from prescriber or 3-day emergency supply	PBS quantity for OCP pill & Statins - continued dispensing, once in 12 months	18 yrs. +, • Influenza • Pertussis-containing vaccines	temporary relocation allowed using existing PBS approval # for up to 6 months		Drugs, Poisons and Controlled Substances Regulations 2017 (VIC) s 25, 56, 57, 159, 163
	TAS	Bushfire, flood, storms, outbreaks	6	Oral prescription from prescriber or 3-day emergency supply	PBS quantity for OCP pill & Statins - continued dispensing, once in 12 months	18 yrs. +, • IM Influenza	temporary relocation allowed using existing PBS approval # for up to 6 months		Poisons Regulations 2008, version current as of 13 December 2017 (TAS) s 43, 43A 48, 64
	SA	Heatwave, bushfires, coral poisoning, storms, outbreaks	11	3 days	PBS quantity for OCP pill & Statins - continued dispensing, once in 12 months	16 yrs. +, • IM Influenza	temporary relocation allowed using existing PBS approval # for up to 6 months		SA Health. Pharmacist Legal Obligations when Handling, Dispensing and Supplying Drugs of Dependence - Emergency Supply. Government of South Australia; 2018 [cited 2018 12th August]; Available from: https://www.sahealth.sa.gov.au/wps/wcm/connect/public/content/sa+health+internet/clinical+resources/clinical+topics/medicines+and+drugs/legal+control+ove

									r+medicines/legal+requirements+for+the +prescription+and+supply+of+drugs+of+ dependence/pharmacist+legal+obligatio ns+when+handling+dispensing+and+sup plying+drugs+of+dependence
									Controlled Substances (Poisons) Regulations 2011 (SA) s 21
	WA	cyclone Hilda, cyclone George, floods, bushfires, storms, bushfires, industrial accidents, outbreaks, heatwaves	13	Oral prescription from prescriber or 3-day emergency supply	PBS quantity for OCP pill & Statins - continued dispensing, once in 12 months	18 yrs. +, • IM Influenza	temporary relocation allowed using existing PBS approval # for up to 6 months		Poisons Regulations 1965 (WA) r. 36, 38, 39AA
	NT	Cyclone Grant, Katherine floods, train derailment, chemical spill, outbreak	6	7-days' supply, previous had	PBS quantity for OCP pill & Statins - continued dispensing, once in 12 months	16 yrs. +, • IM/SC Influenza (not intradermal) • DTP • MMR	temporary relocation allowed using existing PBS approval # for up to 6 months		Medicines, Poisons and Therapeutic Goods Act 2017 (NT) S 59, 62

Appendix B - Quantitative Surveys

International survey released at the WADDEM congress

03/08/2018

The Role of Pharmacists in Disaster Health Management in Natural and Manmade Disasters



The Role of Pharmacists in Disaster Health Management in Natural and Manmade Disasters

	PARTICIPANT INFORMATION FOR QUT RESEARCH PROJECT
The Role of Pharmacists in Disaster Health Management in Natural and Manmade Disasters	
QUT Ethics Approval Number 170000048	

RESEARCH TEAM

Principal Researcher: Ms Kaitlyn Porter (PhD Student)
Ms Elizabeth McCourt (PhD Student)

Associate Researcher: Professor Lisa Nissen (Principal Supervisor)
Professor Vivienne Tippett (Associate Supervisor)
Mrs Judith Singleton (Associate Supervisor)

School of Clinical Sciences, Faculty of Health, Queensland University of Technology (QUT)

DESCRIPTION

This project is being undertaken as part of Kaitlyn Porter and Elizabeth McCourt's PhD research. This study is looking at the roles of pharmacists in disasters and their core competencies. It will determine if pharmacists should have a role in disaster management aside from logistics and if so what those roles could be.

Natural disasters are increasing in frequency and/or intensity requiring a multitude of healthcare professionals to meet the needs of a community in the aftermath of a disaster. Disaster research has shown lack of access to basic health services – mainly medications cause the highest mortality rate in a disaster. The elderly and those with chronic diseases (i.e. diabetes, cancer, renal, cardiovascular and chronic respiratory diseases) have been identified as significantly vulnerable to adverse health outcomes during disasters. These groups of vulnerable people in the wake of a disaster need medical assistance however have limited options other than to turn to overcrowded hospitals as community

<https://survey.qut.edu.au/Member/ObjectDesign/DesignPreviewObject.jsp?VMODE=1&authStart=1&surveyId=188732&nocache=1533272696252#> 1/7

healthcare services collapse in the immediate aftermath of a disaster. As their medical needs are important but not an emergency they are generally under prioritized for acute disaster-related emergencies and can wait hours to days to get a prescription for their chronic disease medications or checkup. Pharmacists are the third largest healthcare providers following doctors and nurses and are recognized as the medication experts of the world. Their role and responsibility during a disaster is undefined and their skillset is underutilized in times of crisis.

The purpose of this project is to determine if there is an opportunity for pharmacists to undertake new roles and responsibilities during natural and manmade disasters and what those roles would be. You are invited to participate in this project because you are experienced in disaster health management and have had previous experience in disasters.

PARTICIPATION

Participation will involve completing a 25 question anonymous survey with Likert scale questions (strongly agree – strongly disagree) that will take approximately 10 minutes of your time. The survey can be completed online via Key Survey or via a paper-based survey.

Questions will include:

- How have you participated in previous disasters?
- Do you think assisting in disasters is within a pharmacist's current scope of practice?
- What do you think are the barriers to pharmacists assisting in disasters currently?

Your participation in this project is entirely voluntary. If you agree to participate you do not have to complete any question(s) you are uncomfortable answering. Your decision to participate or not participate will in no way impact upon your current or future relationship with QUT or WADEM. If you do agree to participate you can withdraw from the project during your participation without comment or penalty. However as the survey is anonymous once it has been submitted it will not be possible to withdraw and partially completed survey responses will be used.

EXPECTED BENEFITS

It is expected that this project will not directly benefit you. However, it may benefit disaster health management in the future should the potential for pharmacists having a larger role assisting response teams to provide the best healthcare possible be demonstrated.

RISKS

There are no risks beyond normal day-to-day living associated with your participation in this project.

PRIVACY & CONFIDENTIALITY

All comments and responses are anonymous and will be treated confidentially unless required by law. The names of individual persons are not required in any of the responses. Non-identifiable data obtained from the survey may be used for future comparative projects.

Any data collected as part of this project will be stored securely as per QUT's Management of research data policy.

CONSENT TO PARTICIPATE

Submitting the completed survey is accepted as an indication of your consent to participate in this project.

QUESTIONS / FURTHER INFORMATION ABOUT THE PROJECT

Should you have any questions or queries Kaitlyn and Elizabeth are here at the WADEM congress and are presenting their research in the pharmacy stream. They can also be reached at the below email addresses.

Kaitlyn Porter

PhD Student

k20_porter@qut.edu.au

Elizabeth McCourt

PhD Student

elizabeth.mccourt@hdr.qut.edu.au

Lisa Nissen

Principal Supervisor

lnissen@qut.edu.au

CONCERNS / COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT

QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Advisory Team on +61 7 3138 5123 or email humanethics@qut.edu.au. The QUT Research Ethics Advisory Team is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.

Thank you for helping with this research project. Please keep this sheet for your information.

1. What country do you currently reside in?**2. What age bracket best describes you?**

- Under 20
- 21-30 Years
- 31-40 Years
- 41-50 Years
- 51+ Years

3. What is your gender?

- Male
- Female
- X

4. Are you a registered health professional?

- Yes
- No

5. What is your job/role in relation to disasters?

6. How many years have you been in your profession?

- 0-5 Years
- 6-10 Years
- 11-15 Years
- 16-20 Years
- 21+ Years

7. How many disasters have you responded to while in your profession?

- 0-5
- 6-10
- 11-15
- 16-20
- 21+

8. Types of disasters you have responded to (please tick all that apply):

- Natural Disasters
- Manmade Disasters

9. How have you participated in previous disasters? (please tick all that apply)

- Local Response
- Organised Response
- Government Response
- Military Response

10. Are there pharmacists in your country?

- Yes
- No

11. Are they involved in disaster management?

- Yes
- No
- Don't know/unsure

12. Do you believe pharmacists have a role in disaster health management aside from logistics and supply chain management?

