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Supporting health professionals following a clinical error. Understanding the psychological impact that clinical error has on health professionals and if organisational culture influences the experience of the health professional

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Abstract

Background: Despite significant advancements in patient safety over the past two decades, everyday patients continue to be harmed. In the context of the escalating pressures of increasing workloads, staff shortages, burnout, low morale and high staff turnover faced by healthcare organisations, the negative impact these pressures have on patient care is evident. Well-trained staff with years of experience can make errors. These individuals who make an error are recognised as the 'second victims' (Wu, 2000). Becoming a second victim can have severe negative effects that are often long-lasting on a health professional's psychological and physical well-being, and in turn can negatively impact patient care. Organisational support and a positive safety culture play a critical role in lessening the effects of the second victim phenomenon. This research offers a unique insight into the current situation within New Zealand and contributes to the international literature relating to clinical error and the second victim phenomenon.

The aims of this research were, to answer the following questions:

I. What psychological impact does involvement with clinical error have on New Zealand health professionals?

II. What impact does organisational culture have on the recovery of health professionals following a clinical error?

III. What support do health professionals want following a clinical error?

Method: This research adopted a mixed-method embedded convergent parallel design; the study was largely quantitative and included qualitative data to enhance the quantitative results. The quantitative data was collected using a self-reporting survey tool with a Likert scale. The tool was developed by combining selected questions taken from three existing tools, The Second Victim Experience and Support Tool, The Safety Attitudes Questionnaire and The Safety Climate Survey, with the inclusion of two open ended questions. The study included a final sample of 41 participants, all registered New-Zealand-based health professionals, including doctors, nurses, medical imaging technologists and clinical pharmacists.

Findings: There were several significant findings, many of which were consistent with other published studies. Overall, participants experienced greater psychological

distress than physical distress. The most reported psychological symptom was the 'fear of embarrassment.' Female participants experienced more severe psychological and physical effects **(p=0.045)** than males, whilst medical imaging technologists reported more severe psychological effects than nurses or doctors. The most desired support following involvement with a clinical error was colleague support. The difference between gender was statistically significant **(p=0.002)**, and females reported a stronger desire for support than males **(p=0.037)**.

Conclusion: This research has identified that the second victim phenomenon is real and is not well managed. There are several nuances that this study has observed across the different professional groups. These major findings provide a unique insight into the experience of New Zealand health professionals and has contributed to the existing second victim and safety culture research, including a new understanding of the impact clinical errors have on medical imaging technologists. Furthermore, this research has several implications for future research and practice in New Zealand and internationally and provides an opportunity for expanding this research to a wider population.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

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Chapter 1

1.0 Introduction

In 2011, Seattle paediatric nurse Kim Hyatt made a medication error which led to the death of a young child. Kim had 27 years of experience as a nurse. Kim died from suicide seven months after this error (Grissinger,2014). Tragic events like this highlight the significant impact that making a clinical error can have on health professionals.

A clinical error is an unintended or unexpected error or incident which either results in or could have resulted in patient harm (Clinical Excellence Commission, 2019). Clinical errors may also be referred to as a patient safety events, medical errors, or adverse event. For the purpose of this study, a clinical error is any incident that resulted in harm to a patient.

Consequences of clinical errors can vary significantly from no-harm events to major harm and sometimes even death. It is well recognised that errors occur in healthcare every day, with approximately one in every ten patients harmed whilst receiving care (Slawomirski et al., 2017). The way an organisation responds to errors plays a significant role in ensuring the safety of both patients and staff. Organisational culture is frequently described in the literature as the way healthcare organisations think, feel, and behave (Mannion & Davies, 2018).

The impact of clinical error includes harm to the patient but also extends to health professionals. Several studies have confirmed the detrimental effects clinical error can have on health professionals (Seys et al., 2013; Van Gerven, Bruyneel et al., 2016). Wu (2000) highlighted the importance of providing support to health professionals involved with adverse events. However, formal protocols/guidelines are limited to the United States of America (US) and Europe, while in New Zealand there are currently no guidelines.

This study will build upon the existing knowledge and seek to answer the following questions:

I. What psychological impact does involvement with clinical error have on New Zealand health professionals?

II. What impact does organisational culture have on the recovery of health professionals following a clinical error?

III. What support do health professionals want following a clinical error?

1.1 Background

Over the last two decades, patient safety has become a global healthcare priority, but more work needs to be done to further reduce patient harm (World Health Organization, 2019). Some of the most important work in patient safety was carried out by Lucian Leape and James Reason in the 1990s, both being major contributors to patient safety (Leape et al., 1991; Reason, 1990). Leape's work recognised that there was an underlying problem with patients being harmed across healthcare organisations, suggesting healthcare systems lacked transparency, effective processes, and accountability around patient harm (Leape et al., 1991). Reason, on the other hand, provided a theory suggesting that patient harm events could be likened to Swiss cheese, proposing that error was not an individual flaw but stemmed from system failures and flaws. Their early work sought to understand how standardising systems and processes could be used to support safer care delivery and reduce patient harm (Reason, 1990). An important finding from Leape's early work was that doctors and nurses struggled with clinical errors (Leape, 2021).

In 1999, The Institute of Medicine (IOM) published a report, *To Err is Human: Building a Safer Health System*, which acknowledged clinical errors occur frequently in healthcare settings (Kohn et al., 2000) and recognised that errors are not caused by one individual but are complex, multi-faceted and include a combination of factors, namely, human, system, patient, and contextual factors (Kohn et al., 2000). The release of this report, followed by *Crossing the Quality Chasm* in 2001, prompted a shift towards the development of activities to improve safety for patients across the healthcare spectrum (IOM, 2001).

While there is evidence that the introduction of patient safety initiatives such as surgical checklists and communication tools have reduced risk, what is unclear is the impact these improvements have made overall on patient and staff safety (Chance et al., 2024). In New Zealand, from 1 July 2021 to 30 June 2022 there were 1,137 serious adverse events reported to the New Zealand Health and Quality Safety Commission (Health Quality and Safety Commission [HQSC], 2023). Meanwhile, the Accident

Compensation Corporation (ACC) data shows a year-on-year increase in treatment-related injury claims, with 16,285 claims submitted or processed for 2018/2019 (ACC, 2020). This suggests that a large proportion of incidents may go unreported to the HQSC.

Whilst *To Err is Human: Building a Safer Health System* played a critical role in bringing the problem of medical errors into the public domain, its primary focus was to reduce harm; however, it did not address the significant impact that organisational culture can have on patient safety (Kohn et al., 2000). Whilst there is a growing body of literature detailing the direct impact that harm has on patients, what is less well understood is the impact that organisational culture has on patient safety and the well-being of healthcare workers (Bamforth et al., 2023; Janes et al., 2021). Culture is fundamental as it sets the values, attitudes and behaviour of the organisation, including how an organisation's workforce collectively views safety (Mannion & Davis, 2018).

At a national level, key messages about the importance of building a positive safety culture have been reinforced in key policy documents and government agendas (HQSC, 2023; WorkSafe New Zealand, 2021). The recently published New Zealand Health Strategy (2023) reinforces the importance of patient safety and workforce culture. However, international headlines about patient harm events provide evidence that safety improvements have frequently failed to deliver wider organisational change (Rimmer, 2023). Patients continue to experience harm, and errors go under-reported; the reasons for this vary, but one thing is clear: there is still uncertainty about what safety culture means across different health professional groups, between management and the frontline workforce, and how it can be achieved (Gauld & Horsburgh, 2020; Hafezi et al., 2022). Furthermore, without establishing a common understanding of what safety culture is, it is difficult to understand how to instil it. The ability to improve safety in healthcare is further complicated by the current unprecedented challenges healthcare organisations face, with escalating workloads, staff shortages, burnout, low morale and high staff turnover further exacerbating the negative impact on patients and staff safety (Sipos et al., 2024).

1.2 The Impact of Clinical Error

When patients come to harm, the negative impact of clinical error can be felt at an individual level but also more widely at an organisational and economic level (Ozeke et al., 2019; Slawomirski et al., 2017). Clinical errors are the result of a variety of factors

and the impact is wide-reaching (The Health Foundation, 2011). In addition to the direct harm caused to patients and their families, health professionals can also experience significant psychological and physical effects (Seys et al., 2013 Van Gerven, Bruyneel et al., 2016; Wu et al., 2000).

1.2.1 The Second Victim

Professor Albert Wu sought to understand the personal and professional impact that medical error could cause to health professionals, naming them the 'second victim' (Wu, 2000). However, the term 'second victim' is viewed by some patient advocates as controversial, on the grounds that the word 'victim' lacked accountability (Clarkson et al., 2019). Grissinger (2014) stressed the term 'second victim' does not absolve the health professional of their responsibilities but merely acknowledges the emotional trauma experienced by healthcare workers after a harmful event. Similarly, Gómez-Durán (2019) suggested the term 'second victim' validates the psychological damage healthcare workers suffer when harming a patient. The term 'second victim' will be used throughout this study, as it is widely recognised and accepted in the literature and highlights the significance of this work.

Both Wu (2000) and Van Gerven, Bruyneel et al. (2016) reported that healthcare workers involved with error experience a variety of symptoms including loss of appetite, insomnia, depression, guilt and anxiety after a clinical error (Van Gerven, Bruyneel et al., 2016; Wu, 2000). The intensity of these effects can range from minor to extreme and have been likened to those experienced by victims of post-traumatic stress disorder (Baas et al., 2018). Harmful behaviours can develop, such as obsessive checking, defensive medicine practices, and personal difficulties (Ozeke et al., 2019). Also, longer-term effects include staff needing to take unplanned leave, losing confidence in their abilities, or removing themselves from undertaking or performing high-risk patient procedures (Marran, 2019; Scott et al., 2009). Furthermore, Burlison et al. (2017) reported clinical error can lead to an increased risk of another error being made. However, these risks can be reduced when health professionals feel supported by their organisation (Burlinson et al., 2017). The immediate negative effects and the impact of clinical errors can be felt more widely, with some staff choosing to leave clinical practice altogether (Burlinson et al., 2021). This is a significant problem as the retention of health professionals is critical for the delivery of quality services. The loss of experienced staff at a time when health

organisations are struggling with recruitment and retention will only add to the significant stress and pressures already felt by many healthcare organisations (Sipos et al., 2024).

The prevalence of the second victim phenomenon varies from 10.4% up to 43.3%, suggesting that up to half of all health workers could experience the second victim phenomenon at some point during their career (Seys et al., 2013). Research conducted by Missouri University Hospital identified six distinct phases of the second victim phenomenon (Scott et al., 2009). In the immediate aftermath of an event, the health professional is in a state of chaos and accident response. Their initial response is one of shock and denial, trying to understand how the error happened. The next phase is the development of intrusive reflections and a need to restore their personal integrity, followed by a state of inquisition and psychological preparation for the inquiry or investigation into the incident. Lastly, there is the need for emotional first aid followed by moving on. Scott et al. (2009) detailed three potential outcomes: dropping out, surviving, or thriving. Research has highlighted the negative impact clinical error can have on future practice, causing negative behaviours to develop, which can, which can adversely impact patient care (Pellino & Pellino, 2015). Similarly, a survey by the British Medical Association found n=3,864 (49%) of doctors reported they did or would practice defensively following an error (British Medical Association, 2018).

The emotional trauma experienced following these events can be exacerbated by the severity of the event, with certain factors directly influencing the effects (Scott, 2011). Margulies et al. (2020) suggested that these factors include the extent to which health professionals share characteristics with individuals, for example, personal similarities with the patient, such as age, name or even displaying similar physical characteristics to a loved one. Gender may also be a factor, the literature highlights females may be more at risk of the second victim phenomenon than men (Coughlan et al., 2017; Van Gerven, Bruyneel et al., 2016). Furthermore, younger health professionals and those with less years of experience have also been highlighted as being more at risk (Mok et al., 2020). Additionally, the severity of the response to error can be influenced by professional group/discipline (Harrison et al., 2015). This may be explained by the subcultures that exist within different professional groups, such as nurses and doctors. Edmonson's (1996) work highlighted the influence that subcultures have on detecting errors and organisational learning.

Barriers are known to exist between professional groups which may result in hierarchical challenges and impede collaboration between different professional groups on matters relating to improving patient safety (Senot et al., 2016). Sirriyeh et al. (2012) suggested that professional groups hold core beliefs and values, stemming from societal values. This is important as it implies that subcultures can have a direct influence on safety culture. Several studies have reported differences between the safety attitudes of doctors and nurses, suggesting that nurses are more likely to approach risk more proactively, and report clinical incidents, compared to doctors (Evans et al., 2006; Lawton & Parker, 2002). These studies indicate the response to error and safety can vary between professional groups. One potential explanation for these differences is that professional credibility and success are important to the medical profession, and reporting errors could be viewed as failure or a weakness (McGee, 2020). This further creates a barrier to accepting support. Furthermore, Pepper et al. (2012) suggested there is a societal expectation that doctors must just deal with significant trauma, which can cause them to internalise their feelings and not seek help when needed. This is supported by Sirriyeh et al. (2010) who highlighted the medical profession can have a negative attitude towards error, resulting in barriers to doctors accessing support. Fisseni et al. (2007) found doctors were less likely to engage with reflection in certain situations and may even deny error. There needs to be a significant shift to overcome fear of failure and a greater understanding of the needs and coping mechanisms of different professional groups. Understanding these behaviours and their impact on the broader context of patient care will enable a more individualised approach to support services (Sirriyeh et al., 2012).

1.2.2 Complaints Investigation Process

Whilst the purpose of this research is to look at the impact of clinical error, errors that have resulted in significant patient harm can result in investigations by external agencies. Therefore, it is important to explore the impact that the complaints process has on health professionals, as it relates to processes that might occur after a clinical error. While there is a significant amount of literature relating to health consumer complaints and the organisational impact of these, by comparison only a small number of studies have examined the impact of complaints on health professionals (Cunninghan & Wilson, 2011). Complaint investigations can have a variety of negative consequences, with staff experiencing distress, anxiety and shame similar to the second victim phenomenon (Hanganu & Ioan, 2022; Nash et al., 2004).

In New Zealand, the Health and Disability Commissioner has the authority under the Crown Entities Act 2004 to investigate complaints relating to patient care. The complaints process is a necessary requirement to ensure the quality and safety of patient care in New Zealand. While the complaints process is appropriately focused on consumers' needs, there is often no support offered to health professionals. Historically, New Zealand investigations have adopted a blame response to error, promoting a culture of shame and victimisation (Cunningham, 2004). Wise (2018) reported 95% of doctors in the United Kingdom (UK) were either 'occasionally' or 'often' fearful of making a medical error, with over half of the respondents reporting they were worried they would be blamed for errors that were the result of system failures and pressures. The significant catastrophic impact of the investigatory process is highlighted by Hawton (2015) who reported 28 doctors in the UK who were under fitness to practise investigations died by suicide or suspected suicide. Similarly, a 2023 review of American surgeons involved in medico-legal lawsuits found that lawsuits were strongly correlated to burnout and depression. Furthermore 4.6% of respondents reported experiencing suicidal thoughts (Balch et al., 2011). Additionally, the investigatory process can negatively impact on patient care. Adelani et al. (2023) found surgeons involved with a lawsuit were more likely to be involved with future clinical errors.