- Yes
- No



13. Do you think assisting in disasters is within a pharmacist's current scope of practice?

- Yes
 No

14. Where in the continuum of PPRR (Prevention, Preparedness, Response and Recovery) do you believe pharmacists have a role? (select all that apply)

- Prevention
 Preparedness
 Response
 Recovery
 None

15. Research on previous disasters indicates that pharmacists have undertaken the roles described below. On the scale please mark your level of agreement with pharmacists undertaking these roles.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A
Logistics of pharmaceuticals and stockpile management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CPR and assisting in 'first response'	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing first aid and wound care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Triaging and screening in evacuation centres	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
'Prescribing' continuing chronic disease medications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
'Prescribing' vaccinations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Administering vaccinations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developing drug algorithms and guidelines to streamline patient diagnosis and treatment options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assist decision-making on health issues in disaster management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication advocate between different healthcare professions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate public on health risks in disasters and those most vulnerable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Prior to this survey had you heard of pharmacists fulfilling these roles in disasters?

- Yes
 No



17. What roles do you think pharmacists could undertake in the preparing a community for a disaster/natural hazard event?

18. What roles do you think pharmacists could undertake during the Response phase of a disaster/natural hazard event?

19. Have you had any specific disaster training?

Yes: Please name
program

No

Comments

20. Did the training help you to work in a disaster?

- Yes
 No
 Don't Know/Haven't tested it in a disaster event yet

21. What aspect of your job did this training best prepare you for?

22. What aspect of your job did this training least prepare you for?



23. What are the most important skills to have during a disaster? (Can be practical, clinical, interpersonal)

24. What overall training do you believe is best for health professionals prior to participating in disaster management?

25. What do you think are the barriers to pharmacists assisting in disasters currently?

Completed:

Australian survey released via CEDM mailing list

03/08/2018

The Role of Pharmacists in Disaster Health Management – Aust Perspective



The Role of Pharmacists in Disaster Health Management - Aust Perspective

	PARTICIPANT INFORMATION FOR QUT RESEARCH PROJECT
The Role of Pharmacists in Disaster Health Management in Natural and Manmade Disasters	
QUT Ethics Approval Number 1700000106	

RESEARCH TEAM

Principal Researcher: Ms Kaitlyn Porter (PhD Student)

Associate Researcher: Professor Lisa Nissen (Principal Supervisor)
Professor Vivienne Tippett (Associate Supervisor)
Mrs Judith Singleton (Associate Supervisor)

School of Clinical Sciences, Faculty of Health, Queensland University of Technology (QUT)

DESCRIPTION

This project is being undertaken as part of Kaitlyn Porter's PhD research. This study is looking at the roles of pharmacists in disasters. It will determine if pharmacists should have a role in disaster management aside from logistics and if so what those roles could be.

Natural disasters are increasing in frequency and/or intensity requiring a multitude of healthcare professionals to meet the needs of a community in the aftermath of a disaster. Disaster research has shown lack of access to basic health services – mainly medications cause the highest mortality rate in a disaster. The elderly and those with chronic diseases (i.e. diabetes, cancer, renal, cardiovascular and chronic respiratory diseases) have been identified as significantly vulnerable to adverse health outcomes during disasters. In the immediate aftermath of a disaster these groups of vulnerable people need medical assistance, however they may be limited to turning up to overcrowded hospitals as community healthcare services collapse. As these patients are low acuity they may wait hours to days

<https://survey.qut.edu.au/Member/ObjectDesign/DesignPreviewObject.jsp?VMODE=1&authStart=1&surveyId=189645&nocache=1533272780618#> 1/6

for a checkup and/or prescriptions. Pharmacists are the third largest healthcare providers following doctors and nurses and are recognized as the medication experts of the world. Their role and responsibility during a disaster is undefined and their skillset is underutilised in times of crisis.

The purpose of this project is to determine if there is an opportunity for pharmacists to undertake new roles and responsibilities during natural and manmade disasters and what those roles would be. You are invited to participate in this project because you are experienced in disaster health management and have had previous experience in disasters.

PARTICIPATION

Participation will involve completing a 19 question anonymous survey with Likert scale questions (strongly agree – strongly disagree) that will take approximately 10 minutes of your time. The survey can be completed online via Key Survey.

Questions will include:

- How have you participated in previous disasters?
- Do you think assisting in disasters is within a pharmacist's current scope of practice?
- What do you think are the barriers to pharmacists assisting in disasters currently?

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EXPECTED BENEFITS

It is expected that this project will not directly benefit you. However, it may benefit disaster health management in the future should the potential be demonstrated for pharmacists having a larger role assisting response teams to provide the best healthcare possible.

RISKS

There are no risks beyond normal day-to-day living associated with your participation in this project.

PRIVACY & CONFIDENTIALITY

All comments and responses are anonymous and will be treated confidentially unless required by law. The names of individual persons are not required in any of the responses. Non-identifiable data obtained from the survey may be used for future comparative projects.

Any data collected as part of this project will be stored securely as per QUT's Management of Research Data Policy.

CONSENT TO PARTICIPATE

Submitting the completed survey is accepted as an indication of your consent to participate in this project.

QUESTIONS / FURTHER INFORMATION ABOUT THE PROJECT

Should you have any questions or queries Kaitlyn can be reached at the below email address.

Kaitlyn Porter
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Lisa Nissen
Principal Supervisor
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CONCERNS / COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT

QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT

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Research Ethics Advisory Team on +61 7 3138 5123 or email humanethics@gut.edu.au. The QUT Research Ethics Advisory Team is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.

Thank you for helping with this research project. Please keep this sheet for your information.

1. What State in Australia do you currently reside in?

2. What is your age bracket?

- Under 20
- 21–30 Years
- 31–40 Years
- 41–50 Years
- 51+ Years

3. What is your gender?

- Male
- Female
- X

4. Are you a registered health professional?

- Yes
- No

5. What is your job/role in relation to disasters?



6. How many years have you been in your profession?

- 0-5 Years
- 6-10 Years
- 11-15 Years
- 16-20 Years
- 21+ Years

7. How many disasters have you responded to while in your profession/job?

- 0-5
- 6-10
- 11-15
- 16-20
- 21+

8. Types of disasters you have responded to (please tick all that apply):

- Natural Disasters
- Manmade Disasters
- None

**9. How have you participated in previous disasters?
(please tick all that apply or tick none if you haven't responded to a disaster before)**

- Local Response
- Organised Response
- Government Response
- Military Response
- None

10. Do you believe pharmacists have a role in disaster health management aside from logistics and supply chain management?

- Yes
- No

11. Do you think assisting in disasters is within a pharmacist's current scope of practice?

- Yes
- No



12. Where in the continuum of PPRR (Prevention, Preparedness, Response and Recovery) do you believe pharmacists have a role? (select all that apply)

- Prevention
 Preparedness
 Response
 Recovery
 None

13. Research on previous disasters indicates that pharmacists have undertaken the roles described below. On the scale please mark your level of agreement with pharmacists undertaking these roles.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Coordinating logistics of pharmaceuticals and stockpile management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assisting in CPR and in 'first response'	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing first aid and wound care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Triaging the 'walking wounded' and screening in evacuation centres	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
'Prescribing' continuing chronic disease medications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
'Prescribing' vaccinations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Administering vaccinations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developing drug algorithms and guidelines to streamline patient diagnosis and treatment options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assisting decision-making on health issues in disaster management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being a communication advocate between different healthcare professions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educating the public on health risks in disasters and those most vulnerable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Prior to this survey had you heard of pharmacists fulfilling these roles in disasters?

- Yes
 No



15. What roles do you think pharmacists could undertake in the prevention/mitigation phase of a disaster/natural hazard event?

16. What roles do you think pharmacists could undertake in the preparing a community for a disaster/natural hazard event?

17. What roles do you think pharmacists could undertake during the Response phase of a disaster/natural hazard event?

18. What roles do you think pharmacists could undertake during the Recovery phase of a disaster/natural hazard event?

19. What do you think are the barriers to pharmacists assisting in disasters currently?

Completed: 



Appendix C - Semi-Structured Interview Questions

International participants questions

- 1) What country do you currently reside in?
- 2) What is your profession?
- 3) What is your experience in dealing with unpredictable events or disasters in your profession?
- 4) What roles were required of you during these events?
- 5) In those roles was your scope of practice stretched? In what way?
- 6) Is that a common occurrence for someone with your skillset when in that situation?
- 7) Did you feel you were fully equipped to handle the challenging circumstances of the event? What training or skills did you feel you were missing?
- 8) What is your/your organisation's general opinion on the role of pharmacists in disaster health management?
- 9) Do you think assisting in disasters is within a pharmacist's current scope of practice? Why or why not?
- 10) Where in the continuum of PPRR (prevention, preparedness, response and recovery) do you believe, pharmacists have a role?
- 11) Research on previous disasters indicates that pharmacists have undertaken the roles described below. On the scale please state your level of agreement with pharmacists undertaking each of these roles in a disaster (1=strongly disagree. 2= disagree, 3= neutral, 4= agree 5= strongly agree)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Logistics of pharmaceuticals and stockpile management	1	2	3	4	5
CPR and assisting in 'first response'	1	2	3	4	5
Providing first aid and wound care	1	2	3	4	5
Triaging and screening in evacuation centres	1	2	3	4	5
'Prescribing' continuing chronic disease medications	1	2	3	4	5
'Prescribing' vaccinations	1	2	3	4	5
Administering vaccinations	1	2	3	4	5
Developing drug algorithms and guidelines to streamline patient diagnosis and treatment options	1	2	3	4	5
Assist decision-making on health issues in disaster management	1	2	3	4	5
Communication advocate between different healthcare professions	1	2	3	4	5
Educate public on health risks in disasters and those most vulnerable	1	2	3	4	5