As discussed, the complaints process is a significant source of anxiety for health professionals, and the current system neglects to address the impact of complaints on staff involved, suggesting that neither staff well-being nor psychological safety are considered a fundamental component of the complaints process. Cunningham and Wilson (2011) supported this view, stating that the current investigation process lacks attention to the broader health context, the 'real world' of healthcare and the human impact on clinical practice. Furthermore, the complaints process can be prolonged, often taking several years to complete, which can further intensify and increase the anxiety and stress experienced by affected health professionals (Waterman et al., 2007). This highlights the importance of better mental health support for staff and organisations involved in a complaint investigation. Whilst there have been some improvements which have led to a more holistic approach being adopted, the current complaints system operates under a punitive approach, and the process continues to apportion blame to individuals. The complaints process itself may be negatively impacting patient care by limiting openness and transparency within healthcare organisations. The current complaints system needs

to be refined to create a model that supports the patient, health professional and organisation to address the factors that led to the error and aid continuous, shared learning and practice improvement (Seys et al., 2013).

The 2003 Queenstown Report proposed several changes to the New Zealand medical disciplinary complaints process (Cunningham & Tilyard, 2003). One of the key recommendations was to improve the timeliness around the resolution of complaints for both the complainant and health professional. However, in 2024, the average time for an outcome was 2-3 years (Health and Disability Commissioner, 2024). In May 2023, the HQSC released *He Maungarongo ki ngā Iwi: Envisioning a Restorative Health System in Aotearoa New Zealand* (National Collaborative for Restorative Initiatives in Health, 2023). This publication addressed the need for a restorative approach to address and prevent healthcare harm in New Zealand. Implementing a restorative approach may reduce the damaging psychological effects experienced, improve transparency around errors, and in turn increase error reporting. However, while this is a welcomed move in the right direction, to be successful, there needs to be closer integration between the HQSC and Health and Disability Commissioner.

1.2.3 Defensive Medicine

The concept of defensive medicine goes back to the 1970s. Defensive medicine is often an outcome of the second victim phenomenon (Pellino & Pellino, 2015). It is the practice of medical professionals requesting unnecessary tests and/or excluding patients from certain treatments to protect themselves from a complaint (Panella et al., 2016). Defensive medicine can have detrimental effect on both the patient, and healthcare services by leading to increased healthcare costs (Pellino & Pellino,2015). Furthermore, complaints systems have been found to promote the practice of defensive medicine (Borgan et al., 2020; Cunningham & Dovey, 2006). Fear of conflict, complaints and litigation has resulted in some medical professionals avoiding complex and difficult patients (Özdemir et al., 2024). Panella et al. (2016) stressed that one of the most significant predictors of defensive medicine is when a health professional becomes a second victim.

In New Zealand, Cunningham (2004) sought to gain insight on doctors' attitudes about complaints. Findings from his research found doctors supported the need for complaint investigations but also reported on the prevalence of negative emotions and

practice of defensive medicine. Furthermore, the findings highlighted that if complaints focused on individuals rather that organisations, this approach may exacerbate the practice of defensive medicine, thus negatively impacting on quality of care. Defensive practice in the nursing profession is less well understood. Manuel and Crowe (2014) suggested that in nursing, shifting the responsibility of a clinical error is an indication of defensive medicine, highlighting that negative organisational cultures can increase the practice of nurses practicing defensive medicine. Defensive practice in nursing may be due to a fear of making mistakes and being reprimanded, or because nurses feel pressured by an inability to meet organisational expectations (Manuel & Crowe 2014). Furthermore, McKeown et al. (2019) reported other factors such as a lack of resources, environmental constraints, and culture within organisations can predispose nurses to practice defensively.

1.2.4 Psychological Well-being and Self-Resilience

In recent years, there has been increasing interest in the psychological well-being and mental health of healthcare professionals (Cohen et al., 2023). It is important to recognise that occupational stressors such as staffing, time pressures, professional responsibilities and societal expectations can negatively impact the physical and psychological well-being of healthcare workers and increase the risk of burnout (Cohen et al., 2023). Furthermore, there have been clear links drawn between staff well-being and patient safety (Jamal et al., 2022). Kakemam et al. (2021) found that burnout directly correlated with increased clinical errors.

Since the COVID-19 pandemic, mental health in the workplace has become a common issue and has now been recognised as a priority area for research (Anger et al., 2024). The WHO's (2022) *Health and Care Workforce in Europe: Time to Act* report, described the significant challenges faced by the health workforce and reported the problems of retaining healthcare workers due to negative mental health with symptoms including anxiety, depression and burnout (WHO, 2022). Workplace well-being may be a contributing factor to the alarming level of suicide in the medical profession (Harvey et al., 2021). Findings suggest that female doctors are more at risk than males. Furthermore, suicide rates amongst female doctors are 130% higher than females in general (Davies et al., 2021). An extremely concerning finding published in WorkSafe New Zealand's (2023) *A Psychosocial Survey of Healthcare Workers* found healthcare workers reported a significantly lower psychosocial safety climate compared to other New Zealand workers

(Worksafe New Zealand, 2023). Notably, 14% of healthcare workers reported experiencing at least one form of psychological distress 'all the time' (Worksafe New Zealand, 2023), further highlighting the significant unmet need for psychological well-being in the New Zealand healthcare workforce.

It is well recognised that burnout and high levels of stress are commonplace in healthcare (WorkSafe New Zealand, 2023). Furthermore, there is a mounting body of evidence to suggest that healthcare workers' well-being can be negatively impacted following a clinical error. These negative effects can last for several months or even years after the event, often resulting in burnout and depression (Edrees et al., 2016; Seys et al., 2013 Van Gerven, Vander Elst et al., 2016). New Zealand's public healthcare provider, Te Whatu Ora, has made a commitment to the workforce by commissioning the Health Workforce Advisory Board. One of the board's key objectives is workforce well-being. However, more clarity is needed to understand what this includes and how Te Whatu Ora aims to implement changes to improve the well-being of the New Zealand health workforce (Health Workforce Advisory Board, 2022).

When looking to understand well-being and burnout, the impact of personal resilience should be considered. Harrison et al. (2015) recognised that some individuals can thrive in challenging situations. Resilience has been described as an individual's ability to recover from an adverse event or difficult situation (de Terte et al., 2014). Emotional resilience is complex, focusing on an individual's adaptability dependent on the situation, highlighting the importance of balance and maintaining a sense of purpose (Sergeant & Laws-Chapman, 2012). Winning et al. (2020) reported self-resilience following an adverse event allows for the development of adaptive behaviours which assist with future avoidance of errors. Further research is required to understand what impact self-resilience has on the second victim phenomenon and to understand the scale and impact of burnout on patient safety.

1.3. Support Mechanisms

The WHO Global Patient Safety Action Plan 2021-2030 recognised the importance of providing support to individuals involved with clinical error, recommending that healthcare staff should be provided with ongoing psychological support following a serious patient safety incident (WHO, 2021). Professional bodies have acknowledged the emotional impact clinical error can have on health professionals.

The New Zealand Medical Council's (2024) statement on the disclosure of harm noted that

> doctors need the opportunity to discuss adverse events in a safe environment, and for systems to be built to prevent recurrence. The Council recommends that employers facilitate a supportive work environment by providing peer support and training on responding to adverse events. (p. 6)

Several studies have reported that healthcare workers feel unsupported following a clinical error (Scott et al., 2009; Ullström et al., 2013; Van Gerven, Bruyneel et al., 2016). The recently revised New Zealand Adverse Events Policy (HQSC, 2023) stressed the importance of providing support for staff involved with clinical incidents/errors. Furthermore, the Royal New Zealand College of General Practitioners (2021) supported the need to have support programmes. However, despite these statements, there remains an absence of support or any meaningful resources available with links to international support programmes. Professional bodies including the New Zealand Medical Council, New Zealand Nursing Council, New Zealand Medical Radiation Technologists Board and New Zealand Pharmacy Council offer no formalised support for healthcare workers being investigated following receipt of a complaint. The New Zealand Nurses Organisation provides legal support to members but, outside of this, offers no formalised support services.

1.3.1 Support Programmes

Although the research has consistently highlighted that health professionals need to receive appropriate support following a clinical error, there is limited evidence to guide organisations on how to do this. Internationally, there has been a small number of second victim programmes developed in the US, including Swaddle, Resilience in Stressful Events and We Care Programs (Edrees et al., 2016; Trent et al., 2016). In the UK, following a review of the serious incident framework, the patient safety incident response framework was introduced. The aim of this framework was to ensure compassionate engagement with those impacted by clinical errors, including the patient, their family and staff members involved (National Health Service [NHS] England, 2024). The patient safety incident response framework links staff to a second victim support programme that provides access to mental health hubs. In addition to this, professional colleges such as The Royal College of Nursing in the UK offers access to free counselling services for

staff involved with a clinical error. The content and quality of existing support programmes is variable and quantitative research into the effectiveness of these programmes is limited (Edrees et al., 2016). One published evaluation of the John Hopkins Hospital's Resilience in Stressful Events Program found the service was well utilised and recommended by nurses and allied health professionals but less so by doctors (Dukhanin et al., 2018).

Whilst these programmes go some way to bridging the gap, second victim support programmes remain an undeveloped area outside of the US. Additionally, there is limited quantitative analysis of the benefits of support interventions. Further engagement with different professional groups is required to understand the usefulness of support interventions following a clinical error. There are no widely adopted guidelines, and many health organisations and professional bodies are offering no support services to staff (Kable et al., 2018), demonstrating a clear need for organisations to invest more resources in establishing second victim support guidelines and resources to assist with recovery. Evaluation studies of the uptake of support programmes are limited. Edrees et al.'s (2016) evaluation of the Resilience in Stressful Events (RISE) programme in Missouri found that nurses were most likely to use the services, suggesting that behaviours may exist within some professional groups that may impact the health professional accessing support.

1.4. Patient Safety

Despite some positive changes to improve safety in healthcare, patients continue to experience harm, with many errors going unreported. The reasons for the non-reporting of errors vary, including being too busy, perceived lack of practical usefulness, and the fear of being subject to disciplinary action or job loss (Evans et al., 2006). One study found that 20% of nurses admitted failing to report a medication error because of fear of being subject to disciplinary action or job loss (Mayo et al., 2004). Furthermore, another study found 36.4% of junior doctors reported witnessing at least one clinical incident that they did not report (Bertram et al., 2021). Whilst these figures may be partly due to barriers in reporting, the fear of failure and stigma attached to clinical error are also compounding factors. Clinical errors should be used as an opportunity to learn, including personal reflection and growth. The cultural ethos of not wanting to fail in the medical/nursing profession needs to be overcome, as this can lead to isolation and a reluctance to seek help at a time when the affected person needs support from their colleagues and organisation.

1.4.1 Safety Culture

The culture of any health organisation is fundamental to the delivery of safe high-quality care (Singer et al., 2009). Safety culture is defined as the individual and organisational values related to the delivery of safe care (Sexton et al., 2006). Well-publicised cases in the UK including the Mid Staffordshire and Bristol heart scandals, uncovered critical flaws in healthcare services resulting in significant harm to patients. Investigations into these events found deep-rooted systemic problems stemming from poor organisational cultures (Francis, 2013; Kennedy, 2001). Initiatives were developed to avoid future failures and to improve the culture of these organisations to make care safer.

Experts in patient safety highlight four essential components for safety culture, namely teamwork, leadership, communication, and a just culture (Farokhzadian et al., 2018). Pellegrino's (2019) work in the aviation sector implies that a just culture is one where everyone is responsible for safety and the focus is on continuous learning from harm to reduce risk rather than appointing individual blame, while Connors et al. (2021) suggested that having organisational support following a traumatic event can itself promote a just culture. Furthermore, the Institute for Health Improvement (2005) highlighted the important role that organisational culture plays in supporting transparency and compliance around error reporting. These transparent safety cultures reassure staff they will be supported if things go wrong, which has been found to reduce the severity of second victim effects (Quillivan et al., 2016; Ullström et al., 2013). However, it is important to note that the research findings on whether improving safety culture directly improves patient outcomes are mixed (Groves, 2013). Nevertheless, improving patient safety culture requires health organisations to instil a positive safety culture throughout the workplace, whereby staff can speak up, challenge poor practice, raise concerns and feel listened to (Farokhzadian et al., 2018).

The WHO (2019) recommended organisations should focus on instilling a safety culture and encourage transparency, whereby workforces have shared beliefs and attitudes towards safety. Organisations have a responsibility and a duty of care to both patients and workers to learn from errors and continuously improve (Ozeke et al., 2019). The way health organisations respond to error either helps to improve systems by learning from mistakes or allows problems to become significant, leaving issues inadequately addressed and putting patients and staff at risk. The evidence supports the view that

positive safety cultures impact on improving staff safety behaviours and reduce workplace harm (Weaver et al., 2013). Additionally, Quillivan et al. (2016) indicated that a hospital's patient safety culture may also help to reduce second victim distress.

Furthermore, to enable sustainable change organisations and leaders need to engage with frontline teams to gain a greater insight into how healthcare workers view risk and safety (Conrad & Douma, 2015). Leaders need to focus on culture and invest time into role modelling safety behaviours and a just culture (Firth-Cozens & Mowbray, 2001). Team members need to be actively engaged in safety, feel safe enough to raise concerns, and feel supported by leadership (Daugherty Biddison et al., 2016). The engagement and support of health leaders is critical in enabling this to occur. However, safety culture is complex and difficult to measure (Ellis et al., 2022). There is no clear consensus on the best way to measure culture. Over the last two decades, there have been several tools developed. Two tools widely used and validated are the Safety Attitudes Questionnaire (SAQ) and the Hospital Survey on Patient Safety (Sexton et al., 2006). Both surveys were developed in the US, to gain a greater understanding into the attitudes and perceptions of health professionals towards patient safety (Sexton et al., 2006). Since these tools were created, they have been successfully adapted and rigorously tested across different settings and have been implemented in several different countries (Bethune et al., 2023).

Before we can successfully measure safety culture, we need to understand the ambiguity in what safety culture is. Safety culture is a complex and multi-faceted phenomenon and it has received multiple definitions; essentially, it includes the perception, vision and beliefs, values, and attitudes of staff (Cooper, 2000; Ellis et al., 2023). A healthy safety culture is based on mutual respect, trust and a shared understanding of workplace safety. However, despite significant improvements in safety culture, poor culture still exists. Furthermore, the direct correlation between culture and patient safety must not be underemphasised (Lu et al., 2022). Poor safety behaviours can permeate the workplace and lead to negative safety cultures. Breaking down barriers in organisations that display poor attitudes towards patient safety must be made a priority for health leaders (Mahmoud et al., 2023), given the evidence supporting the importance of leaders in directing change and creating cultures of safety (Murray et al., 2022). Furthermore, there is a need for guidelines to be developed at a national level to tackle

poor safety behaviours and introduce safety tools and strategic guidelines that call for shared accountability at all levels of an organisation (Gandhi et al., 2018).