- 12) Can you explain why you thought pharmacists strongly should not do any of the above roles or why they should?
- 13) What roles do you think pharmacists could undertake in **preventing/mitigating** a disaster/natural hazard event within a community?
- 14) What roles do you think pharmacists could undertake in the **preparing** a community for a disaster/natural hazard event?
- 15) What roles do you think pharmacists could undertake during the **Response** phase of a disaster/natural hazard event?
- 16) What roles do you think pharmacists could undertake during the **Recovery** phase of a disaster/natural hazard event?
- 17) What do you see as the barriers to implementing these roles in non-emergency settings?
- 18) What do you see as the facilitators to implementing these roles in non-emergency settings?
- 19) How could these barriers be addressed?
- 20) What suggestions do you have for an alternative or better implementation of pharmacists into disaster health management?

Australian participants questions

- 1) What state do you currently reside in?
- 2) What is your profession?
- 3) What is your experience in dealing with unpredictable events or disasters in your profession?
- 4) What roles were required of you during these events?
- 5) In those roles was your scope of practice stretched? In what way?
- 6) Did you feel you were fully equipped to handle the challenging circumstances of the event? What training or skills did you feel you were missing?
- 7) What is your general opinion on the role of pharmacists in disaster health management?
- 8) Do you think assisting in disasters is within a pharmacist's current scope of practice? Why or why not?
- 9) Where in the continuum of PPRR (prevention, preparedness, response and recovery) do you believe, pharmacists have a role?
- 10) Research on previous disasters indicates that pharmacists have undertaken the roles described below. On the scale please state your level of agreement with pharmacists undertaking each of these roles in a disaster (1=strongly disagree. 2= disagree, 3= neutral, 4= agree 5= strongly agree)

Role	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Coordinating logistics of pharmaceuticals and stockpile management	1	2	3	4	5
Supporting in CPR and assisting in 'first response'	1	2	3	4	5
Providing first aid and wound care	1	2	3	4	5
Triaging the 'walking wounded' and screening in evacuation centres	1	2	3	4	5
'Prescribing' continuing chronic disease medications	1	2	3	4	5
'Prescribing' vaccinations	1	2	3	4	5
Administering vaccinations	1	2	3	4	5
Developing drug algorithms and guidelines to streamline patient diagnosis and treatment options	1	2	3	4	5
Assisting decision-making on health issues in disaster management	1	2	3	4	5
Being a communication advocate between different healthcare professions	1	2	3	4	5
Educating the public on health risks in disasters and those most vulnerable	1	2	3	4	5

- 11) Can you explain why you thought pharmacists should not do any of the above roles or why they should?
- 12) Prior to this interview, had you heard of pharmacists fulfilling these roles in disasters?
 Yes No
- 13) What roles do you think pharmacists could undertake in the **preparing** a community for a disaster/natural hazard event?
- 14) What roles do you think pharmacists could undertake during the **Response** phase of a disaster/natural hazard event?
- 15) Do you see there being a difference between logistics and clinical roles pharmacists could provide in a disaster?
- 16) What do you see as the barriers to implementing these roles in non-emergency settings?
- 17) How could these barriers be changed?
- 18) What do you see as the facilitators to implementing these roles in non-emergency settings?
- 19) Do you have any suggestions as to how pharmacists could be better utilised in disasters?

Appendix D – Codes Developed from Qualitative Interviews

Table 31: Categories and codes devised from manual coding of qualitative interviews with key stakeholders

Codes 1-9	Category: Each Disaster Presents Unique Challenges	Codes 87-93	Category: Context of Pharmacists' Current Role in Disasters
1	Changing patient demographic	87	Context of pharmacist employment
2	Disasters disrupt medication management	88	Could v Should for pharmacist roles
3	Disasters become public health crisis with collapsed services	89	Hospital emergency pharmacy disaster plan
4	Interrupted supply becomes a disaster	90	Pharmacists are not involved currently as much as they could be
5	Patients get displaced with no medical records or their medications	91	Overlapping or relaxed roles in a disaster
6	Quality control of pharmaceuticals is important for disaster-affected regions	92	Single pharmacist performing workload of multiple pharmacists and pharmacy staff in disaster
7	Strain on the disaster response system and health resources	93	Not detracting from the primary purpose of pharmacy
8	Recognition of displaced evacuees impacting on states not operating under a state of emergency	Codes 94-97	Category: Recent Movement in Pharmacist Roles in Disasters
9	Diets for managing chronic diseases often not catered for following a disaster	94	Increased uptake of pharmacist position in NGOs
Codes 10-15	Category: Military & DMAT Objectives in Disasters	95	Increasingly pharmacists participating in disaster training courses
10	Disaster management focus is on acute	96	Gradual changing opinion of breadth of pharmacists' capabilities & skillset
11	Medical teams do not cater for chronic diseases	97	Recognition by disaster and health professions of the need and value of pharmacists
12	Military is logistics	Codes 98-113	Category: Pharmacy Purpose in Disasters
13	Military medical purpose is acute ailments	98	Catch patients before they become acute'
14	Military medical team purpose is to treat their own	99	Anticipating surge of pharmaceuticals
Codes 15-23	Category: PPRR Cycle	100	Behavioural first aid support
15	Health Professionals roles evolve & change throughout the PPRR disaster cycle	101	Attending to hospital patients neglected for incoming casualties
16	Pharmacists have a role across the whole PPRR cycle	102	Educating and Counselling patients
17	Recovery can be return to normal business	103	Ensuring patients are prepared for a disaster and have plenty of medication supplies

18	Recovery is disruptive longer than the emergency period	104	Local collaboration for providing emergency supplies
19	Response depends on collapse of services	105	Maintaining pharmaceutical cache for deployment
20	Response does not happen to you, we all have an integral role to plan as responders	106	Medication Reconciliation for displaced people in a disaster to determine what their medical needs are (Triage)
21	Response is assisting local services without causing harm	107	Pharmacists' primary objective is ensuring continuity of care
22	Shift from response to the whole PRR disaster cycle	108	Pharmacists provide clinical resource
23	Without preparation the response is inappropriate	109	Preventing diseases becoming disasters
Codes 24-37	Category: Training & Skills Required in a Disaster	110	Responsibility over staff safety
24	Expertise needed in both logistics and clinical	111	Responsibility to be open, accessible and functioning as soon as possible
25	Generic disaster training all personnel complete	112	Protocol management for the streamlining of patients
26	Disaster management should be part of every health professions practice	113	Pharmacists maintaining team vaccinations levels for rapid deployment
27	Military background leads to better coping skills in disaster management personnel & better compliance with disaster coordinator's orders & host country's legislation	Codes 114-120	Category: Benefits of Further Inclusion of Pharmacists in Disasters
28	NGOs provide pharmacy training on their cache and dispensing systems	114	Indirect clinical advice through the supplying of drugs
29	Offshore requires a different skillset and knowledge base to home base disasters	115	Benefits of pharmacists being able to vaccinate to prevent diseases following a disaster
30	Public health skillset required in disaster	116	Free others up to do their job
31	Problem solving skills learnt in the field with the limited resources available	117	Patient safety is optimised with the inclusion of pharmacists
32	Pharmacists training pharmacists in the response	118	Reliance on pharmacists' expertise
33	Undergraduate pharmacy does not prepare pharmacists for disasters, it's learnt on the job	119	Value of pharmacists in logistics role
34	Essential Medicines List	120	Understanding the legalities of moving drugs
35	Missing disaster resources for pharmacists	Codes 121-129	Category: Training Opportunities to Facilitate Inclusion of Pharmacists
36	Pharmacy aspects not included in trainings and preparedness	121	Interprofessional education to stimulate inclusion
37	Specific disaster skills and training required	122	Mass gathering medicine as preparedness and training tool