1.5. Chapter Summary

In summary, despite the evidence that exists on the negative impact of clinical errors and the positive impact safety culture can have on health professionals and patients, there are currently no New Zealand guidelines to support workplaces in addressing the gap between patient safety and organisational culture. There is still more work to be done to evaluate the extent of the second victim phenomenon in New Zealand, the nuanced differences between various professional groups and the cultural dynamics that exist in healthcare. Furthermore, the impact of support mechanisms and workplace culture on the second victim phenomenon needs more exploration. Developing a greater understanding will assist health leaders to understand the impact subcultures have on the wider safety culture of an organisation, and assist with the creation of national support programmes and the development of strategies that meet the needs of the New Zealand workforce.

The aims of this mixed-methods study are to build on existing research by gaining a greater understanding of the psychological impact of a clinical error on health professionals in New Zealand, including whether the psychological effects manifest as physical symptoms or result to changes to the healthcare worker's clinical practice. This study also aims to identify effective support mechanisms and provide a deeper understanding of how organisational culture can impact the recovery process. This study's findings can be used to guide policymakers to develop an effective tool to gauge the impact of clinical errors on health professionals in New Zealand whilst providing valuable information on the type of support staff desire. Chapter 2 reviews the existing literature and identifies current gaps in the existing second victim and safety culture knowledge to support the rationale for this research.

Chapter 2

2.0 Introduction

This chapter uses a narrative literature review to identify and critically review the existing literature relating to clinical error, safety culture and the second victim phenomenon. It explores the availability and content of second victim support programmes locally and internationally. Additionally, this chapter discusses the rationale for the research study reported in this thesis and identifies gaps in the literature.

Title: You are not alone. Supporting health professionals following a clinical error.

Aim: Understanding the psychological impact that clinical error has on health professionals' and how organisational culture influences psychological recovery.

Research Questions:

I. What psychological impact does involvement with clinical error have on New Zealand health professionals?

II. What impact does organisational culture have on the recovery of health professionals following a clinical error?

III. What support do health professionals want following a clinical error?

2.1 Background

All healthcare professionals are at risk of becoming a second victim, with an estimated prevalence of between 10% and 72% (Seys et al., 2013; Van Gerven, Bruyneel et al., 2016; Vanhaecht et al., 2019). Previous studies have focused on the impact error has on doctors and nurses. However, little is understood about the second victim effect on other health professional groups and the extent to which organisational safety culture impacts recovery. The most severe clinical errors are associated with harm that can result in injury or even death (Slawomirski et al., 2017). Braithwaite et al. (2017) acknowledged that healthcare is a complex and adaptive system where health professionals regularly contend with unpredictability and uncertainty. Alexander Pope's familiar statement, "to err is human", acknowledges that humans make mistakes (Pope, 1711).

The patient safety movement began following the publication of two key reports, namely the IOM reports *To Err is Human* (Kohn et al., 2000) and *Crossing the Quality Chasm* (IOM, 2001). Following these reports, organisations started to acknowledge that errors are an unavoidable reality of working in complex healthcare environments (Kohn et al., 2000). These reports encouraged healthcare providers to implement various initiatives to reduce patient harm. However, despite these initiatives, errors continue to occur and one in ten patients experience harm while receiving healthcare (WHO, 2019).

Preventing patient harm from clinical error and increasing patient safety remains a strategic focus both internationally and in New Zealand (Ministry of Health [MoH], 2016; WHO, 2019). The MoH's Health Strategy (2016) stated: "The health system minimises harm to people, by ensuring that it honestly and openly tracks harm when it occurs, and learns from mistakes, so that the system as a whole can improve" (p. 20).

However, improving patient safety has proven to be a hard and slow process, with competing priorities, resistance to change, lack of funding, technical barriers and a failure of boards to oversee healthcare quality (Brown, 2019; Levey et al., 2007). Additionally, there has been limited understanding of the impact organisational culture has on improvement (The Health Foundation, 2012). To make and sustain improvements, healthcare workforce well-being and engagement must be viewed as key factors in improving patient safety (Bodenheimer & Sinsky, 2022; Janes et al., 2021).

This mixed-methods research is focused on understanding the psychological impact that clinical errors have on healthcare professionals in New Zealand, across two out-patient services, with a particular focus on understanding any similarities or differences between professional groups (doctors, nurses, medical imaging technologists and pharmacists). Including a diverse participant group presents a unique opportunity to examine the differences between professional groups regarding the emotional response to clinical error and to understand more about the impact culture has on the response and recovery following a clinical error. Furthermore, the study aims to investigate the influence of organisational culture on the recovery process and explore effective support mechanisms that can be used to further develop organisational and national support programmes for health professionals in New Zealand. This research contributes to the current understanding of the psychological impact of clinical error, as prior research has predominantly focused on doctors and/or nurses (Baas et al., 2018; Quillivan et al., 2016; Van Gerven, Bruyneel et al., 2016).

2.2 Patient Safety in New Zealand

In 2010 the New Zealand Government commissioned the HQSC. The HQSC is a government entity set up with the objective of partnering with healthcare providers across all sectors, including public and private and primary and secondary care to improve patient safety (Ryall, 2010). In 2021 the HQSC developed a set of national quality and safety markers, focused on measuring improvement (HQSC, 2021).

More recently, the 2023 New Zealand Health Strategy stated that the health system needs to set minimum standards for care delivery but acknowledged there is no routine understanding of what 'good care' looks like (MoH, 2023, p. 84). Like the government objectives outlined for the HQSC back in 2010, the 2023 strategy emphasises the importance of cross-sector and cross-government relationships as a pivotal component of improvement (MoH, 2023, p. 106). Nonetheless, for this strategy to be successful, New Zealand requires a well-resourced and engaged workforce. At a time when New Zealand is making significant changes reforming healthcare system, with the recent dissolution of District Health Boards and the introduction of Te Whatu Ora, there is an opportunity to evaluate and improve patient safety and staff well-being across all healthcare organisations throughout New Zealand.

2.3 Search Strategy

A crucial component of the research process is to understand and assess the extent and breadth of current knowledge on the subject by undertaking a review of the literature. This process enables the researcher to identify current knowledge gaps and to assist the researcher to integrate new knowledge with existing knowledge (Snyder, 2019). A database search was undertaken in the Cumulated Index in Nursing and Allied Health Literature (CINAHL), Scopus and Medline databases in December 2023 using the keywords 'clinical error*, or medical error*, or adverse event*, or clinical incident*'; AND 'health professional*, or healthcare worker'; AND 'organizational culture, or corporate culture, or company culture'; AND 'lived experience, or perception, or attitude'; AND 'psychological impact, or psychological effect'; AND 'second victim'. The inclusion criteria were peer reviewed manuscripts published in English from 2013-2023, as well as seminal/landmark studies with no time limit. In addition, grey literature, such as relevant reports by government agencies or professional bodies obtained from New Zealand organisational websites, was included in the review. The literature review

is intended to place the proposed study within the context of internationally published literature.

The second step was reviewing the articles identified during the initial searches. To refine the search, articles not written in English and more than 10 years old were excluded, apart from seminal studies. Seminal studies were foundational work that played an important role in identifying, clinical error, organisational safety culture and the second victim phenomenon. Next, the identified articles were reviewed by title and abstract and restricted to those that contained at least two of the key concepts. Finally, a manual citation search of reference lists was undertaken to identify additional articles of relevance.

2.4 Clinical Error

The IOM's *To Err is Human* report defines clinical error as "the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim" (Kohn et al., 2000, p. 4). The terms 'clinical error', 'medical error', 'adverse event', or 'patient harm events' are used interchangeably (Singh et al., 2024). In this study, the term 'clinical error' is used.

While there is no universally adopted definition of clinical error, most descriptions imply that harm must occur. However, error does not always lead to harm. The significant variations in descriptions may contribute to the variability of error reporting across healthcare organizations (Elder et al., 2006). Reason (2001) adopted a more comprehensive description of clinical error, suggesting it is a deviation from the expected standard of care, which may or may not result in harm. It is essential to recognise that a substantial number of clinical errors do not result in harm, and these events are referred to as 'near miss' events. Nevertheless, although harm does not occur to patients in these situations, such events or clinical errors can cause significant distress for the health professionals involved (Sachs & Wheaton, 2023).

2.4.1 Seminal Studies

Early literature on clinical error dates to two seminal studies conducted in the early 1990s; these studies sought to understand the prevalence of error in healthcare (Leape et al., 1991; Wilson et al., 1995). In 1991, the Harvard Medical Practice undertook an extensive retrospective study across the US, involving a review of 30,195 medical

records (Leape et al., 1991). The study found that 1,133 (3.7%) of patients had incurred significant injuries resulting in disablement from a medical error, with the most frequently reported event being medication error (Leape et al., 1991). In 1995, Wilson et al. undertook a large-scale retrospective study exploring safety and adverse events across 28 hospitals in New South Wales and South Australia (Wilson et al., 1995). Their findings were similar to those of the Harvard Medical Practice study reporting that 16.6% of admissions to hospital had been impacted by an adverse event. Furthermore, the study highlighted that 51.2% of the reported events were preventable.

However, despite the findings of these two studies, it was nearly a decade later, in the early 2000s, before the gravity of clinical errors gained significant attention. Two key publications, *To Err is Human* (Kohn et al., 2000) and *Crossing the Quality Chasm: A New Health System for the 21st Century* (IOM, 2001), acknowledged that patient harm was not just a result of individual error but often the result of underlying causes within an organisation (Kohn et al., 2000). However, there was some criticism regarding the two IOM reports, in particular the focus on small studies and the transferability of this data to larger populations, suggesting the findings were exaggerated (McDonald et al., 2000; Sox & Woloshin, 2000).

In response to the recommendations made by these key reports, government agencies and healthcare organisations across the globe made patient safety a primary concern (Bates & Singh, 2018; Kohn et al., 2000), resulting in the development of safety programmes and targets aimed at enhancing and measuring the quality of patient care and minimising harm to patients (Pronovost et al., 2016). Many government agencies adopted the use of measures, checklists and error-reporting systems designed to reduce error rates and emphasised the importance of establishing clear national patient safety objectives, as highlighted in the HSQC's (2016) Clinical Governance Guidance. However, the overall success of these interventions on patient safety can be impeded by poor organisational safety cultures (Chance et al., 2024).

2.4.2 Recent Research

This section explores the recent literature on clinical error. While the exact numbers of those affected by clinical error remains unclear, there have been several recent studies aimed at understanding the prevalence and severity of patient harm events (Leitch et al., 2021; Panagioti et al., 2019). Panagioti et al. (2019) conducted a systematic review

and meta-analysis to examine the prevalence, severity, and nature of preventable patient harm across a variety of medical settings worldwide. This was the first systematic review to focus on preventable harm. The design of the study was observational, incorporating a total of 70 studies in the meta-analysis, including quantitative studies that encompassed both prospective and retrospective studies, focusing on data from 2000 onwards. A total of 7313 records were identified and 70 studies consisting of 337,035 patients were included in the analysis. The authors found that the preventable patient harm rate was 6% and that most preventable harm events were due to medication errors. Notably, the strengths of this review include it being a large-scale systematic review; however, it was limited as, despite 80% of care being delivered in primary care settings, only three of the studies included were conducted in primary care (Sundwall et al., 2020; WHO,2009) and, therefore, the review's findings have limited generalisability outside of secondary care.

It is important to note that most of the research looking at clinical error has been conducted in high-risk hospital settings. Mueller et al. (2019) pointed out that specialist areas such as intensive care units and paediatrics often benefit from better resources, which could potentially reduce the frequency of errors. Interestingly, the volume of clinical errors reported by Panagioti et al. (2019) was low in comparison to a nationwide survey conducted by the Institute for Healthcare Improvement (IHI) in 2017 in the US. The survey was carried out across several healthcare providers including primary care, secondary care, in-patient, outpatient and aged-care facilities. A total of 2,500 healthcare consumers responded to the survey, which asked about their perspective on healthcare harm. Findings suggest that 21% had personally experienced a clinical error (IHI, 2017). Furthermore, the study found that outpatient settings were frequently reported as being the site where the clinical error occurred. However, as Sundwall (2020) pointed out, the high percentage of patient-reported errors may be partly attributed to a patient's lack of understanding of the difference between a medical error, a complication, and/or the natural progression of their illness. Furthermore, self-reported surveys have their limitations, as they rely heavily on patients' subjective recollection of events, which may further compromise the robustness of the study (Althubaiti,2016). Nevertheless, these findings are consistent with findings from several other studies indicating there is a significant number of unreported clinical errors (Afaya et al., 2021; Sundwall et al.,2020).

Sundwall et al. (2020) suggested there may be insufficient monitoring of patient harm events within outpatient settings. Leitch et al. (2021) conducted a large retrospective

cohort review of 9,076 patient records across 44 randomly selected primary healthcare settings in New Zealand. The objective of the study was to understand the prevalence of harm across primary care. The study reviewed patient records from 2011-2013 and applied stratified cluster sampling to improve the validity of the findings. The authors identified 2,972 harm events, estimating that 123 harm events occur per 1000 patient years, which suggests approximately 12% of patients had been affected by an error (Leitch et al., 2021). Interestingly, the study conducted by Leitch et al. (2021) in a primary care setting reported twice the number of clinical errors found in the study conducted by Panagioti et al. (2019) in secondary care.

Several limitations of the Leitch et al. (2021) study have been identified. Firstly, the review panel for the study consisted of eight general practitioners, which could have resulted in reviewer bias. Secondly, as the reviewers belonged to the same specialist area, this may have resulted in them being reluctant to be critical of their peers' decision-making and may have also impacted how they assessed the level of harm, potentially being more lenient. Gearing et al. (2006) suggested that reviewers can adversely affect the outcome of a study by being either overly lenient or harsh. However, being from the same speciality could also be seen as a strength, as the reviewers would be familiar with primary healthcare clinical practice guidelines and expected standards of care. Nguyen et al. (2023) asserted that subjective measures rely on human judgement, and having a panel of general practitioners may result in confirmation bias, as their existing opinions may influence their review of the appropriateness of clinical decision-making, interpretation of tests and compliance with guidelines. Wang et al. (2023) reported that clinical practice guidelines in primary care are often underutilised. Furthermore, previous studies on adverse events have highlighted reviewer behaviours, which can weaken study findings (Shojania & Marang-van de Mheen, 2015).

2.4.3 Summary

Despite nearly three decades since the landmark Harvard Medical study and key patient safety publications, the prevalence and economic burden of clinical error continues to be reported. All four studies reviewed revealed that patient harm regularly occurs in health organisations across several countries, including New Zealand, and across different specialties (Leape et al., 1991; Leitch et al., 2021; Panagioti et al., 2019; Wilson et al., 1995), The extent of patient harm events varied between 3.7% and 21%, with up to half of all reported events being preventable (Leape et al., 1991; Leitch., 2021;

Panagioti et al., 2019; Wilson et al., 1995). These findings are consistent with findings from several other studies indicating that a significant number of clinical errors go unreported (Farquhar et al., 2015; Leape, 1994; Wise, 2018). Furthermore, there is inconsistency across all four studies as they used different methodologies and screening tools.

These findings support the need for more focused research in the primary care setting (Leitch et al., 2019; Sundwall et al., 2020). As discussed in Chapter 1, there are several well documented barriers to the reporting of clinical errors. Therefore, the studies reviewed are unlikely to be revealing the full extent of the problem. Whilst the research confirms that clinical error remains a real issue, it is crucial to explore the factors that contribute to these errors (Wallin et al., 2023), including a deeper understanding of the extent to which both organisation and professional cultures are linked to safety and quality in healthcare (Mannion & Davies, 2018).

2.5 Safety Culture

2.5.1 Background

Following significant high-profile events relating to clinical error and patient harm, governments and researchers have been increasingly interested in the concept of safety culture. Safety culture is the shared perception, vision and beliefs, values, and attitudes of staff (Cooper, 2000; Ellis et al., 2023). It is clear from the literature that culture plays a significant role in the way in which health professionals and organisations respond to safety (DiCuccio, 2015; Gauld & Horsburgh, 2020). Despite the recognition that organisational factors contribute to the complexity of safety culture, the reasons for this are not well understood. Significant high-profile inquiries in the UK, at Mid Staffordshire and Morecambe Bay hospitals, uncovered significant healthcare failures, resulting in patient harm, linked to problematic organisational cultures (Taylor & Goodwin, 2018). Investigations into these events revealed deep-rooted cultural issues that allowed poor standards, compounded by a lack of leadership (Francis, 2013). As discussed in Chapter 1, public inquiries into poor care and patient harm reaffirm the importance of organisations encompassing shared values, behaviours, and attitudes towards patient safety among staff members. These elements influence the day-to-day practice within an organisation (Bloor & Dawson, 1994). Furthermore, the nuances of professional subcultures influence the wider organisational environment. Mannion and Davies (2018)

stressed that the broader context of organisational culture needs to be investigated to understand how personal beliefs, attitudes and professional subcultures impact the values of an organisation. The next section explores recent research on safety culture.

2.5.2 Relevant Research

Research conducted by Oliveira et al. (2024) sought to understand the perception of safety culture across a central hospital in Portugal. An observational, cross-sectional study surveyed registered nurses from high acuity areas (emergency departments, operating room, intensive care units). The researchers utilised the Hospital Survey on Patient Safety Culture (HSOPSC) (produced by the Agency for Healthcare Research and Quality), a validated survey tool used to glean nurses' perceptions of the safety culture. The HSOPSC is a 42-item survey tool encompassing 12 patient safety domains across three different levels – the unit level, the hospital level and the individual level. The target population was 257 nurses with 57 nurses completing the survey; most of the nurses surveyed were registered general nurses (77.2%). The findings from the study indicated that the nurses' perception of safety culture was mainly positive. Teamwork was recognised as the most positive dimension, with intensive care nurses reporting the highest positivity rates. However, as Mueller et al. (2019) suggested, specialist areas such as intensive care often benefit from better resources such as higher staff to patient ratios, which may explain the perception of a more positive safety culture. Just under half of the nurses surveyed (42.1%) had reported a clinical error in the last 12 months and 45.6% of participants considered critical patient safety to be acceptable. However, of concern was the finding that over half of respondents (57.9%) had not reported a clinical error, suggesting a lack of compliance with reporting practice. This could be explained by nurses fearing being reprimanded as a barrier to the adverse event reporting process (Vrbnjak et al., 2019). Not reporting adverse events has been found in other international studies (Wise, 2018; Yung et al., 2016).

In 2015, DiCuccio conducted a systematic review, looking to evaluate research on patient safety culture in relation to patient outcomes. A total of 17 studies were included in the review; of these, 16 studies used a cross-sectional descriptive design, and one study had a qualitative design. Most studies were conducted in secondary care services. Several survey tools were used including the HSOPSC and Safety Attitudes Questionnaire (SAQ). Selected studies focused on patient-related outcomes such as medication error, morbidity, mortality, hospital-acquired infections, falls and re-

admission rates. Additionally, several studies included nurse outcomes such as turnover, job satisfaction and workplace injury rates; however, as the focus of the research was on outcomes, these were not discussed in the review. Measures such as mortality and readmission rates were found to be connected to safety culture, with organisations displaying lower mortality rates having a stronger focus on patient safety, communication and continuous learning. These findings are consistent with Singer and Vogus (2013) suggestion that positive patient safety culture results in more favourable patient outcomes. However, the findings regarding significant relationships between safety culture and nurse-sensitive patient outcomes, such as hospital-acquired infections, were inconsistent. Furthermore, the generalisability of the study's findings was limited, as 11 of the studies were conducted in the US, restricting the ability to generalise the findings to other countries.

Similarly, Flotta et al. (2012) utilised a nationwide cross-sectional survey to investigate the knowledge, attitude, and behaviour that physicians have towards clinical error. Physicians (n=696) were surveyed across 40 hospitals in Italy with an overall response rate of 58%. The survey was divided into sections and included a combination of questions taken from three separate tools: the Hospital Survey on Patient Safety Culture AHRQ, questions selected from Wu et al. (1991) paper, and the framework for analysing risk and safety developed by Vincent et al. (1998). The survey used a combination of three-point, four-point and five-point Likert scales. The results from this study were overwhelmingly positive: 98.7% of respondents reported that they would discuss errors with their colleagues. However, the percentage of respondents supporting disclosure to patients was only 44.5%, with 44.1% uncertain. These findings support those of Oliveira et al. (2024) highlighting a lack of compliance with reporting practices, and the importance of educating healthcare workers on the benefits of reporting. Another interesting finding from this study was that more experienced physicians were found to be less comfortable with error reporting. This could be attributed to their social standing and the hierarchical frameworks of the medical profession, the stigma associated with making mistakes, or the fear of malpractice, all of which may impact their response to disclosure (Bell et al., 2010).

In 2016, McLennan et al. conducted a small-scale qualitative study using semi-structed interviews to explore nurses' attitudes and experiences of disclosing medical errors to patients. The study took place in Switzerland across two hospitals. Participants

included nurses from a variety of specialities, including several different nursing roles which provided a more diverse perspective. However, it is important to note that several of the nurses interviewed held senior nursing positions, with only eight of the participants working in frontline nursing roles and only 10 having regular patient contact. Therefore, the under-representation of frontline nurses may limit the generalisability of the study data as it does not provide a good, generalised representation of the population. Additionally, 17 of the participants were female, which could also be viewed as a limitation of the study as it does not provide a viewpoint of the different gender groups.

These findings were similar to those of Oliveira et al. (2024), suggesting that despite nurses recognising the importance of disclosing errors to patients, the exercise of open disclosure in their actual practice was impacted by several factors. The barriers to error reporting highlighted by McLennan et al. (2016) and supported by other research, are explored in more detail below.

1. Limited understanding of error. Some participants did not understand what constituted an error, which resulted in some errors going unreported (McLennan et al., 2016). Participants also revealed that the severity of the error was the deciding factor in whether they would report (Gallagher et al., 2023; McLennan et al., 2016; White et al., 2008), suggesting that only significant errors would be reported.

2. Patient characteristics. Participants suggested that certain patient-related factors could impact on disclosure of events, including the expected response to error by the patient (Gallagher et al., 2023; McLennan et al., 2016). This is consistent with findings from Yardley et al.'s (2010) study investigating the disclosure of medical errors across cancer settings. Yardley et al. surmised that the increased sensitivity of the oncology specialty and concerns about how patients might react may serve as a barrier to disclosure.

3. Organisational response. Organisations that do not have open cultures can act as a barrier to error reporting (McLennan et al., 2016). Furthermore, the absence of clear organisational guidance or guidelines is another barrier. The importance of organisational culture has been identified as a fundamental component in effective error reporting (Flotta et al., 2012 Kavanagh, 2017). How an organisation responds to error can significantly influence how their staff respond to errors. Quillivan et al. (2016) found that closed and punitive organisational cultures can have a negative

impact on error reporting, which in turn can be linked to heightened distress following a clinical error.

4.Personal fears. Participants cited the fear of potential negative consequences, including losing the trust of patients, potential legal repercussions, and punishment, as potential barriers to disclosing errors (Aljabari&Kadhim, 2021; Castel et al.,2015). However, it is worth noting that some participants saw open disclosure positively, suggesting that openness and transparency can enhance relationships by improving patient's trust (Myren et al., 2022).

In New Zealand, Gauld and Horsburgh (2020) aimed to understand the perceptions and attitudes of healthcare staff across several New Zealand public hospitals. The researchers included three questions within a national workforce survey conducted in 2012 and repeated in 2017. Three questions focusing on quality and safety were adopted from safety surveys. Participants surveyed included a variety of health professionals, including doctors, nurses, midwives and allied service providers. A total of 10,303 surveys were received in 2012 and 8,541 in 2017. Overall, Gauld and Horsburgh found healthcare organisations and health professionals were committed to quality and safety. There were no significant differences noted between the 2012 and 2017 results in responses to the statement "*In this clinical area, it is easy to speak up if I perceive a problem with patient care*", suggesting that there has been little improvement in error reporting cultures across organisations despite the introduction of key safety initiatives.

The results also highlighted some variation between District Health Board (DHB), profession, gender and age. In the 2012 survey, there were some demographic differences, with female respondents slightly more likely to agree with the statements "*health professionals in this DHB work together like a well-coordinated team*" and "*health professionals in this DHB involve patients and families in efforts to improve patient care*". However, this was not seen in the 2017 surveys. There were no statistically significant differences noted between the demographic groups.

2.5.3 Summary

Three of the studies reviewed used different methodological approaches, which made direct comparisons challenging. Nevertheless, the findings from all four studies support the importance of safety culture for improving staff engagement and transparency around patient safety and harm (Dicuccio, 2015; Gauld & Horsburgh, 2020; McLennan

et al., 2016; Oliveira et al., 2024). Additionally, Flotta et al. (2012) highlight the significant impact of organisational culture on error reporting. A significant limitation of all studies reviewed is that they were restricted to secondary care, emphasising again the need for further research in the primary care sector (Leitich et al., 2021; Sundwall et al., 2020). Nevertheless, the research provided valuable insights into how health professionals perceive error and suggested that whilst health professionals recognise the importance of open disclosure, their compliance with reporting is variable (Flotta et al., 2012). A similar theme emerged with the barriers to open disclosure; both Flotta et al. (2012) and Castel et al. (2015) noted healthcare professionals' fear of negative consequences, including potential legal repercussions, suggesting that punitive cultures can adversely affect patient safety by acting as a barrier to open disclosure. Notably, most of the literature reviewed involved nurses' perceptions of errors, while research into doctor's perceptions of and response to errors is limited (Dicuccio , 2015; McLennan et al., 2016; Oliveira et al., 2024).

Disparities between professional groups requires more research to gain a deeper understanding of the role organisational culture, professional cultures and personal factors, such as age, gender and ethnicity have on patient safety, and the impact organisational culture has on error reporting. Understanding these nuances will allow for a more customised approach to supporting staff who have been involved with clinical errors.

2.6 The Second Victim Phenomenon

2.6.1 Background

While clinical error can have significant consequences for patients, in recent years there has been a growing body of research focusing on the impact that clinical error has on health professionals (Baas et al., 2018; Burlinson et al., 2017; Seys et al., 2013; Ullström et al., 2013; Van Gerven, Bruyneel et al., 2016). This work acknowledges that, in addition to the emotional harm that error causes patients and their whānau, health professionals can also experience significant distress following these events. Several studies have highlighted the profound emotional impact that clinical errors can have on the psychological and physical well-being of health professionals, potentially resulting in the development of unhealthy behaviours, which can lead to burnout (Reiser et al., 2020; Seys et al., 2013; Van Gerven, Bruyneel et al., 2016).

The ‘second victim’ has been defined by Vanhaecht et al. (2022) as “Any health care worker, directly or indirectly involved in an unanticipated adverse patient event, unintentional healthcare error, or patient injury, and who becomes victimized in the sense that they are also negatively impacted” (p. 6).

Almost half of all health professionals will become a second victim (Seys et al., 2013). As discussed in Chapter 1, second victims are health professionals who have made an error and are emotionally traumatised by the event (Ozeke et al., 2019). The level of distress experienced varies, with reports of symptoms including loss of appetite, insomnia, depression, guilt and anxiety after a clinical error, which is referred to as the ‘second victim phenomenon’ (Baas et al., 2018; Ullström et al., 2013; Van Gerven, Bruyneel et al., 2016; Wu, 2000). At the most extreme level, post traumatic distress disorder and suicide have been reported (Baas et al., 2018). One UK study found that out of 1,463 doctors whose patients had an adverse event or near miss, 1,077 (74%) reported stress, 995 (68%) anxiety, 840 (60%) sleep disturbance and 886 (63%) lower professional confidence. 1,192 (81%) became anxious about the potential for future errors (Harrison et al., 2014). Additionally, making an error can carry significant stigma, further exacerbating the negative psychological effects (Baas et al., 2018; Reiser Crelier et al., 2020; Ullström et al., 2013; Van Gerven, Bruyneel et al., 2016).

In addition to the personal impact, the second victim phenomenon can be felt more widely at an organisational level, with staff involved potentially needing to take unplanned leave or stand down from clinical practice, and in certain situations some health professionals may leave their profession altogether (Marran, 2019; Scott et al., 2009). The negative consequences of the second victim phenomenon have been shown to correlate with increased staff turnover (Van Gerven, Bruyneel et al., 2016; West et al., 2009). Additionally, patients can feel the impact of distressed staff delivering suboptimal care (Strametz et al., 2024).

Furthermore, Holden and Card (2019) suggested that in addition to the patient and staff members, other members involved with the investigation of adverse events such as risk managers or members of the review team could be considered the third victim. Although not directly involved, these individuals become immersed in the error during the investigation process, and they often play a supportive role for the staff members involved (Holden & Card, 2019).

As discussed in Chapter 1, Scott et al. (2009) identified six distinct phases of the second victim phenomenon. In the immediate aftermath of an event, the health professional is in a state of chaos and accident response. Their initial response is one of shock and denial, trying to understand how the error happened. The next phase is the development of intrusive reflections and a need to restore their personal integrity, followed by a state of inquisition and psychological preparation for the inquiry or investigation into the incident. Lastly, there is the need for emotional first aid followed by moving on. Scott et al. stated the final phase can lead to three potential outcomes: dropping out, surviving, or thriving. Scott et al.'s work is important as it uncovers a clear need for institutional support for second victims. In response to these findings Scott et al. designed a three-tier emotional support system based on the six phases that the second victim experiences.

2.6.2 Seminal Work

Professor Albert Wu (2000) described his own experience as a house officer. Wu recalled a colleague's failure to identify a cardiac tamponade. Recalling the events that followed, Wu described ridicule from colleagues and a lack of sympathy for what was human error. Wu went on to detail the distress and self-doubt that follow a mistake and the deliberation as to whether to report the error at all. He acknowledged that the distress can escalate into more defensive behaviour and suggested that, in certain situations, individuals may direct their anger at the patient or their colleagues. Wu also acknowledged that the second victim phenomenon is not unique to doctors but can affect all members of the healthcare team.

In a later publication Wu described the improvements that had been made in his own hospital since 2011, with a peer support programme available for healthcare workers who have been involved in stressful patient-related events (Wu et al., 2018). Furthermore, Wu emphasised the importance of teaching about error early in practice and described how he teaches medical students about open disclosure and the impact of error. Busch et al. (2021) supported the importance of raising awareness of work-related stress, the second victim phenomenon and patient safety early by educating and the provision of an awareness raising-campaign.