Codes 38-45	Category: Where Do Pharmacists Fit?	123	Offer to provide pharmacy training materials to organisations delivering online disaster management training programs
38	Pharmacists bring a different perspective to disaster management	124	Pharmacists giving lectures in Disaster Medicine training programs on their role & skillset
39	Pharmacists fit in between the medical and logistics	125	Pharmacists skillset highlighted to other health professionals before disaster in trainings
40	Pharmacy sits in between the medical and public health welfare aspects of a disaster	126	Pharmacy student involvement and advocacy
41	Pharmacists role in risk mitigation and reducing risk of harm to patients	127	Role playing scenarios or drills to demonstrate value
42	Cannot wait until the disaster to include pharmacists or the roles will not change	128	Roll out training programs for pharmacists
43	Temporary extension of pharmacists' everyday practice in a disaster	129	Train pharmacy technicians to aid pharmacists in disaster roles
44	Utilising Pharmacists knowledge from a public health standpoint for disasters	Codes 130-142	Category: External Barriers
45	Pharmacists form part of the team involved in the decanting of wards and emergency departments for surge capacity	130	Job security when called to respond to a disaster
Codes 46-50	Category: Donations in Disasters	131	Lack of understanding of pharmacists' role by administrators
46	Belief disaster areas want donations	132	Language barrier in counselling and educating patients
47	Dealing with donations is time consuming for little benefit	133	Limited locality of AUSMAT team
48	Donations need to be asked by the host country to ensure appropriateness	134	Other health professions not aware pharmacists are capable of being involved
49	Most donations are not useful or wanted	135	Pharmacists need to be recognised by disaster and health professions as a legitimate team member
50	Pharmacists have the time and skills to check appropriateness of donated medicines	136	Pharmacists' viewed as support role not essential
Codes 51-59	Category: Business Continuity	137	Perception of pharmacy as a hands-off health profession
51	Business Continuity Plans essential for preparedness	138	Pharmacists are not routinely included in disaster management discussions but pulled in when required
52	Business continuity suggests pharmacy will be there during crisis	139	Stigma - pharmacists stick labels on boxes
53	GP practices and pharmacies are mostly private businesses, and some do not want to be involved	140	Reduced staff capacity due to personally being affected by disaster

54	Pharmacies are fundamentally businesses and need to make money	141	Role clarification of pharmacists in disasters could be a barrier
55	Pharmacies should be reimbursed for their contributions	142	Turf encroachment and egos of other health professions
56	Shopping Centre restrictions on pharmacy in disaster	Codes 143 - 148	Category: Intrinsic Barriers
57	Wholesaler CSO agreement	143	Intimidation factor
58	Providing professional services free of charge in a disaster	144	Pharmacists are their own barriers - not seeing they can have a role
59	Mobile pharmacies to continue pharmacy service	145	Pharmacists need confidence to act in disasters
Codes 60-69	Category: Importance of Pharmacy in the Community	146	Pharmacists perception of themselves
60	Community pharmacies are first fully operational health care entity following a disaster	147	Potential lack of interest in participating in extra roles & getting involved in disasters
61	Community pharmacies can provide shelter, hydration, supplies, medications & attend to basic medical needs	148	Role prioritisation based on limited number of pharmacists
62	Community pharmacies play an important role in rebuilding affected communities to keep families intact after disasters	Codes 149-159	Category: External Facilitators
63	Community pharmacist as first responder	149	Extending hospital vaccinating protocols to include pharmacists
64	Expectation pharmacy will assist'	150	Facilitating conversations with regulators around the issues facing pharmacies during disasters
65	Pharmacy as a community communication hub	151	Insurance reform to better prepare patients for disasters
66	Pharmacy as a community landmark	152	Increased emergency supply quantity to aid patients displaced
67	Pharmacy is first port of call for assistance	153	Interested pharmacists need to actively seek out opportunities to assist in mass gathering events to raise awareness of beneficial skillset in a disaster setting whilst developing training and skills
68	Public's trust in pharmacists as the medication experts	154	Modelling and anticipating health need in disasters
69	Pharmacy easily accessible	155	Proactively align with NGOs and organisers working with pharmacists and get involved
Codes 70-77	Category: EthicoLegal and Moral	156	Structure and infrastructure of disaster management can facilitate pharmacy involvement
70	3-day emergency supply hinderance to response	157	Surveillance of over the counter sales to identify disease outbreaks
71	Ethical consideration for providing free medications	158	Work under remote orders like paramedics do to provide services and medications in a disaster

72	Financially not feasible to assist with the discrepancies in the payrates for pharmacist responders	159	Form a collective between health professions for preparing and responding to disasters
73	Flexibility in legislation is required	Codes 160 - 167	Category: Intrinsic Facilitators
74	Legal issues concerning dispensing medications in absence of pharmacist	160	After action reports to document what worked well and what did not
75	Legislative barrier to expanded role	161	Develop pharmacy disaster interest groups
76	Lack of remuneration for risk associated with assisting in a disaster	162	Knowing the local professionals and community
77	Pharmacist putting themselves at risk to assist	163	Public health messaging as prevention measure to prepare patients for a disaster
Codes 78-82	Category: Need for Government Involvement	164	Relocation or sharing of dispensing history
78	Government health contribution	165	Role in identifying vulnerable community groups
79	Pharmacy needs to be active in the government to advocate role development and legislative interpretation	166	Written instruction sheets to provide counselling to deal with surge capacity in disaster
80	Pharmacy professional organisations can set the expectation of pharmacists' responsibilities to assist in a disaster	167	Pharmacists need to make their presence in disasters known
81	Prepared community concept		
82	Cannot prepare without funding		
Codes 83-86	Category: Information Dissemination		
83	Better coordination with disaster management before and after a disaster		
84	Communication between disaster organisations need improvement		
85	Dissemination of information from disaster command		
86	Communication link to public of services in disaster missing (including health, fuel, etc.)		

Appendix E - Delphi Surveys

Round 1 survey

03/08/2018

Pharmacists Roles in Disasters for Consensus by Expert Panel



Pharmacists Roles in Disasters for Consensus by Expert Panel

This survey is taking a multi-hazard approach (e.g. infections, pandemics, weather related natural disasters, bio-vector born, bio-terrorism, etc.) and encompasses pharmacists of varying backgrounds (e.g. community, hospital, military, volunteer, relief, etc.)

Disaster Definition - "A serious disruption to community life which threatens or causes death or injury in that community and/or damage to property which is beyond the day-to-day capacity of the prescribed statutory authorities and which requires special mobilisation and organisation of resources other than those normally available to those authorities."
(Disaster Health Handbook 1, page 3)

For Round ONE- please score each role listed below, as to whether pharmacists are **capable of undertaking these roles in a disaster within a disaster health team setting regardless of your current role or context.**



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Prevention/Mitigation - reduce the health risks posed by hazards					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Administer vaccinations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate the public on reducing the spread of communicable diseases/infections	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tailored 'point of care' messaging to chronic disease patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ensuring patients are aware of their increased risk of adverse health outcomes in a disaster	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Optimising medication supplies for chronic disease management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



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Preparedness - ensure timely and effective response systems are in place

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Developing drug algorithms and treatment guidelines to determine drug choice based on co-morbidities in the event of bio terrorism (e.g. Anthrax, Plague, Tularemia - requiring antibiotics/prophylaxis measures)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop educational tools for health professionals on preparedness, signs and symptoms and drug treatments for CBRN (chemical, biological, radiological and nuclear) weapons	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being a part of local/state/national disaster preparedness health meetings - providing medication management advice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being a part of the local community disaster management teams to involve pharmacy in coordinated response	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowing how to access national stockpiles if necessary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop Business Continuity Plans that include disaster management to ensure sustainability of service	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have systems in place to secure cold chain lines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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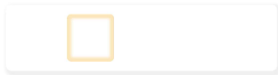
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Maintain systems and processes for the reconciliation and security of Controlled Drugs (e.g. morphine, oxycodone, etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ensuring uninterrupted supply of essential medications in a disaster	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developing a list of at risk patients in their community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



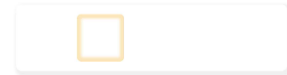
Response - action in disaster/emergency					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Coordinating logistics of medications and medical supplies for patients with chronic diseases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rationing limited supplies of medications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assisting with the release and allocation of national stockpiles if required in pandemic or emergency	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Triage of low-acuity patients. (e.g. medication reconciliation, patient medical history, referring to physician for further assessment or to pharmacist for refill of lost medications)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Institute cardiopulmonary resuscitation (CPR)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide wound care and first aid for minor ailments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing one off medication emergency supply refills for up to 30 days during the declared disaster	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Continue provision of chronic disease medications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<https://survey.qut.edu.au/Member/ObjectDesign/DesignPreviewObject.jsp?VMODE=1&authStart=1&surveyId=190778&nocache=1533272819086#> 5/9