2.6.3 Relevant Research

In 2013, Ullström et al. conducted a small qualitative study at a Swedish hospital using semi-structured interviews. The interview guide was originally developed by Scott et al. (2009) for their study of healthcare professionals' reactions following adverse events. Twenty-one health professionals participated in the study, inclusive of nurses (n=9), doctors (n=10) and allied health professionals (n=2); 16 participants were women and five men. All participants had been involved with a serious clinical error. Several respondents described emotional distress such as sadness, anxiety and experiences of re-living the event. Respondents reported feelings of guilt and shame, and feelings of frustration. Physical distress such as sleep disturbances were also reported. Some respondents raised concerns about criticism from other people, while others were mainly self-critical. They highlighted the need for empathetic support and respect from their colleagues.

The importance of support in the coping process was highlighted in early work by Wu et al. (2000). Additionally, Ullström et al. (2013) found that many of the respondents reported suffering long-lasting effects. These findings resonate with findings from other studies suggesting that many health professionals never fully recover following involvement with a patient harm event (Naya et al., 2013; Wu & Steckelberg, 2012). Mira et al. (2015) reported that second victim effects for healthcare professionals involved with error were prevalent for five years for 86.3% of respondents. Ullström et al. (2013) looked at the importance of feedback and timeframes. Five of the respondents reported receiving support; however, the majority reported that there was often a lack of timely feedback to staff, which resulted in an extended period of distress and made it more difficult for second victims to reach a resolution.

While Ullström et al.'s (2013) study was externally peer reviewed, there were limitations including small study size and potential for response bias, as the study was conducted by the organisation's Chief Nursing Officer. The study was also heavily weighted to female respondents (women n=16, male n=5) which limits the transferability to a wider population. Additionally, the lack of percentage data presenting the symptoms experienced by participants allows no comparison to other studies. However, one advantage of the study was that it surveyed a mixed group of health professionals.

In 2016, Van Gerven, Bruyneel et al. undertook research across 33 hospitals in Belgium, to glean a wider understanding by examining the individual, situational and organisational impacts of medical error, whilst also focusing on the recovery of healthcare workers. The study included doctors, nurses and midwives who had been involved in and/or witnessed an adverse event, and used a cross-sectional retrospective design, utilising an online quantitative survey. The 15-item impact scale survey sought to understand the psychological impact of healthcare worker involvement with an adverse event and the factors that influence their recovery.

The study was conducted in two steps. Firstly an online survey was sent to 24,118 medical professionals across 26 hospitals. The response rate was low with an overall response rate of (7%, n=1,755). Across the individual hospitals the response rate varied between 1%-35%. Across professions, response rates for doctors were 8% (n=378); nurses, 7% (n=1,294); and midwives, 8% (n=83).

In addition to participants' professions, demographic characteristics were collected for age, gender, years in practice and whether the health professional was in a training role. Participants were also asked to provide an indication of how long ago the adverse event had occurred. To answer the research question, the authors utilised three separate measures for the study. To measure psychological effects the 15 Impact of Event Scale (IES) was used (Horowitz et al., 1979). The COPE inventory was used to measure coping skills (Carver, 1997). Personal resilience and self-efficiency were measured using eight items from the Life Orientation Test (LOT) (Scheier et al., 1985). Finally, respondents were asked about the existence of organisational support, to which the response was either yes or no.

There were several notable findings in the Van Gerven, Bruyneel et al., (2016) study, firstly, that female healthcare workers appeared to be at higher risk of experiencing more severe psychological effects than males. This is consistent with recent research, suggesting that female health providers may be at higher risk of second victim effects and burnout, noting the intensity of the effects could be worse in those who have family responsibilities (Coughlan et al., 2017; Gupta et al., 2019; Harrison et al., 2015). However, this theory may be unreliable as most published studies have had a larger number of female participants (Gupta et al., 2019; Quillivan et al., 2016; Ullström et al., 2013; Van Gerven, Bruyneel et al., 2016). Furthermore, although women suffer more psychological distress, the findings indicated a stronger recovery process. This may be

explained by the fact they may feel more comfortable talking about the error and accepting support (Seys et al., 2013). This suggests that an individual's response to error, including their emotional processing and openness to accessing support, may in turn improve the psychological recovery process and enable them to make constructive changes following the event (Harrison et al., 2022).

Secondly, while the severity of the event increased the psychological distress experienced, there were notable disparities when comparing nurses' to doctors' psychological response to severe outcomes, such as a patient death, and nurses reported significantly higher psychological distress than doctors (Van Gerven, Bruyneel et al., 2016). This suggests that the severity of the event has a direct impact on the length of symptoms. This finding is supported elsewhere in the literature, in that health workers suffer more distress, and that it lasts longer, when the clinical error resulted in a serious adverse patient outcome such as the death of a patient (Rinaldi et al., 2016; Vanhaecht et al., 2019). Interestingly, for moderate harm events doctors reported higher distress scores.

Thirdly, participants who utilised active coping and planning strategies were found to report significantly higher psychological distress. A possible explanation for this is that those with strong coping strategies may not accept or seek support. The negative impact of delays in accessing support programmes has been highlighted in the literature (Edrees et al., 2017).

There were several limitations of the study, including the low response rate. Furthermore, as the study asked participants to think back and report on a past event, the distress reported could have been exaggerated or could have minimised the incident, resulting in recall bias. The researchers cautioned that results of their study should be interpreted as associations rather than causation (Van Gerven, Bruyneel et al., 2016).

The findings from Ullström et al. (2013) and Van Gerven, Bruyneel et al., 2016) are supported by a recent systematic review conducted by Naya et al. (2023). The review included five studies published between 2002 and 2023. All studies used cross-sectional survey design. Participants of four of the studies included doctors or nurses, with one study including members of the allied health team, including pharmacists and respiratory technicians.

Findings showed that the most commonly reported second victim effects were shame (27-35%), guilt (12-68%), lower self-confidence (7-57%), fear of judgement by

colleagues (17-46%), anger at self (25-58%) and anger at others (17-30%) (Naya et al., 2023). Psychological symptoms included anxiety (38-63%), depression (23-45%), and re-living the event over and over (48%). The length of effects varied with a lifetime prevalence of second victim effects estimated to be 58%.

2.6.4 The Impact of Safety Culture on the Second Victim Phenomenon

In 2016, Quillivan et al. sought to understand if there was a connection between patient safety culture and second victim distress. They conducted a cross-sectional study at a specialised paediatric hospital located in Memphis, in the US. The study involved the completion of two surveys using the Second Victim Experience and Support Tool (SVEST) and the HSOPSC. The study only recruited nurses with the study information sent out to 358 nurses with a response rate of 47.2% (n=169). Demographics were collected for speciality, years in speciality, years in work unit, years at hospital and hours per week, while age, gender and ethnicity demographics were not collected. The findings suggest that non-punitive responses to errors were associated with reductions in all forms of perceived second victim distress. Quillivan et al. (2016) quantitatively linked patient safety culture to second victim distress. Findings showed the indirect effect of organisational support on psychological distress, physical distress and professional distress were statistically significant ($p<0.01$). Quillivan et al.'s findings are similar to those of Van Gerven, Bruyneel et al., (2016) suggesting that punitive work cultures can increase the severity of symptoms and lead to non-disclosure of events. However, Schroder et al. (2019) asserted that a positive patient safety culture may not be enough for second victim support and that official operating models should be developed.

Furthermore, Quillivan et al.'s (2016) work supports the idea that the second victim experience may negatively impact patient safety by increasing the potential for further medical errors. One limitation of the study was that it was confined to one professional group from one specialist area. Moreover, demographic data was not collected for gender, age or ethnicity, which may have provided more details to identify specific differences between groups, improved the rigour of the study, and improved the applicability of the findings to a wider population (Shea et al., 2022). These limitations were noted by researchers, who recommended that future research can be used to investigate how safety culture affects other populations of hospital clinical staff.

2.6.5 Summary

All studies reviewed confirm the significant emotional toll that clinical errors can take on those involved and recognise both the broader consequences of clinical errors and the negative impact that clinical error can have on the organisation, colleagues and future patients (Quillivan et al., 2016; Ullström et al., 2013; Van Gerven, Bruyneel et al., 2016). Despite significant improvements to patient safety, the stigma of making an error remains a real and ongoing problem. The impact can cause long-term distress and has the potential for long-term negative consequences to develop for health professionals both personally and professionally. Research by Quillivan et al. (2016) emphasised the importance of fostering an open and supportive culture, which is crucial to ensuring that individuals involved with clinical error feel acknowledged and cared for. However, feelings of shame, guilt and low self-confidence are frequently reported in the literature. Understanding organisational culture is the first step to identifying underlying behaviours and their relationship to safety culture and staff well-being.

Whilst the research suggests that healthcare organisations should have support in place for staff involved with clinical error, how to mitigate the second victim effects and support second victims in real world practice is less well understood. The limitations of many of the studies reviewed are that they focus on one specific group of professionals such as doctors or nurses and have been conducted in secondary care in high-risk specialist areas such as paediatrics, intensive care and obstetrics. There are only a small number of studies that have surveyed several different health professionals, but having this information may uncover important insights specific to professional groups that can be used to assist with the development of support interventions. Furthermore, there is a gap in the literature in terms of understanding how organisational culture impacts recovery and the effectiveness of support interventions.

2.7 Second Victim Support

2.7.1 Background

Most of the second victim literature argues that further improvements are required to support healthcare workers involved with clinical error (Quillivan et al., 2016; Van Gerven, Bruyneel et al., 2016; Wu et al., 2000). Regulatory bodies recognise the emotional impact that error can have on health professionals and stress the importance of organisations having mechanisms in place to support their employees (New Zealand

Medical Council, 2024). The New Zealand Medical Council (2024) statement on the disclosure of harm stated that doctors should be provided with support and an opportunity to discuss incidents in a safe environment, recommending that employers provide training and peer support. The New Zealand Nursing Organisation (NZNO) recommended that members involved with an investigation to seek guidance and support from their professional body (NZNO, 2014). However, despite these statements, many organisations and professional bodies do not have structured support services in place.

It has been over a decade since the concept of the second victim was first introduced by Professor Albert Wu, and although globally there have been a handful of support programmes developed there is still a lack of understanding about which programmes are most effective (Stone, 2020). Ozeke et al. (2019) suggested that only 10% of those involved with clinical error report feeling well-supported.

The importance of support has been highlighted in a policy statement published by the recently formed European Researchers Network Working on the Second Victim Phenomenon (ERNST), the statement addresses the profound impact clinical error has on health professionals and the wider implications of these effects (Mira et al.,2024). It is however important to recognise that the impact of clinical error is individualised, and not all staff respond in the same way, with health professionals varying in the intensity of emotions and the duration of necessary support (Seys et al., 2013).

Whilst having a clear structure is useful, it is important to note that the second victim response is not ‘one size fits all’ and applying a generalised approach may not provide the level of support required to get optimal outcomes (Stone, 2020). Several studies have noted the limitations of formal counselling and employee assistance programmes (EAPs), with respondents finding these less useful or desirable than peer support (Burlison et al., 2017; Mok et al., 2020). Concerns have also been raised by participants about the confidentiality of EAPs (Edrees et al., 2017). Furthermore, there are well documented barriers to accessing support including fear of embarrassment and stigma attached to needing help (Edrees et al., 2017).

In 2009, Scott et al. developed a three-tiered response model for second victim support. The model is a framework for applying support after an adverse event.

Tier 1 provides immediate emotional first aid from peers or leaders and/or managers.

Tier 2 utilises trained peers, monitoring the staff members for second victim symptoms.

Tier 3 is the provision of access to professional resources such as referral to counsellors or guidance services.

2.7.2 Relevant Research

Reiser Crelier et al. (2020) undertook a cross-sectional study across Swiss hospitals in 2019 to identify the prevalence of organisational structures and processes available for second victims. The study used a multi-centre survey approach and targeted acute care, mental health, rehabilitation, and specialty clinics. In total there were 231 clinics surveyed using a 13-item questionnaire. 116 quality managers responded, a response rate of 50.2%. Findings indicated that 31.9 % of respondents reported having organisational guidelines for second victims in place. The remainder of participants were not aware of any local guidelines or reported having no guidelines. This study highlighted that even though some organisations had developed institutional guidelines, only 60.3% notified staff of these services. Also, 31% provided some form of second victim support training for line managers although details of the training provided is limited. Although the study provided insight into the availability of support, it did not offer any information about the take-up of such programmes. The study's limitations are that the surveys were directed at quality managers and chief operating officers. No frontline staff were surveyed so the data was not representative of the healthcare population that is most likely to be affected by clinical error (Reiser Crelier et al., 2020).

Baas et al. (2018) conducted a cross-sectional study using a survey to understand the impact of adverse events on Dutch gynaecologists. In addition to personal experience questions the survey included 12 questions on support provided and two questions on desired support. The majority of respondents were female (65%), with most respondents aged between 35-44 (30.9%). According to 60% of respondents, support services following an adverse event were insufficient.

It was also found that 62% of respondents did not have access to a support programme, and 25.7% reported that they were not aware of a support programme. Most respondents (82%) preferred a peer or colleague to provide direct support, with 86.1% stating that the culture following an adverse event needed to change. Findings are supported by a recent systematic review conducted by Naya et al. (2023) on the support

that second victims desire peer support in the aftermath of an adverse event. Peer support is often considered the most important intervention following patient safety incidents (Kobe et al., 2019).

Seys et al. (2013) conducted a literature review to identify supportive interventional strategies for second victims, with 21 research articles were selected for inclusion in the review. Seys et al. found that several studies commented on the importance of second victims talking and sharing their experiences with colleagues. Participants also valued access to professional and confidential support. Interestingly, one study found participants were hesitant to talk to and share their experiences with colleagues, being fearful of potential damage to their professional reputation and image (Bell et al., 2010). More recently, Seys et al. (2023). published a narrative review focusing on the preventative actions. The findings support those of the earlier research and highlight the importance of providing structured and tiered support dependant on individual needs.

2.7.3 Types of Support

In New Zealand there are no formal support programmes or guidelines to support health professionals who become second victims. Many health organisations offer EAPs; however, several studies have highlighted limitations in the services provided in regard to, the EAP staff's ability to relate to clinical providers, and timely accessibility to appointments (Edrees et al., 2016). Timeliness of support is crucial, with Scott et al. (2009) stressing the importance of providing immediate support following an adverse event, and early intervention. Furthermore, some staff have raised concerns over receiving a mental health diagnosis requiring disclosure to professional bodies, resulting in some health professionals seeking support services from outside the workplace (Nosanov et al., 2023). However, this is often at the health professionals' own cost and time, resulting in limited take-up of these services (Gallagher et al., 2003).

The underlying themes from the research to date indicate that healthcare staff involved with clinical errors need access to support. White (2008) stressed the importance of organisations addressing the needs of second victims. However, there is limited information on what support should be used and if this needs to be tailored for different professional groups. The support second victims desire most is informal peer support

(Burlison et al., 2017; Seys et al., 2013). Peer support has been highlighted as being a valuable component of post-incident support (Edrees et al., 2016).

2.7.4 Support Programmes

Internationally, there have been a small number of second victim programmes developed, mainly in the US specifically for healthcare staff impacted by clinical error including Swaddle, Resilience in Stressful Events (RISE) and We Care Programs (Edrees et al., 2016).

While these services were each set up slightly differently, the overall aim is to provide emotional support for staff involved with a patient harm event. It is, however, important to note that evaluation of these programmes is limited.

- *Resilience in Stressful Events (RISE)*. In 2010, the John Hopkins Hospital safety department developed the RISE programme (Edrees et al., 2016). Initially launched in paediatrics, the RISE programme provides timely psychological first aid and emotional support within 12 hours of a clinician experiencing a clinical error. The RISE programme offers 24/7 support in a peer-to-peer or group format, depending on the healthcare worker's request. The support groups are made up of trained peer responders, including nurses.

  In 2016, Edrees et al. undertook a mixed-methods study to describe the development and evaluate the frequency of encounters of the RISE programme. The study reviewed encounters, staff surveys and evaluations by RISE peer responders. The study found that most respondents preferred a multidisciplinary peer group to provide support (68.7%, n=95), whilst 15.5% (n=21) preferred a nurse manager and 13.5% (n=19) preferred pastoral care. The timing of support varied with 12.7% (n=17) wanting access to support at the time of the event, 25.4% (n=34) wanting access to support a few hours after it happened, and 48.2% (n=66) wanting access to support a couple of days after the event. Barriers to accessing support included concerns about confidentiality and the confidentiality of shared information that may result in legal and disciplinary action.

- *forYou*. The University of Missouri Health Care (UMHC) developed the forYou programme. The programme was implemented into practice in 2009 with the primary aim being to ensure that health professionals were supported and assisted

by providing peer-to-peer support and supporting the healthcare professional through the aftermath of an adverse event, using a three-tiered response model for second victim support (Scott et al., 2009). The forYou programme support, provided by a group of allied health professionals consisting of doctors, nurses, social workers and respiratory physicians, aimed to normalise the emotional impacts and provide surveillance for those impacted (Paparella, 2011).

In 2015, Hirschinger et al. conducted a longitudinal study to evaluate the use of the forYou programme. Since implementation, 1,075 doctors that had accessed the programme. Tier 1 department level one-to-one support was generally provided by peers and line managers. The health professional involved would receive regular check-ins and be monitored for second victim symptoms. One-to-one support accounted for 396 interactions over a five-year period. Additionally, there were 632 interactions for group de-briefing and 47 for mentoring. At tier 2, support was provided by peer experts; this was delivered as one-to-one and debriefing, and accounted for 1,028 interactions. Tier 3 professional support accounted for 104 interactions.

- *Swaddle*. This second victim support programme was set up by Scott & White Healthcare, a health provider in Texas from 2001-2012, and formalised in 2011 by naming the programme Swaddle. Like the forYou programme, Swaddle provided support to staff impacted by adverse and/or traumatic events through a team of volunteer experienced personnel. These personnel provided ongoing peer support and were also trained to provide psychological first aid for high-risk situations (Trent et al., 2016). A fast-track process was imbedded to escalate to a behavioural health clinician for staff who were in crisis.

  Trent et al. (2016) used a qualitative interview technique to evaluate the experience of Scott and White Healthcare staff following an adverse event. Participants included nurses, doctors and allied health practitioners; all were identified as being staff members involved with clinical errors. A total of 30 interviews were conducted. The interview questions had four themes, with one focused on the design of support systems for impact. Participants placed a strong emphasis on the importance of peer-to-peer support and, where possible, this support should be provided by a staff member from the same speciality. Additionally, confidential and personalised support was also an important factor.

Furthermore, participants highlighted the importance of timeliness and making staff aware of the existence of second victim support services (Trent et al., 2016). Whilst the study suggests that the peer support programme may have decreased the distress of the health professional, it did not evaluate the experience of those that had accessed the programme.

2.7.5 Summary

Whilst these programmes go some way to bridging the gap, they are all different and specific to each organisation. As discussed above, evaluation of the effectiveness of support programmes is limited to a few small studies, and the success of programmes outside of the US is unknown, making it difficult to generalise the findings**.** However, despite the lack of evaluation, these programmes provide staff members with support and care to help them cope with the emotion and psychological distress experienced in the aftermath of a clinical error. It is also important to note though that whilst peer support programmes are generally well received, they are not suitable for all situations (Dukhanin et al., 2018; Edrees et al., 2017).

As highlighted by Trent et al. (2016) one of the key areas for improvement is the communication to staff that these programmes exist and how to access them. Additionally, the research highlighted that none of the programmes provided details on the length that support would be available. Holden and Card (2019) stated that many of the programmes available are restricted to a specified timeframe. However, for some events, an external review may be required. These processes can take years to investigate, resulting in staff members suffering over a prolonged period, causing a cumulative effect. Experts suggest that external investigations, disciplinary board reviews or malpractice suits prolong the suffering experienced by both patients and health professionals, increasing the intensity and length of negative psychological and physical effects (Hanganou, 2022; Nash et al.,2004). Therefore, allowing unrestricted access to support services would be paramount (Holden et al., 2019). One key theme frequently reported throughout the literature was the importance of peer and leadership support. The importance of collegial and leadership support should not be understated in the recovery of the second victim.

2.8 Chapter Summary

Chapter 2 has outlined the history and current situation relating to clinical error in healthcare, as well as the perceptions and attitudes of healthcare staff towards patient safety, clinical errors and reporting practices. It has outlined the experience of those who are involved with a clinical error and reviewed the support mechanisms that are currently available.

Although improvements have been made to enhance patient safety, patients are harmed in healthcare every day. While the importance of open communication, transparency and shared learning is frequently referred to in the literature, the stigma associated with making an error still exists (Detsky et al., 2013). The fear of failure and potential repercussions of making an error are frequently highlighted, as well as the guilt and shame experienced (Detsky et al., 2013). Whilst the development of support programmes is a step in the right direction, the effectiveness of these programmes remains unclear and further evaluation of them is required (Guerra-Paiva et al., 2023).

The study of the impact of clinical error is undeveloped in New Zealand and requires more focused research, particularly further engagement with health professionals to understand the prevalence of the second victim phenomenon in the New Zealand healthcare sector and the impact of organisational culture on recovery. For this to be successful, regulatory bodies and government organisations must move away from the traditional disciplinary process and take a collaborative approach to safety culture across Aotearoa. Additionally, more focus should be given to improving education on the second victim phenomenon during training, to inform staff about the concept of the second victim and related feelings (Schroder et al., 2018).

The findings from the studies included in this literature review serve as the basis of the present research investigating the emotional effects of clinical error, the impact of organisational culture, the availability of support, the types of support and the appropriate timing and effectiveness of interventions. This mixed-methods study is, to the best of the author's knowledge, the first study looking at the impact of clinical errors on the New Zealand health workforce. This study adds to the existing body of evidence, and seeks to assist with the development of educational resources and help guide the development of second victim support programmes and guidelines. It has also sought to uncover any

differences between professional groups, allowing for the development of targeted resources that will hopefully enhance the ability to learn from error.

Chapter 3 outlines the research methodology used to underpin this study. It discusses the research design, survey tools and sampling methods used, and ethical considerations, Furthermore, it discusses the rationale for the chosen approach and identifies specific issues relating to the research methodology.

Chapter 3

3.0 Introduction

The primary aims of this research are to understand the impact that clinical error has on healthcare professionals, to understand their desired support mechanisms, and to investigate how organisational culture affects the severity of the effects and recovery process of a clinical error. To the best of the author's knowledge, this is the first study in New Zealand to look at the impact of clinical error on health professionals, and the first study internationally to explore the impact of clinical errors on medical imaging technologists. This chapter outlines the research design, techniques, data analysis strategy and methods, ethical considerations and limitations. Furthermore, this chapter provides a detailed description of the research process and rationale to support decision-making, providing an audit trail of the research to ensure scientific rigour and credibility throughout the study (Carcary, 2020).

3.0.1 Research Questions

This study seeks to answer the following questions:

I. What psychological impact does involvement with clinical error have on New Zealand health professionals?

II. What impact does organisational culture have on the recovery of health professionals following a clinical error?

III. What support do health professionals want following a clinical error?

3.1 Research Paradigms

It is important for researchers to have a clear understanding of the philosophical approaches to research before embarking on their own research (Weaver & Olson, 2006). Several research concepts exist, and these individual views are known as paradigms. Creswell (2018) identified four paradigms as positivism, post-positivism, interpretivism and pragmatism. Teddlie and Tashakkori (2012) described these paradigms as principles that influence the researcher's approach to answering the research question by linking methods with paradigms. Understanding these paradigms allows the researcher to decide on the most appropriate methodology to underpin their research (Halcomb 2018).

3.1.2 Pragmatism

This study takes a pragmatic approach, allowing the researcher freedom of choice to explore and understand connections between knowledge and action (Creswell and Tashakkori, 2007). Pragmatism is a colloquial term defined in the Oxford dictionary as "a method of understanding facts and events in terms of cause and effect, and of inferring practical lessons or conclusions from this process" (Oxford English Dictionary, 2015). Pragmatism stems from the physical, psychological and social worlds, recognising the importance of culture, language, institutions and subjective thoughts (Johnson & Onwuebuzie, 2004). Furthermore, pragmatism combines a realist perspective with a constructive perspective, seeking to understand how outcomes occur in relation to context, by combining different research methods (Biesta, 2010; Greene et al., 2008). However, Slevitch (2011) points out that quantitative and qualitative methods belong to different ontological and epistemological origins which represent different world views. Conversely, Johnson and Onwuegbuzie (2004) argued that pragmatism is seen by many researchers as the most useful philosophy to support mixed methods research.

It is generally accepted that the choice of methodology should be considered in light of the research context and conditions, and that a combination of different approaches may provide a broader understanding of the phenomena being investigated (Creswell & Plano Clark, 2018). Pragmatism is viewed as a supportive paradigm for mixed-methods research using qualitative approaches to examine experience and quantitative approaches to examine consequences; and either combined or independently, both can be used to examine actions (Creswell, 2014). Hesse-Biber (2015) stated that pragmatism has become mixed-methods' 'paradigm of choice'.

3.2 Research Methodology

3.2.1 Mixed-Methods Research

Due to the complex questions this study sought to answer, a convergent parallel fixed mixed-methods approach was used. Harrison et al. (2020) described a convergent design in which both quantitative and qualitative data were collected at the same time to answer the research question, with the intention being to combine the results of the quantitative and qualitative data analysis.

The mixed-method approach to research is defined by Creswell and Tashakkori (2007) as: “Research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry” (p. 4).

Greene’s (2007) definition provides a more philosophical viewpoint, acknowledging multiple world views of seeing and hearing the social world: “[Research] that actively invites us to participate in dialogue about multiple ways of seeing and hearing, multiple ways of making sense of the social world, and multiple standpoints on what is important and to be valued and cherished” (p. 20).

Mixed method research takes a pragmatic philosophical approach (Maarouf, 2019), making it an appropriate choice of methodology for this research study. The benefit of this approach is that it utilises the strengths of both approaches, providing a more holistic understanding of the research questions (Bressan et al., 2017). Palinkas et al. (2011) suggested that, in a mixed method approach, qualitative methods provide depth of understanding, while quantitative methods are used to provide breadth of understanding, indicating that a mixed-methods approach allows researchers to examine multiple perspectives, compare and triangulate different findings, and assess both processes and outcomes (Creswell & Plano Clark, 2017). Howe (2012) discussed the concept of triangulation whereby qualitative and quantitative methods can be used to conjunctively triangulate, suggesting, that the two methods can be used to explore complex problems, different perspectives and provide more detail and completeness than qualitative or quantitative data provides alone (Creswell et al 2011; Doyle et al., 2016). This is reinforced by Brown et al. (2015), who stated that, in health research, a mixed-methods approach is useful to understand the wider factors that may influence behaviour, health, and policies and programmes.

While the mixed-methods approach continues to grow in popularity in the field of health science and nursing, it continues to be challenged for philosophical theoretical and methodological value, pedagogy, definition, discourse, rigour and persuasiveness in the integration and syntheses of data (Giddings, 2006; Morgan, 2007). There are concerns about the philosophical underpinnings of this approach, and it is viewed by some academics as a controversial method, based on the belief that quantitative and qualitative methods cannot be mixed in a single study (Shan, 2021).

Onwuegbuzie and Johnson (2006) acknowledged the challenge of assessing the validity of a mixed-methods approach. Additionally, Tashakkori and Teddlie (2010) suggested that the validity of the study may be affected by the drawing of quality conclusions or inferences based on one set of data. Furthermore, Leavy (2017) suggests that one method may become more dominant, which could lead to the contribution of the other method being undermined.

However, it is important to note that the mixed-methods design has been successfully executed in a variety of research settings (Wasti et al., 2022). Creswell & Plano Clark, (2017) highlighted the valuable insights that qualitative and quantitative data can provide, ensuring more richness, depth and understanding of the issue. Polit and Beck (2010) argued that a mixed-methods design allowed the quantitative and qualitative methods to balance out the limitations of each method and provide a more holistic understanding of the phenomenon being studied in this case, the impact of clinical error on health professionals. Furthermore, Cooper (2000) highlighted that, for safety culture research, there is a consensus in the literature that using a triangulation approach is the preferred method for measuring safety culture.

3.2.2 Quantitative Methods

It is important to note that the study design was largely quantitative, using a survey tool to collect self-reported responses from participants. Quantitative research allows for the analysis of large volumes of data and usually involves numbers and statistics (Bryman, 2016). Holt (2009) described the approach as reductionist. A reductionist approach is found in positivist views of science. Positivism is fundamentally concerned with verifying a hypothesis, and uses methods such as controlled trials, random statistical samples, and structured questionnaires (Wasti et al., 2022). Henline-Hall (2024) detailed the advantages of using a quantitative approach, including the generalisability of results to larger populations and other contexts.

Despite the advantages of being able to collect and analyse large volumes of data, there are disadvantages to using a quantitative approach including the risk of research biases, limited context and depth in regard to participants' personal experiences, and the risk of misleading or misinterpreting results if proper methods are not used (Henline-Hall, 2024). Additionally, effects can be lost due to selection and sampling biases which can affect the validity of the research (Brown et al., 2024). Therefore, careful consideration

of sample selection is fundamental to ensure objectivity in quantitative research and to minimise bias (Holt, 2009).

3.2.3 Qualitative Methods

Although this study was largely quantitative, additional insights were derived by incorporating qualitative methods into the study design by including free-text questions. Qualitative approaches can be embedded into a quantitative research methodology to elaborate, enhance or clarify the results from another method (Halcomb & Hickman, 2015). Denzin and Lincoln (2013) suggested that qualitative data can help to complement, clarify, expand, and explain the findings, thereby increasing their overall credibility of the study. Qualitative methodology is primarily driven by exploring and understanding people's beliefs, attitudes, behaviours, and experiences, often through the use of interviews (Leavy, 2017). Qualitative research is descriptive and has been defined as interpretivist (Sanjari et al.,2014). It uses words and language in situations such as discussion groups and interviews to explore participants' perspectives (Bryman, 2016). According to Fife & Gossner (2024), the qualitative approach is used as a deductive approach towards research. Bergdahl and Berterö (2023) suggested that deductive approaches play vital positions in theory creation. Wasti et al. (2022) suggested that qualitative data collection takes more of an interpretive approach. Interpretivism has a 'relativist' ontological perspective, incorporating culture, norms, understanding, social reality and definitions of the situation. The researcher adopted a mixed-methods convergent parallel design, the quantitative data was given priority, and the qualitative data was used to enhance the quantitative results (Malau-Aduli & Alele, 2023).