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Dispense medications and other necessary medication-related items to affected members of the community (prescription, over-the-counter medications, inhalers, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dispense general health pharmacy items to affected members of the community (toiletries, nappies, bandages, incontinence pads, water, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Making therapeutic substitutions for drugs available on limited formularies without prior authorisation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Making dose adjustments to existing therapeutic regimens where clinically necessary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Counselling patients on how to use and take medications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prescribing and administering vaccinations (e.g. tetanus, antidote/prophylaxis to bio-terrorism agent following state public health disaster protocols)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attend clinical ward rounds to provide pharmacist expertise on medical patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Prescribe medication needs of low-acuity patients in hospital	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medication identification and safety assessment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitoring the chronic disease(s) of at-risk individuals to minimise exacerbation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advocate pharmacy's role during an event	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maintain media liaison on medication issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decide on the appropriateness of donated medications and other supplies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Recovery - returning to 'normal' business and beyond					
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Provide Mental Health support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Check on the health needs of the local community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Re-establish normal stock levels, destroy contaminated stock appropriately	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Restock emergency/ disaster kits for next disaster event	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify and prioritise vulnerable patients in local community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Restore order to patient records and drug records, if manually written due to power outages	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Document what worked and what didn't in the disaster response and change disaster plans accordingly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in post-disaster research/reports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inform local disaster management reports on pharmacy response improvements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Round 2 survey

Key words in each question were highlighted in this survey round, however, this does not show up on the screenshot version below but only on the online survey the participants accessed.

Round 2 for consensus of pharmacists roles in disasters

<https://survey.qut.edu.au/Member/ObjectDesign/DesignPreviewObject...>

Round 2 for consensus of pharmacists roles in disasters

Thank you for completing Round ONE of this modified Delphi study. We value the time and input you are providing to this research and research area.

For Round TWO, the feedback and results from the previous round have been collated and are provided back to you for further comment and consensus.

Any role which received a score from the panel in Round one of >80% has satisfied the conditions for consensus and is provided to you for additional comments.

Roles which received a score between 70-79% will be reassessed with a 4point Likert scale.

Roles which did not receive 70% score from the panel is provided to you for additional comments and the option to be removed.

Any questions on Round TWO, please email me and I am happy to assist. Thank you again for your support in this research.

Please select your gender			
<input type="radio"/> Female			
<input type="radio"/> Male			
<input type="radio"/> Prefer not to say			

Please provide your age	
<input type="text"/>	

Please select which perspective you are answering this survey from			
Disaster and Emergency Services	Government and/or Policy	Pharmacy	<input type="text"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Role Definition Section

Prevention/Mitigation - reduce the health risks posed by hazards

- Roles which recieved a score of 80% or higher has achieved a suitable level of consensus and you will be asked if the role should be retained.
- 70-79% will be reassessed with a 4 point Likert scale,
- <69% will be queried for removal

The group either agreed or strongly agreed pharmacists have a role in administering vaccinations to prevent diseases in disasters. Should this role be retained?		
Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group either agreed or strongly agreed pharmacists have a role in educating the public to prevent the spread of communicable diseases/infections in disasters. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group either agreed or strongly agreed pharmacists have a role in tailored 'point of care' messaging to chronic disease patients to prevent exacerbations in disasters. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group either agreed or strongly agreed pharmacists have a role in ensuring patients are aware of their increased risk of adverse health outcomes in a disaster. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group all strongly agreed pharmacists have a role in optimising medication supplies for chronic disease management to prevent exacerbations in a disaster. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

Preparedness - ensure timely and effective response systems are in place

- Roles which recieved a score of 80% or higher has achieved a suitable level of consensus and you will be asked if the role should be retained.
- 70-79% will be reassessed with a 4 point Likert scale,
- <69% will be queried for removal

Pharmacists role in developing educational tools for health professionals on preparedness, signs and symptoms and drug treatments for CBRN (chemical, biological, radiological and nuclear) weapons (e.g. antidotes).

Please rate your level of agreement for pharmacists undertaking this role?

Strongly Agree	Agree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Pharmacists should know how to access national stockpiles if necessary in the event of a disaster

Please rate your level of agreement for pharmacists undertaking this role?

Strongly Agree	Agree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Pharmacists role in developing drug algorithms and treatment guidelines to determine drug choice based on co-morbidities (ongoing medicines, allergies, medical conditions, pregnancy status, etc.) in the event of bio terrorism (e.g. Anthrax, Plague, Tularemia - requiring antibiotics/prophylaxis measures)

Please rate your level of agreement for pharmacists undertaking this role?

Strongly Agree	Agree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Pharmacists should have systems in place to secure cold chain lines in the event of power loss in a disaster.

Please rate your level of agreement for pharmacists undertaking this role?

Strongly Agree	Agree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The group either agreed or strongly agreed pharmacists should be a part of local/state /national disaster preparedness health meetings - providing medication management advice. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group either agreed or strongly agreed pharmacists should be a part of the local community disaster management teams to involve pharmacy in coordinated response. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>



The group either agreed or strongly agreed pharmacists have a role in developing Business Continuity Plans that include disaster management to ensure sustainability of service. Should be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group either agreed or strongly agreed pharmacists should maintain systems and processes for the reconciliation and security of Controlled Drugs (e.g. morphine, oxycodone, etc). Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group either agreed or strongly agreed pharmacists should ensure uninterrupted supply of essential medications in a disaster. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group either agreed or strongly agreed pharmacists have a role in developing a list of at risk patients in their community. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

Response - action in disaster/emergency

- Roles which recieved a score of 80% or higher has achieved a suitable level of consensus and you will be asked if the role should be retained.
- 70-79% will be reassessed with a 4 point Likert scale,
- <69% will be queried for removal



The group did not come to consensus on pharmacists role in instituting cardiopulmonary resuscitation (CPR). Should it be removed?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

Pharmacists role in rationing limited supplies of medications to ensure the majority of disaster victims receive medicines in a timely and efficient manner. Please rate your level of agreement for pharmacists undertaking this role?

Strongly Agree	Agree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Pharmacists role in providing wound care and first aid for minor ailments in the event of a disaster. Please rate your level of agreement for pharmacists undertaking this role?

Strongly Agree	Agree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Pharmacists role in making therapeutic substitutions for drugs available on limited formularies available in disasters without prior authorisation (freeing up doctors and nurses). Please rate your level of agreement for pharmacists undertaking this role?

Strongly Agree	Agree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Pharmacists role in making dose adjustments to existing therapeutic regimens where clinically necessary due to changes in patient parameters and environments (diet, BP, BGL's, etc.). Please rate your level of agreement for pharmacists undertaking this role?

Strongly Agree	Agree	Disagree	Strongly Disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Pharmacists role in monitoring the chronic disease(s) of at-risk individuals to minimise exacerbation in the event of a disaster (e.g. changed environment, diets, medications). Please rate your level of agreement for pharmacists undertaking this role?

Strongly Agree Agree Disagree Strongly Disagree

Pharmacists role in maintaining media liaison on medication issues. Please rate your level of agreement for pharmacists undertaking this role?

Strongly Agree Agree Disagree Strongly Disagree

The group either agreed or strongly agreed pharmacists have a role in coordinating logistics of medications and medical supplies for patients with chronic diseases. Should it be retained?

Yes No Comments

The group either agreed or strongly agreed pharmacists have a role in assisting with the release and allocation of national stockpiles if required in pandemic or emergency. Should it be retained?

Yes No Comments

The group either agreed or strongly agreed pharmacists have a role in triaging low-acuity patients (e.g. medication reconciliation, patient medical history, referring to physician for further assessment or to pharmacist for refill of lost medications). Should it be retained?

Yes No Comments



The group either agreed or strongly agreed pharmacists have a role in providing one off medication emergency supply refills for up to 30 days during the declared disaster. Should it be retained?

Yes No Comments

The group either agreed or strongly agreed pharmacists have a role in continuing provision of chronic disease medications. Should it be retained?

Yes No Comments

The group either agreed or strongly agreed pharmacists have a role in dispensing medications and other necessary medication-related items to affected members of the community (prescription, over-the-counter medications, inhalers, etc.) in the event of a disaster. Should it be retained?

Yes No Comments

The group either agreed or strongly agreed pharmacists have a role in dispensing general health pharmacy items to affected members of the community (toiletries, nappies, bandages, incontinence pads, water, etc.) in the event of a disaster. Should it be retained?

Yes No Comments

The group either agreed or strongly agreed pharmacists have a role in counselling patients on how to use and take medications in the event of a disaster. Should it be retained?