A mixed-methods approach aims to provide more detail around any nuances between different demographics and to generate a better answer the research questions. The justification for using this methodology for this research study was twofold. Firstly, there were strict requirements around participant confidentiality, and using largely quantitative methods allowed for strict participant anonymity. Secondly, due to the need for strict confidentiality, interviews had to be replaced by the use of free text. This would provide some flexibility in response and enabled augmentation of the quantitative findings (Farquar et al., 2011). Harrison et al. (2020) highlighted the complexity of human behaviour, suggesting that to derive a deeper understanding researchers require both breadth and depth, and asserting that mixed-methods research is especially well suited when conducting research looking to understand human behaviour. Furthermore,

including free-text questions allowed for a more holistic approach, providing a more detailed representation of the participants experience, whilst still ensuring anonymity. Therefore, supporting the rationale for a mixed-methods approach, while quantitative data and results provide a general answer to the research problem, qualitative data bridges the gap between the positivist and social humanistic worldviews by exploring participants' views in more depth. Bryman (2016) described the mixed-methods approach as; "*putting meat on the bones of dry quantitative data*". p641

Additionally, existing literature that evaluated all the components of the research question were limited. Therefore, incorporating qualitative data would provide more valuable insights than using only approach alone, enabling a more detailed and granular insight into the experiences of participants. Hesse-Biber (2015) observed that qualitative methods can help draw important characteristics from the population studied. Furthermore, having qualitative data is vital to support the development of theories, and provide a clear focus to the study in relation to what might make a difference to participants. When exploring the preferred support mechanisms following a clinical error, qualitative data can provide the researcher with a more detailed understanding of "what matters most" to participants (Davidoff et al., 2015).

3.2.4 Validity and Rigour

Ensuring the validity and reliability of research is essential. Due to the mixing of different paradigms in mixed-methods research, the requirement for and assurance of validity in mixed-methods research is an ongoing issue for researchers (Creswell & Plano Clark, 2018). Rolfe (2006) highlighted the importance of verification at all steps of the decision-making process, referring to it as the 'audit trail'. Validity is the integrity of the research steps, the integrity of the chosen methods and how accurately the findings reflect the data (Noble & Smith, 2015). Rigour is described as the act of precision and the strength of the research design, which increases the quality of the research (Morse et al., 2022). As outlined in this chapter, several steps were taken to ensure the validity and rigour of this research.

3.3 Positionality Statement

Positionality is the underpinning of how researcher's personal beliefs impact their position with regard to their research and its social and political context; it may also impact their choice of processes, and their interpretation of outcomes (Creswell &

Creswell, 2018). Epistemology is the way we understand how knowledge is generated and impacted by past experiences and how these impact how the role of the researcher is enacted (Leavy, 2017). Berger (2015) suggested that the researcher's positionality is influenced by their personal experiences and may influence the research process. The process of reflexivity, the practice of identifying pre-conceptions, allows the researcher to understand their own positionality, allowing them to gain a deeper understanding of how their own personal beliefs and perspective influence the research field (Holmes, 2020).

My own personal experiences as a health professional and as a strong advocate for patient and staff safety inspired my interest in this research area. I have worked as a Registered Nurse for over 20 years, initially overseas in the UK before emigrating to New Zealand in 2009. Prior to my role in quality and risk, I worked in several patient-facing roles in both primary and secondary care. As a nurse, I have my own personal experience of being a second victim. As a colleague, I have witnessed the distress of those I have worked alongside who became second victims. As a health leader, I have at times found it challenging to determine the most effective way to best support second victims under my leadership. These personal experiences resulted in a deep curiosity about the second victim phenomenon and the different experiences of those who become a second victim. Of particular interest to me is whether there are unique differences and hierarchical differences between professional groups, and whether the individual challenges different professions may encounter in accepting support are due to historical, professional and societal expectations.

Despite this disclosure of my positionality, throughout the study, several steps were taken to mitigate my own bias, including the use of reflexivity. Olmos-Vega et al. (2022) suggested that reflexivity is used to explore the researcher's own influence on the research. Furthermore, they pointed out that rather than the researcher's personal viewpoint being eliminated, the researcher's influence needs to be acknowledged or explained (Olmos-Vega et al., 2022). I used reflective practice continuously throughout this study, reflecting on my personal beliefs and experiences and having a clear understanding of the power dynamics between the researcher and participants. Additionally, the findings from the study closely resonated to my own experience with clinical error. I used this as an opportunity to reflect on my feelings and positionality throughout the study.

The framework of the study ensured a robust and structured approach throughout, including a robust recruitment process whereby I removed myself from the research process, acknowledging the power imbalance that could potentially lead to bias (Råheim, 2016). Furthermore, throughout the study I adopted strict adherence to confidentiality to protect participants, employing expert involvement at all stages of the study, and ensuring clear validity strategies, appropriate statistical analysis, pilot testing, and ethical approval. Additionally, regular meetings with the supervisory team provided a platform for regular critique of and reflection on the data and findings.

3.4 Participant Selection and Recruitment

3.4.1 Target Population

The target population were registered medical professionals holding a current practicing certificate, registered nurses (with a current practicing certificate), medical imaging technologists and pharmacists. The inclusion criteria required that participants were registered health professionals holding a current practicing certificate, as listed above and whom had made a clinical error. There were no exclusion criteria.

Research to date has been largely focused on nurses and/or doctors (Baas et al., 2018; Quillivan et al., 2016; Van Gerven, Bruyneel et al., 2016). Therefore, a wider variety of professional groups were invited to participate in the study to provide greater insight into the extent of the impact of clinical error on a broader range of health professionals. The role of the participants was limited to the sharing of personal experience through answering a survey. Participants were not involved in designing the study.

The sensitive nature of this study may have acted as a potential barrier to recruitment impacting sample size. Elmir et al. (2011) suggested it may be difficult to recruit participants into research that involves sensitive topics, as they are required to revisit past trauma. This is supported by Dempsey et al. (2016), who highlighted a sensitive research topic can be a barrier to recruiting participants. Furthermore, healthcare workers can be difficult to recruit, due to lack of interest in the topic, lack of time or ambivalence about the value of the research itself (Broyles et al., 2011).

3.4.2 Recruitment and Sampling

Medical doctors, registered nurses, medical imaging technologists and pharmacists were included in the sample. These professional groups were included in this study to provide a wider perspective of the impact of clinical error on different health professional groups. Previous research has generally focused on doctors and/or nurses (Baas et al., 2018; Quillivan et al., 2016; Van Gerven, Bruyneel et al., 2016). Gathering data on a wider range of professions could provide more information about the extent of the problem and the potential differences between different professional groups. For the purpose of this study, demographics including gender, age, professional group and practice years were collected; no demographics were collected on ethnicity, first language or culture.

It is generally accepted that higher response rates improve the quality of the research and increase the likelihood of uncovering an effect, if one exists (Meterko et al., 2015). One of the key considerations is that sample size achieves sufficient power (Bacchetti et al., 2011). Charan et al. (2021) cautioned that if a sample size is too small, the results cannot be generalised to a different population. A response rate of 60% has been recommended (Fincham, 2008). However, Eysenbach (2004) suggested that this is an arbitrary cut-off point**.**

Essentially, sample size should provide enough data that is representative of the wider population, to allow for generalisability of the findings (Memon et al., 2020). Generalisability is the process of extrapolating the results of a study to a wider population and is considered a major criterion for evaluating the quality of a study (Kamper, 2020; Polit & Beck, 2018). Harrison et al. (2020) stated that the use of largely quantitative methods will further strengthen a study's generalisability. While sample size is important, it can be argued that the sample size is largely dependent on the characteristics of the setting (Moser & Korstjens, 2018). In this study, the sensitive nature of the questions may have impacted the final sample size. This view is supported by Althubaiti (2022), who argued that a sample size can be small when investigating rare diseases or when the sampling technique is complicated and costly.

3.4.3 Sampling Technique

Due to the nature of this study being conducted in a healthcare setting with a mixed health professional workforce, the convenience sampling technique was applied.

Convenience sampling is a non-probability form of sampling of participants drawn from a source that is conveniently accessible to the researcher, allowing participants to self-select to participate (Stratton, 2021). There are several disadvantages to the technique; most importantly, the findings from non-probability sampling only apply to the participants in the research, limiting the generalisability of the findings (Stratton, 2021). Additionally, it requires the willingness of those eligible to participate, thus it may introduce motivation bias into the study (Stratton, 2021). Bias is described by Polit and Beck (2021) as any influence that can distort the results of a study. Motivation bias can directly influence participation in the study. In this situation, those who have a vested interest in or specific opinion on the research topic may be more likely to participate. However, despite the disadvantages of convenience sampling, studies conducted using this technique can have high internal validity if the findings are trustworthy; however, it should be noted that a study conducted using convenience sampling will have limited external validity (Andrade, 2021).

The initial target population was 255 which required a sample size of 154. However, because only a maximum of 50% of potential participants would have experienced clinical error (Seys et al., 2013), this reduced the eligible population size to 127.5, and therefore the sample target was calculated as 96. Therefore, for this study the aim was to recruit a smaller sample target between 80 and 100 participants, which allowed for a confidence level of 95%, and a margin of error of 5%. A confidence level of 95%, provides a good level of confidence on the extent to which the true data lies (Clarke, 2012). A 5% margin of error suggests that there is a 5% chance that the data would lie outside of the true population level, 5% is generally viewed as being an acceptable level (Clarke,2012).

Additionally, as detailed in the previous section, due to the nature of the study there were potential recruitment constraints identified that may have limited the final sample size. Due to strict adherence to confidentiality, only specific demographics could be obtained to protect the identity of participants; the data collected included gender, age range, professional group and years in practice. Due to the low numbers of pharmacists these were combined with medical technicians as ‘other’ to ensure anonymity. Ethnicity and race were excluded as these demographics could potentially identify participants. To ensure rigour, independent advice regarding appropriate sampling was sought from two biostatisticians; this is detailed in section,3.5.

3.4.4 Location

The study was conducted across a healthcare organisation in New Zealand in an outpatient setting. The researcher had the full support of the organisation, including senior colleagues, to conduct this study. Study approval was granted by the Chief Executive Officer and Chief Medical Officer.

3.5 Research Instruments

3.5.1 The Survey

An online survey was used to collect both quantitative and qualitative data. Surveys are advantageous as they are easy to conduct, relatively inexpensive, and can be distributed to large numbers of people, whilst providing a degree of confidentiality and, if necessary, surveys can allow total anonymity (Holt, 2009). However, one major disadvantage of surveys is the low response rate (Goodfellow, 2023). To collect good quality data, surveys should be constructed to collect minimal amount of information from respondents that can be generalised to a population, therefore reducing the risk of low-response rate and non-completion of the research survey (O'Connor, 2022). Due to the sensitive nature of this study, participant anonymity was crucial, therefore no identifiers were linked to the participant and their responses. Furthermore, the answering of all survey questions was not mandatory. Participants could skip questions. Décieux et al. (2015) suggested that mandatory survey fields can lead to increased dropout rates.

3.5.2 Tool Selection

Relevant literature was reviewed to identify existing survey instruments or tools that could be utilised or refined for this study. Kelley et al. (2003) emphasised the importance of the rigorous development of a survey tool, to ensure the reporting of credible findings. Using validated tools improves the credibility of the study and research findings (Clark et al., 2013). Additionally, using validated tools also enables the researcher to compare findings against those of previous studies, providing a more comprehensive analysis.

After a thorough literature search, no single survey tool was located by the researcher that could specifically answer the research questions. Only one survey tool, the Second Victim Experience and Support Tool (SVEST), was identified that measured the second victim phenomenon (Burlison et al., 2017), whilst several survey instruments

existed to measure safety culture. These were the SAQ (Sexton et al., 2006) and the HSOPSC (Nieva and Sorra, 2004), and a modified version of the Safety Climate Survey (SCS) (Hutchinson et al., 2006).

The original SAQ and HSOPSC tools were developed in the US, and both have been adapted and used outside the US in a variety of settings. The SCS was a modified version of the SAQ that had been successfully adapted and used to measure safety climate across several acute trusts located in the UK. Safety culture surveys were adopted to measure all aspects of the underlying safety culture, identifying possible weaknesses in clinical settings (Bondevik et al., 2014). The SAQ has been widely implemented across various healthcare settings, including a validity study conducted in New Zealand (Sexton et al., 2006). Additionally, the SAQ has been used to measure safety culture within Australian hospitals, and modified versions have been validated for use in South Australia and Victoria. It is important to note that safety questionnaires have been criticised for lack of theoretical underpinning (Flin et al., 2006). However, more recent work has provided assurance around the quality of these questionnaires. In 2018, Aslalem et al. conducted a systematic review of the adequacy of psychometric properties by comparing five tools. Using quality appraisal criteria, the SAQ was found to have good quality overall.

3.5.3 Identification of appropriate tools

The following steps were taken to identify the appropriate tool for use in this study. First, a review of the selected tools for content validity and reliability was undertaken. Surveys generally undergo a process of review by subject experts in order to establish content validity (Taherdoost, 2016). Content validity refers to the how accurately a tool measures what it needs to measure (Taherdoost, 2016), while reliability is the extent to which the tool provides stable and consistent results (Streiner et al., 2024). Several tests can be applied to measure the validity and reliability of survey tools; the most commonly used is Cronbach's alpha coefficient. It is generally accepted that a minimum internal consistency coefficient of 0.70 is satisfactory (Malapane & Ndlovu, 2024). Second, the chosen tools were modified to answer the research question by extracting a subset of items related to second victim phenomenon and safety culture from existing tools and adding additional questions.

3.5.4 The Second Victim Experience and Support Tool (SVEST)

The SVEST was selected as an appropriate tool to measure the psychological and physical effects of clinical error on participants. Although the study focuses on the psychological impact of clinical error, including physical effects and defensive medicine provides a deeper understanding of how the psychological symptoms can lead to broader negative outcomes.

The SVEST was developed by Burlison et al. (2017) to assess the experiences of healthcare staff involved with clinical errors. The original tool consisted of 29 items representing seven dimensions (psychological distress, physical distress, colleague support, supervisor support, institutional support, non-work-related support, and professional self-efficacy) and two outcome variables (absenteeism and turnover) and uses a five-point Likert scale. Internal consistency assessment was reported using Cronbach's alpha, and reliability scores ranged from 0.61 to 0.89 for the survey dimensions (Burlison et al., 2017). The Cronbach's alpha reliability score for the psychological distress dimension of the SVEST is 0.83 and the confirmatory analysis score is 0.91 overall, indicating good internal consistency (Burlison et al., 2017). Furthermore, the SVEST has revealed good content validity (Dato et al., 2023), which confirms its accuracy and ability to measure what it is intended to measure (Anderson et al., 2024).

Additionally, the SVEST has been adapted and revised for use across a variety of different healthcare settings including general hospitals, and paediatric, maternity and emergency departments (Yusof et al., 2023). The SVEST- Revised is an adaptation of the original SVEST. The revised questionnaire contains additional positive focused questions, and questions about resilience (Winning et al.,2020).