Yes No Comments



The group either agreed or strongly agreed pharmacists have a role in prescribing and administering vaccinations (e.g. tetanus, antidote/prophylaxis to bio-terrorism agent following state public health disaster protocols). Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input style="width: 200px;" type="text"/>

The group either agreed or strongly agreed pharmacists have a role in attending clinical ward rounds to provide pharmacist expertise on medical patients in a disaster. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input style="width: 200px;" type="text"/>

The group either agreed or strongly agreed pharmacists have a role in prescribing medication needs of low-acuity patients in hospital in a disaster (freeing up doctors for disaster emergencies). Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input style="width: 200px;" type="text"/>

The group either agreed or strongly agreed pharmacists have a role in medication identification and safety assessment. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input style="width: 200px;" type="text"/>

The group either agreed or strongly agreed pharmacists should advocate pharmacy's role in disasters. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input style="width: 200px;" type="text"/>



The group either agreed or strongly agreed pharmacists role in deciding on the appropriateness of donated medications and other supplies. Should it be retained?

Yes No Comments

**New addition:
Engaging the pharmacy student workforce to backfill duties (dispensing, inventory, etc.), freeing up pharmacists to perform more clinical roles in a disaster.**

Please rate your level of agreement for pharmacists undertaking this role?

Strongly Agree Agree Disagree Strongly Disagree

Recovery - returning to 'normal' business and beyond

- Roles which recieved a score of 80% or higher has achieved a suitable level of consensus and you will be asked if the role should be retained.
 - 70-79% will be reassessed with a 4 point Likert scale,
 - <69% will be queried for removal

The group did not come to consensus on pharmacists' role in providing behavioural and mental health support following a disaster to their patients, customers and staff. Should it be removed?

Yes No Comments

The group either agreed or strongly agreed on pharmacists have a role in checking on the health needs of the local community. Should it be retained?

Yes No Comments

The group either agreed or strongly agreed on pharmacists have a role in re-establishing normal stock levels, destroying contaminated stock appropriately. Should it be retained?

Yes No Comments

The group either agreed or strongly agreed on pharmacists have a role in restocking emergency/disaster kits for the potential next disaster event. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group either agreed or strongly agreed on pharmacists have a role in identifying and prioritising vulnerable patients in local community. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group either agreed or strongly agreed on pharmacists have a role in restoring order to patient records and drug records, if manually written due to power outages. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group either agreed or strongly agreed on pharmacists have a role in documenting what worked and what didn't in the disaster response and change disaster plans accordingly. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>

The group either agreed or strongly agreed on pharmacists have a role in participating in post-disaster research/reports. Should it be retained?

Yes	No	Comments
<input type="radio"/>	<input type="radio"/>	<input type="text"/>



The group either agreed or strongly agreed on pharmacists have a role in informing local disaster management reports on pharmacy response improvements following a disaster event. Should it be retained?

Yes No Comments _____

Role Prioritisation Section

From Round 1: the group prioritised the below 5 top roles in this order for the prevention phase

- 1) Optimising medication supplies for chronic disease management**
- 2) Administer vaccinations**
- 3) Educate the public on reducing the spread of communicable diseases/infections**
- 4) Ensuring patients are aware of their increased risk of adverse health outcomes in a disaster**
- 5) Tailored 'point of care' messaging to chronic disease patients**

Please 'drag-n-drop' the roles into the order of prioritisation you believe pharmacists should focus on during the prevention phase of a disaster.

Top 5 Roles in Prevention Phase Round 2 Top 5 Rated Roles

<div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Optimising medication supplies for chronic disease management</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Administer vaccinations</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Educate the public on reducing the spread of communicable diseases/infections</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Ensuring patients are aware of their increased risk of adverse health outcomes in a disaster</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Tailored 'point of care' messaging to chronic disease patients</div>	
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From Round 1: the group prioritised the below 5 top roles in this order for the preparedness phase

- 1) Ensuring uninterrupted supply of essential medications in a disaster**
- 2) Being a part of the local community disaster management teams to involve pharmacy in coordinated response**
- 3) Knowing how to access national stockpiles if necessary**
- 4) Have systems in place to secure cold chain lines**
- 5) Being a part of local/state/national disaster preparedness health meetings - providing medication management advice**

Please 'drag-n-drop' the roles into the order of prioritisation you believe pharmacists should focus on during the preparedness phase of a disaster.

Top 5 Roles in Preparedness Phase

Round 2 Top 5 Rated Roles

Ensuring uninterrupted supply of essential medications in a disaster
Being a part of the local community disaster management teams to involve pharmacy in coordinated response
Knowing how to access national stockpiles if necessary
Have systems in place to secure cold chain lines
Being a part of local/state/national disaster preparedness health meetings - providing medication management advice

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From Round 1: the group prioritised the below 5 top roles in this order for the response phase

- 1) Dispense medications and other necessary medication-related items to affected members of the community (prescription, over-the-counter medications, inhalers, etc.)**
- 2) Coordinating logistics of medications and medical supplies for patients with chronic diseases**
- 3) Counselling patients on how to use and take medications**
- 4) Providing one off medication emergency supply refills for up to 30 days during the declared disaster**
- 5) Continue provision of chronic disease medications**

Please 'drag-n-drop' the roles into the order of prioritisation you believe pharmacists should focus on during the response phase of a disaster.

Top 5 Roles in Response Phase

Round 2 Top 5 Rated Roles

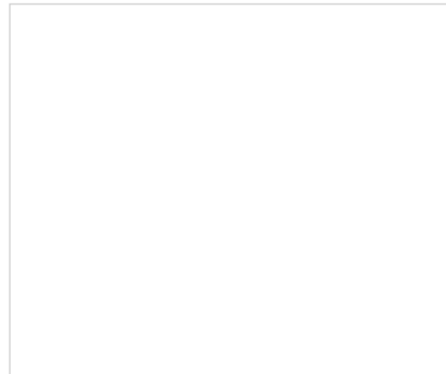
Dispense medications and other necessary medication-related items to affected members of the community (prescription, over-the-counter medications, inhalers, etc.)

Coordinating logistics of medications and medical supplies for patients with chronic diseases

Counselling patients on how to use and take medications

Providing one off medication emergency supply refills for up to 30 days during the declared disaster

Continue provision of chronic disease medications



From Round 1: the group prioritised the below 5 top roles in this order for the recovery phase

- 1) Re-establish normal stock levels, destroy contaminated stock appropriately**
- 2) Restock emergency/ disaster kits for next disaster event**
- 3) Identify and prioritise vulnerable patients in local community**
- 4) Restore order to patient records and drug records, if manually written due to power outages**
- 5) Check on the health needs of the local community**

Please 'drag-n-drop' the roles into the order of prioritisation you believe pharmacists should focus on during the recovery phase of a disaster.

Top 5 Roles in Recovery Phase

Round 2 Top 5 Rated Roles

Re-establish normal stock levels, destroy contaminated stock appropriately	
Restock emergency/ disaster kits for next disaster event	
Identify and prioritise vulnerable patients in local community	
Restore order to patient records and drug records, if manually written due to power outages	
Check on the health needs of the local community	

Do you have an general comments you would like to make related to this topic and the defining and prioritising of pharmacist's roles in disasters?



Round 3 survey

03/08/2018

Final survey and results on pharmacist roles in disasters

Final survey and results on pharmacist roles in disasters

Thank you to everyone on the panel for your contributions to this Delphi study on pharmacist roles in disasters. This is the final survey and presents the results for final comments.

Below is the demographic information collected from the panel from the previous Delphi rounds to ensure a multi perspective viewpoint on the roles of pharmacists in disasters.

Gender	Response %	Response Total
Female	46.67%	7
Male	53.33%	8
Total Participants in Round 2		15

Perspective	Response %	Response Total
Disaster & Emergency Services	14.29%	3
Government and/or Policy	35.71%	6
Pharmacy	57.14%	9
Other (Disaster mgmt & Consultancy)	14.29%	2

*Response total to perspective doesn't equal the number of panel members as there are some with multiple perspectives

Age was provided by 14 panel members, median age is 50.5 years (IQR 16.25 years) for the panel.

The results of each role collected from the previous two Delphi rounds will be presented to you for additional comments. A few roles we would like to ask for clarification and have presented the results for feedback and asking again if the role should be kept in or not.

The roles will continue to be split into the four PPRR disaster stages. Based on the number of panel members available for the round 2 survey, consensus was accepted at 80%.

Prevention Phase

1. Pharmacists role in administering vaccinations to prevent diseases in disasters.

This role reached consensus and received the following comments

"Not sure how to 'read' the word administering here. In terms of managing ok but in terms of dispensing/applying I would say no"

"This is a clearly a critically role and is shared with other members of the healthcare team."

"Yes, this is a role that pharmacists are already fulfilling in non-disaster times. It is important though to ensure adequate training and clear procedures for commissioning."

"This depends on the pharmacists other duties and the level of support they receive. When they are the only pharmacist, they may be too busy doing other roles which can't be done by other professions."

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	93.33%	14
No	6.67%	1

Do you have any additional comments you would like to make?

2. Pharmacists role in educating the public to prevent the spread of communicable diseases/infections in disasters.

This role reached 100% consensus and received the following comment

"Depending on the time on deployment and the other competing demands"

"Pharmacists often spend much face-to-face time with their patients. This is a perfect opportunity to provide this type of information"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?



3. Pharmacists role in tailored 'point of care' messaging to chronic disease patients to prevent exacerbations in disasters.

This role reached 100% consensus and received the below comments

"Pharmacy professionals are well-placed to undertake such role."

"As a part of medication counselling"

"Pharmacists often spend much face-to-face time with their patients. This is a perfect opportunity to provide this type of information."

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

4. Pharmacists role in ensuring patients are aware of their increased risk of adverse health outcomes in a disaster.

This role reached 100% consensus and received the following comments

"Pharmacists often spend much face-to-face time with their patients. This is a perfect opportunity to provide this type of information."

"As a part of medication counselling"

"Important role to increase resilience of the health system in disasters and emergencies"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?



5. Pharmacists role in optimising medication supplies for chronic disease management to prevent exacerbations in a disaster.

This role reached 100% consensus and received the below comment

"no question about this one."

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

Preparedness Phase

6. Pharmacists role in developing drug algorithms and treatment guidelines to determine drug choice based on co-morbidities (ongoing medicines, allergies, medical conditions, pregnancy status, etc.) in the event of bio terrorism (e.g. Anthrax, Plague, Tularemia - requiring antibiotics/prophylaxis measures).

This role has reached consensus

The results to keep the role are:

	Response %	Response Total
Strongly Agree	40%	6
Agree	40%	6
Disagree	6.67%	1
Strongly Disagree	13.33%	2

Do you have any additional comments you would like to make?

7. Pharmacists should have systems in place to secure cold chain lines in the event of power loss in a disaster.

This role reached consensus and received the following comments

"Systems must be in place and absolute limits of each medication in the cache must be documented"

"Not a pharmacist role"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	93.33%	14
No	6.67%	1

Do you have any additional comments you would like to make?

8. Pharmacists should be a part of local/state/national disaster preparedness health meetings - providing medication management advice.

This role reached 100% consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

9. Pharmacists should be a part of the local community disaster management teams to involve pharmacy in coordinated response.

This role reached 100% consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

10. Pharmacists have a role in developing Business Continuity Plans that include disaster management to ensure sustainability of service.

This role reached 100% consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

11. Pharmacists should maintain systems and processes for the reconciliation and security of Controlled Drugs (e.g. morphine, oxycodone, etc).

This role reached 100% consensus and the following comments

"Pharmacists might supply expertise in the subject"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

12. Pharmacists should ensure uninterrupted supply of essential medications in a disaster.

This role reached 100% consensus and received the following comments

"To attempt to ensure it, any way"

"where possible"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

13. Pharmacists have a role in developing a list of at risk patients in their community.

This role reached consensus and the below comments

"only highly knowledgeable ones"

"Privacy is an issue. Not sure about having a list of individuals prior to an emergency"

"They could add to this list, but I don't think that this would be done by the pharmacist in isolation."

"In collaboration with health providers"

"but must comply with agreed data protection and privacy laws and practices"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	86.67%	13
No	13.33%	2

Do you have any additional comments you would like to make?

14. Pharmacists should know how to access national stockpiles if necessary in the event of a disaster.

This role reached consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Strongly Agree	73.33%	11
Agree	20%	3
Strongly Disagree	6.67%	1

Do you have any additional comments you would like to make?

15. Pharmacists role in developing educational tools for health professionals on preparedness, signs and symptoms and drug treatments for CBRN (chemical, biological, radiological and nuclear) weapons (e.g. antidotes).

This role has not reached consensus

"In many disaster deployments, pharmacists have frequently been turned to for expertise in CBRN situations. It is imperative that disaster pharmacists are knowledgeable and know how to access antidotes in all these areas."

"possible drug interactions, administration issues"

"But this is a role for specialist pharmacist, not general pharm"

"Pharmacist should be included in group responsible for these tools - but not sole responsibility for the development of them"

"Specifically around the use of medicines"

"Whilst pharmacists COULD do this with appropriate training I think it is a lesser priority and would be considered EXTENDED scope (additional to the recognised scope of practice for the profession) for pharmacists rather than expanded scope (working at top of licence)"

The results to keep the role are:

	Response %	Response Total
Yes	53.3%	8
No	46.7%	7

For clarification, please indicate whether this role should be kept 'yes' or removed 'no' and provide any additional comments you would like to make?

Yes



No



Comments

Response Phase

16. Pharmacists role in assisting with the release and allocation of national stockpiles if required in pandemic or emergency.

This role reached consensus and received the below comments

"Yes in contact that this aspect is one for specialist pharmacists"

"The national commissioning body has a role in this but pharmacists can play an advisory role"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	86.67	13
No	13.33%	2

Do you have any additional comments you would like to make?

17. Pharmacists role in monitoring the chronic disease(s) of at-risk individuals to minimise exacerbation in the event of a disaster (e.g. changed environment, diets, medications).

This role reached consensus to remain and received the following comments

"This seems to be part of the "list of at risk patients" actions"

"not certain here - difficult - depends on local circumstances and policies and practices"

"Pharmacists can be useful in this - especially with point of care diagnostic tools now available"

"Pharmacy professionals are well placed to advise on medications and side effects"

"Pharmacists' role in chronic disease management is standard practice regardless of whether this is focused on minimising exacerbations in the event of a disaster or not."

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	80%	12
No	20%	3

Do you have any additional comments you would like to make?

18. Pharmacists role in rationing limited supplies of medications to ensure the majority of disaster victims receive medicines in a timely and efficient manner.

This role has reached consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Strongly Agree	53.33%	8
Agree	26.67%	4
Disagree	20%	3

Do you have any additional comments you would like to make?

19. Pharmacists role in providing wound care and first aid for minor ailments in the event of a disaster.

This role has reached consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Strongly Agree	26.67%	4
Agree	53.33%	8
Disagree	20%	3

Do you have any additional comments you would like to make?

20. Pharmacists role in making therapeutic substitutions for drugs available on limited formularies available in disasters without prior authorisation (freeing up doctors and nurses).

This role has reached consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Strongly Agree	46.67%	7
Agree	40%	6
Disagree	6.67%	1
Strongly Disagree	6.67%	1

Do you have any additional comments you would like to make?

21. Pharmacists have a role in maintaining media liaison on medication issues.

This role reached consensus and received the following comments

"But don't need 100 different experts with differing opinions"

It was commented that pharmacists can be the media liaison providing consistent messaging with the rest of the health profession workforce.

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	86.67%	13
No	13.33%	2

Do you have any additional comments you would like to make?

22. Pharmacists role in coordinating logistics of medications and medical supplies for patients with chronic diseases.

This role reached consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	93.33%	14
No	6.67%	1

Do you have any additional comments you would like to make?

23. Pharmacists role in triaging low-acuity patients (e.g. medication reconciliation, patient medical history, referring to physician for further assessment or to pharmacist for refill of lost medications).

This role reached consensus and received the following comments

"depending on local policies and practices"

"No sure pharmacists have those skills unless training has been provided"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	86.67%	13
No	13.33%	2

Do you have any additional comments you would like to make?

24. Pharmacists role in providing one off medication emergency supply refills for up to 30 days during the declared disaster.

This role reached 100% consensus and received the following comment

"Subject to conditions"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

25. Pharmacists role in continuing provision of chronic disease medications.

This role reached consensus and received the following comment

"Subject to conditions"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	93.33%	14
No	6.67%	1

Do you have any additional comments you would like to make?

26. Pharmacists role in dispensing general health pharmacy items to affected members of the community (toiletries, nappies, bandages, incontinence pads, water, etc.) in the event of a disaster.

This role reached consensus and received the following comments

"anyone can do it"

"particularly payment for this is available for pharmacists via whatever source might exist in local arrangements"

"Unless this is not available elsewhere."

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	86.67%	13
No	13.33%	2

Do you have any additional comments you would like to make?

27. Pharmacists role in dispensing medications and other necessary medication-related items to affected members of the community (prescription, over-the-counter medications, inhalers, etc.) in the event of a disaster.

This role reached 100% consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

28. Pharmacists role in counseling patients on how to use and take medications in the event of a disaster.

This role reached 100% consensus and received the following comments

"Need for some specific CPD preparation"

"There is some evidence in literature on pharmacists undertaking such role"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

29. Pharmacists role in prescribing and administering vaccinations (e.g. tetanus, antidote/prophylaxis to bio-terrorism agent following state public health disaster protocols).

This role has reached consensus and received the following comments

"Following protocols"

"a primary role on most disaster deployment"

"But only if there is enough pharmacists employed."

"Need to be careful not to overburden pharmacy professionals with too many roles in disasters and emergencies and to be realistic in what can be done within A health system"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	80%	12
No	20%	3

Do you have any additional comments you would like to make?

30. Pharmacists role in attending clinical ward rounds to provide pharmacist expertise on medical patients in a disaster.

This role reached consensus and received the following comments

"if trained to do so"

"This fits with the role of hospital pharmacists"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	93.33%	14
No	6.67%	1

Do you have any additional comments you would like to make?

31. Pharmacists role in medication identification and safety assessment.

This role reached consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	93.33%	14
No	6.67%	1

Do you have any additional comments you would like to make?

32. Pharmacists should advocate pharmacy's role in disasters.

This role reached 100% consensus and received the following comments

"Including to pharmacists"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

33. Pharmacists role in deciding on the appropriateness of donated medications and other supplies.

This role reached consensus and received the following comments

"Believe this is a WHO recommendation. Needs to comply with WHO and National policies"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	93.33%	14
No	6.67%	1

Do you have any additional comments you would like to make?

34. Pharmacists role in prescribing medication needs of low-acuity patients in hospital in a disaster (freeing up doctors for disaster emergencies).

This role reached consensus and received the following comments

"clear guidelines and procedures are needed"

"May need this in non-disaster. Introducing NEW procedures can add new problems and not achieve hoped for savings"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	86.67%	13
No	13.33%	2

Do you have any additional comments you would like to make?

35. Pharmacists should engaging the pharmacy student workforce to backfill duties (dispensing, inventory, etc.), freeing up pharmacists to perform more clinical roles in a disaster.

This role reached consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Strongly Agree	33.33%	5
Agree	46.67%	7
Disagree	20%	3

Do you have any additional comments you would like to make?

36. Pharmacists role in making dose adjustments to existing therapeutic regimens where clinically necessary due to changes in patient parameters and environments (diet, BP, BGL's, etc.).

This role has not reached consensus

The results to keep the role are from the previous Delphi panel results are:

	Response %	Response Total
Strongly Agree	26.67%	4
Agree	40%	6
Disagree	26.67%	4
Strongly Disagree	6.67%	1

For clarification, please indicate whether this role should be kept 'yes' or removed 'no' and provide any additional comments you would like to make?

Yes
 No

37. Pharmacists have a role in instituting cardiopulmonary resuscitation (CPR).

This role has not reached consensus and received the following comments

- "Pharmacists should be qualified first aiders and be competent in CPR"
- "but pharmacist should be able to perform CPR if no other qualified personal is available"
- "Would hope most/all have First aid training and already should be doing this."
- "everybody should be able"
- "Sad. Everyone should be trained in CPR"
- "I think every individual should be trained in this and then there is no difference if one is a pharmacist or not. the education of being a pharmacist doesn't make a difference here"
- "Again, this is a role that the pharmacist could do if needed, but probably should sit with another health care professional."

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	73.33%	11
No	26.67%	4

For clarification, please indicate whether this role should be kept 'yes' or removed 'no' and provide any additional comments you would like to make?

Yes
 No

Recovery Phase



38. Pharmacists role in checking on the health needs of the local community.

This role recieved 100% consensus however based on the comments recieved for this role there may be some confusion on what the role may entail.

"Pharmacists are the third largest healthcare workforce and are well placed to assist public health professionals in identification of population health needs"

"Whatever this means"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

39. Pharmacists role in re-establishing normal stock levels, destroying contaminated stock appropriately.

Although consensus was reached, the comment was made

"not their role - use techs"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	86.67%	13
No	13.33%	2

Do you have any additional comments you would like to make?

40. Pharmacists role in role in restocking emergency/disaster kits for the potential next disaster event.

Although consensus was reached, the comment was made

"not their role - use techs"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	86.67%	13
No	13.33%	2

Do you have any additional comments you would like to make?

41. Pharmacists role in role in identifying and prioritising vulnerable patients in local community.

This role received 100% consensus with the following comments made:

"particularlry if i compliance wiht ethical and data protection agreements, policies and practices"

"in collaboration with other health providers"

"partially"

"If this feeds into a broader management protocol"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

42. Pharmacists role in restoring order to patient records and drug records, if manually written due to power outages.

This role received 100% consensus

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

43. Pharmacists role in documenting what worked and what didn't in the disaster response and change disaster plans accordingly.

This role received 100% consensus with the comment

"Absolutely"

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

44. Pharmacists role in participating in post-disaster research/reports.

This role received 100% consensus.

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

45. Pharmacists role in informing local disaster management reports on pharmacy response improvements following a disaster event.

This role received 100% consensus.

The results for keeping the role from the previous Delphi round are:

	Response %	Response Total
Yes	100%	15
No	0%	0

Do you have any additional comments you would like to make?

46.**Pharmacists role in providing behavioural and mental health support following a disaster to their patients, customers and staff.**

There were mixed comments received:

"rather than remove it I think we should look to upskill the profession in this area in general and specifically with respect to post-emergency population needs"

"No strong feeling. Feel is a responsibility for staff"

"Many pharmacist have strong relationships with their patients and can certainly provide emotional support as well."

"Further training would be needed to provide this."

"leave it to professionals"

"Not a pharmacist's core training - other specialist better suited to this - but pharmacists working in these settings should be trained and aware of basic mental health support mechanisms"

To note: Many pharmacists have begun to undertake in non-disaster setting mental health first aid training to recognise the signs of someone in mental health crisis to refer on to professional support.

The results from the previous Delphi to keep the role are:

	Response %	Response Total
Yes	40%	6
No	60%	9

For clarification, please indicate whether this role should be kept 'yes' or removed 'no' and provide any additional comments you would like to make?

Yes



No



Comments

47. The role prioritisation results are presented below for the four phases - PRR. The numbers indicate how many of the panel members (n=15) chose that level of priority for that role.

Prevention Phase	Highest priority	2	3	4	Lowest Priority
Optimising medication supplies for chronic disease management	8	5	1	1	0
Administer vaccinations	2	7	1	2	2
Educate the public on reducing the spread of communicable diseases/infections	3	1	6	1	4
Ensuring patients are aware of their increased risk of adverse health outcomes in a disaster	1	1	6	4	3
Tailored 'point of care' messaging to chronic disease patients	1	1	1	7	5

Based on these results the order of the top 5 roles for prevention do not change from above.

Preparedness Phase	Highest priority	2	3	4	Lowest Priority
Ensuring uninterrupted supply of essential medications in a disaster	10	1	1	2	1
Have systems in place to secure cold chain lines	2	7	0	4	2
Knowing how to access national stockpiles if necessary	0	0	10	2	3
Being a part of the local community disaster management teams to involve pharmacy in coordinated response	2	3	4	6	0
Being a part of local/state/national disaster preparedness health meetings - providing medication management advice	1	4	0	1	9

These results reshuffles the order slightly, moving the 'accessing stockpiles' role down to forth place.

1. Ensuring uninterrupted supply of essential medications in a disaster
2. Have systems in place to secure cold chain lines
3. Being a part of the local community disaster management teams to involve pharmacy in coordinated response
4. Knowing how to access national stockpiles if necessary
5. Being a part of local/state/national disaster preparedness health meetings - providing medication management advice

Response Phase	Highest priority	2	3	4	Lowest Priority
Dispense medications and other necessary medication-related items to affected members of the community (prescription, over-	11	1	2	1	0

the-counter medications, inhalers, etc.)

Counseling patients on how to use and take medications	1	6	2	2	4
Coordinating logistics of medications and medical supplies for patients with chronic diseases	1	4	4	4	2
Providing one off medication emergency supply refills for up to 30 days during the declared disaster	1	3	5	4	2
Assisting with the release and allocation of national stockpiles if required in pandemic or emergency	1	1	2	4	7

These results did not change the order, however, the 'counseling ' and 'coordinating logistics' roles tied in second place.

Recovery Phase	Highest priority	2	3	4	Lowest Priority
Re-establish normal stock levels, destroy contaminated stock appropriately	8	2	3	1	1
Restock emergency/ disaster kits for next disaster event	3	6	3	1	2
Check on the health needs of the local community	2	1	6	3	3
Identify and prioritise vulnerable patients in local community	2	2	2	8	1
Restore order to patient records and drug records, if manually written due to power outages	0	4	1	2	8

These results did not change the order, however the 'check on health needs' and 'identify vulnerable patients' tied for third place.

Do you have any additional comments to make?

48. Thank you for participating in this expert panel. Are there any final comments you would like to make?