More recently, a scoping review of the SVEST tool by Yusof et al. (2023) acknowledged that, overall, the SVEST is a reliable and valid tool. However, Yusof et al. highlighted that validation in the original study showed that two of the dimensions in the tool (peer support and institutional support) had low internal consistency. Furthermore, the original study was conducted in a single institution, limiting the generalisability of the results.

For this study to answer the research question, all items were selected from the SVEST's psychological and physical distress domains, two items were selected from

colleague support, and three items were selected from support options (see Appendix A). Prior to commencing the study, the researcher sought permission to use the tool from one of the authors of the original tool, by email.

3.5.5 The Development of the Workplace Culture Questions

To measure workplace culture, questions were taken from both the original SAQ (see Appendix B) and the SCS (Appendix C). The SAQ was originally developed in Texas in 2005 (Sexton et al., 2006). The original authors provided permission for use of the tool. However, they cautioned that any modifications may affect the validity of the tool (Sexton et al., 2006). The SAQ is a refinement of the Intensive Care Unit Management Attitudes Questionnaire (Sexton et al., 2006), which was itself derived from the Flight Management Attitudes Questionnaire (FMAQ) widely used in commercial aviation to address failures in interpersonal aspects of airline crew performance. The SAQ tool contained 60 items across six safety-related climate domains (teamwork, safety climate, job satisfaction, stress recognition, perceptions of management, working conditions); the purpose of the tool was to measure how frontline clinical staff perceived patient safety in their clinical areas and how they viewed management's commitment to patient safety (Sexton et al., 2006).

The SAQ is widely used and has been adapted for use in intensive care units, operating rooms, ambulatory clinics, pharmacies, and maternity and in-patient settings (Sexton et al., 2006; Devriendt et al., 2012). The original validation study was conducted across three countries including New Zealand and in 203 clinical areas, with a total of 10,843 participants. The composite scale reliability measured via Raykov's ρ coefficient, was 0.9, indicating strong reliability of the SAQ (Sexton et al., 2006). Devriendt et al. (2012) reviewed the tool for Dutch translation, content validity and internal consistency, and found good overall validity with an overall Cronbach's alpha of 0.90. Additionally, they found that Cronbach's Alpha showed minimal change when questions were removed, suggesting that the questionnaire can be modified for use in different countries or healthcare settings. A Malaysian study validated the SAQ for use in the Malaysian healthcare setting and found the Cronbach's alpha to be between 0.65 to 0.70, suggesting low consistency, the teamwork domain score being 0.68 (Shah et al., 2016). A recent systematic synthesis conducted by Olesen et al. (2024) assessed the reliability of the SAQ in primary care found that Cronbach's alpha internal consistency studies varied slightly across studies (0.60–0.70).

Hutchinson et al. (2006) modified the SAQ and titled the revised tool the SCS. This modified version contained 19 items and was used by several healthcare organisations across the UK. As discussed in the literature review, the SCS's internal consistency was good, with a Cronbach's alpha ≥0.69 for all five factors (Hutchinson et al., 2006). The SCS has been used across several different settings and in primary and secondary care. Additionally, Hutchinson et al. (2006) removed negatively worded items that were present in the SAQ as, during the validation process, some participants found these items confusing. Research participants can misread negative items, resulting in data contamination (Sonderen et al., 2013).

3.5.6 Survey Design

The SVEST was selected for this study as it was the only validated tool for measuring second victim effects. It had been used across several countries and across a variety of healthcare settings, including ambulatory care, which was the setting of the proposed study (Yusof et al., 2023). To collect data on safety culture, questions from the SAQ and SCS were selected for this study, as New Zealand had been included in the validity testing for the SAQ and because of the similarities that New Zealand healthcare has with the UK system.

The researcher reviewed each tool and selected specific questions based on their relevance to the study's research question. Due to the length of the questionnaires, it was not feasible to use the full versions of the SVEST, SAQ and SCS. Additionally, not all domains were required to answer the research question. The survey design was important too, as too large a survey may result in non-participation and/or result in respondent fatigue, impacting the sample numbers (O'Reilly-Shah, 2017). The survey questions were then included under six domains; psychological distress, physical distress, professional self-efficiency (defensive medicine), colleague support, desired support and safety culture (see Table 1).

Table 1

Survey Domains

Survey Question	Psychological distress	Physical distress	Professional Self-efficiency (Defensive medicine)	Colleague support	Desired support	Safety Culture	Teamwork	Organisation support	Source Tool Selected
Thinking about a clinical error that you have been involved with please rate the following statements.									
Q5. I have experienced embarrassment from these instances.	×								SVEST Tool Burlison et al., 2017
Q6. My involvement from these types of instances has made me fearful of future occurrences.	×								SVEST Tool Burlison et al., 2017
Q7. My experience made me feel miserable.	×								SVEST Tool Burlison et al., 2017
Q8. I feel deep remorse /guilt for my past involvement in these types of events.	×								SVEST Tool Burlison et al., 2017
Q9. The mental weight of my experience is exhausting.	×								SVEST Tool Burlison et al., 2017
Q10. The stress from these situations has made me feel queasy or nauseous.		×							SVEST Tool Burlison et al 2017
Q11. Thinking about these situations can make it difficult to have an appetite.		×							SVEST Tool Burlison et al., 2017
Q12. I have had bad dreams as a result of these situations.		×							SVEST Tool Burlison et al., 2017

Q13. After my experience I became afraid to attempt difficult or high-risk procedures.	×			SVEST Tool Burlison et al., 2017
Q14. I no longer enjoy my job because of my involvement with a patient safety error.		×		SVEST R Tool Winning et al., 2020
Q15. These situations have negatively affected my performance at work.	×			SVEST R Tool Winning et al., 2020
Q16. My colleagues can be indifferent to the impact these situations had on me.		×		SVEST Tool Burlison et al., 2017 SVEST R Tool Winning et al., 2020
Q17. My colleagues help me feel that I am still a good healthcare provider despite any mistakes I have made.		×		SVEST Tool Burlinson et al., 2017 SVEST R Tool Winning et al., 2020
Thinking about support after the event please rate the usefulness of the following support mechanisms.				
Q18. Having opportunity to discuss what happened with colleagues.			×	SVEST Tool Burlison et al., 2017 SVEST R Tool Winning et al., 2020
Q19. Having opportunity to discuss what happened with my Line Manager.			×	SVEST Tool Burlison et al., 2017 SVEST R Tool Winning et al., 2020
Q20. Having validation from a peer around my decision-making process.			×	SVEST Tool Burlison et al., 2017

Q21. Having access to counselling services.	×		SVEST Tool Burlison et al., 2017 SVEST R Tool Winning et al., 2020
Q22. Having access to support immediately following the event.	×		New question
Q23. Having ongoing access to support for several months following the event.	×		New question
Q24. Free text box Are there any support mechanisms that you feel would be beneficial for health workers following a clinical error? **Thinking about the safety culture of the workplace please rate the following statements.**			Qualitative question
Q25. The culture of the organisation makes it easy to learn from the mistakes of others.		×	NHS SCS taken from Sexton et al., 2006 SAQ
Q26. I feel comfortable reporting a clinical error.		×	NHS SCS
Q27. I am encouraged to report any safety concerns I may have.		×	NHS SCS taken from Sexton et al., 2006 SAQ
Q28. I believe that most adverse events occur because of multiple system issues and not attributable to one person's action.		×	NHS SCS
Q29 The staff in the organisation take responsibility for patient safety.		×	NHS SCS

Q30 Free text box Are there any improvements that you feel would make a positive impact on the workplace safety culture?	Qualitative question

The final survey included 30 questions: 28 Likert scale questions and two free-text boxes. Two new questions (q22 and q23) were added to develop the final survey tool. The questions asked participants to rate how strongly they agreed with each statement using a Likert scale. The Likert scale allowed for five possible responses, numbered 1-5, "1- strongly agree", "2- agree", "3- neither disagree nor agree", "4- disagree" and "5- strongly disagree". This was to ensure the measurement scales were sensitive enough to provide an accurate representation of the participants' answers and, additionally, reduce the risk of bias (Polit & Beck 2014). The desired support questions scale was extended to six responses with the inclusion of 'not offered'. Qualitative free-text questions provided a platform to obtain the participants' personal viewpoints and experience. In this study, two free-text questions were added. These were:

1. Are there any support mechanisms that you feel would be beneficial to health workers involved with clinical error?
2. Are there any improvements that you feel would make a positive impact on workplace safety culture?

Findings from the two open-ended questions were interpreted alongside the quantitative findings. Rich et al. (2013) supported the usefulness of including open-ended questions alongside quantitative approaches, suggesting that free-text comments can provide an in-depth viewpoint than cannot be obtained through quantitative data alone. While the two open-ended questions may not provide the same level of detail or richness that face-to-face interviews provide, they allowed participants to be more open and honest with their response whilst protecting their confidentiality. Zimba and Gasparyan (2023) recommended a combination of open-ended and closed-ended questions, which allows for all pertinent points to be covered and enables easy and quick completion of questionnaires. Open-ended survey questions also remove the potential risk of interviewer bias in preconceptions that can negatively impact the quality of the research (Polit & Beck, 2014). Thirsk and Clark (2017) emphasised that qualitative research is at increased risk of bias which can negatively impact the rigour of the study. The utilisation of free-text questions alongside quantitative data collection may have reduced the risk of bias that may be present in other qualitative methods, for example, interviews.

3.6 The Pilot Study

Before primary data collection commenced, the survey flyer, participant information sheet and questionnaire were piloted by a small group of health and non-health professionals. Pilot studies can help to improve the rigour of a questionnaire (Teijlingen and Hundley, 2002) and ensure the suitability and meaningfulness of a tool prior to being administered (Boetag et al., 2018). In addition, piloting a draft survey with a small sample of intended respondents helps to identify problems with the survey content, questions, or confusing instructions or layouts (O'Connor, 2022). The intention of piloting the survey was to test the survey on a small sample to discover any errors, including areas for improvement. Participants were asked to review and provide feedback on the usability of the online survey platform (Qualtrics) hosting the questionnaire

Members of the pilot group were selected by the researcher. Seven participants were involved with the pilot and included medical and nursing representation, non-clinical colleagues and academics (my supervisors). The tool was well received by the group and valuable feedback was obtained and used to amend the survey to improve readability, flow and identify any weaknesses. Some of the feedback was:

From registered health professionals:

- The QR code is good, but could you also put in a link, I had to use my phone to scan the QR code and then forward the link to my computer in order to do the survey on the computer.
- Survey all seems very straight forward – no ambiguous questions, very clear and straightforward layout, very easy to access and use survey.
- I couldn't find any free text area in the survey which was mentioned in participant information sheet.

From non-clinical participants:

- Survey complete, all very easy to follow.
- The initial letter is very comprehensive and thought through.

Following the feedback, some minor adjustments were made to the tool. These were mainly spelling errors and a link to the survey in addition to the QR code.

All data from the pilot study was excluded from the main results and eligible participants were excluded from participation in the main study. Leon et al. (2011) stressed that, in general, pilot study data should be removed from the main study. This is due to the likelihood that modifications were made to the survey tool following the pilot. Additionally, the participants from the pilot were also excluded from participation as they had already been exposed to the survey tool, and this may have affected their response (van Teijlingen et al., 2001).

3.7 Ethical Considerations

This study was conducted in an ethical manner and informed by ethical principles as set out by the Auckland University of Technology Ethics Committee (AUTEC), and in accordance with the Guidelines for Approval of Ethics Committees in New Zealand, including:

- Informed and voluntary consent.
- Respect for privacy and confidentiality.
- Minimisation of risk.
- Truthfulness, including limitation of deception.
- Social and cultural sensitivity, including commitment to the principles of the Treaty of Waitangi.
- Research adequacy.
- Avoidance of conflict of interest.

Prior to seeking ethical approval, I consulted with a member of the ethics committee to ensure all areas had been addressed in the ethics application, and that the proposed study met all requirements outlined by AUTEC. Ethical approval for the study was granted by AUTEC in April 2023 approval number 23/67 (see Appendix D). The study flyer (see Appendix F), participant information sheet (see Appendix G), and survey questions (see Appendix H) were approved by AUTEC. The key ethical considerations and foreseeable risks in undertaking this research study involved confidentiality and the emotional impact on participants.

3.7.1 Informed Consent

To ensure confidentiality, a link to the participant information sheet was imbedded in the study flyer. The participant information sheet provided full disclosure of the study

details including rationale, purpose, objectives, and the benefits and risks of participating in the study, to enable participants to make an informed decision to participate in the research. The participant information sheet included the following statement: "*if you consent to participate in this study the survey can be accessed by clicking the link or scanning the QR code below*."

Informed consent was assumed through the completion of the online survey. Potential participants were advised that they were able to withdraw from the study at any time up until submission of the survey response and that they did not have to answer all questions.

The participant information sheet stated that there would be no direct benefit to the participants from undertaking the study. However, some participants may have experienced relief by sharing their perspectives. No incentive was given to participate in the study. The risks identified were the emotional impact on participants having to recall historic traumatic events. Furthermore, some participants may have felt uncomfortable about providing honest answers in relation to organisational culture. The potential benefits for participants included sharing their experience and an opportunity to contribute to improvement of local and, possibly, national resources.

3.7.2 Participant Confidentiality and Anonymity

Both participant privacy and confidentiality were of paramount importance throughout the study and strict measures were put into place to protect the confidentiality of participants. This was respected throughout the study and all data protection requirements were outlined in the participant information sheet. To honour anonymity, confidentiality, and privacy, all responses were anonymous, data was stored on a password protected computer and only the research team had access to the data. All information was rigorously checked to ensure that no identifiable data existed.

The online survey was generated through Qualtrics an anonymous collection method, ensuring the privacy and confidentiality of participants was maintained. Bryman (2016) suggested the use of a survey as a data collection method minimises the risk of an invasion of privacy. In addition, the specific healthcare setting where the study was conducted is not identified. The participation information sheet clearly stated that participation was voluntary and the survey was anonymous.

3.7.3 Conflicts of Interest

This research is designed to protect staff as participants, as there was the potential for power imbalance due to the relationship of the researcher to the staff answering the survey. As the researcher worked within the organisation, additional safeguards were put in place to ensure that the details of the researcher were withheld throughout the study. The researcher observed strict confidentiality and professionalism in relation to engagement with the participants by ensuring that the researcher remained anonymous and was not involved in seeking participation. The survey was sent out by a staff member with no Line Manager responsibilities and who was not associated with the research. Additionally, no information collected in the survey identifies the respondent, so all participants remain anonymous to the researcher (Resnik, 2016). Furthermore, as this survey was undertaken in the researcher's workplace, the only demographic data gathered covered gender, age, professional group and years in practice, to reduce the risk of identifying a participant. Additionally, the researcher was cognisant of her relationship with participants in the study and the senior role she held within the organisation. To ensure the credibility of the research, the researcher took a reflexive approach throughout the study (Probst & Berenson, 2014). Reflexivity is the ability of the researcher to understand how they influence the research process (Barrett et al., 2020).

Ensuring strict anonymity protected the researcher's and participants' identities to ensure there was no negative effect on any working relationship with either the researcher or the organisation. The importance of the researcher–researched relationship is highlighted by Råheim et al. (2016). In this study, providing the researcher details may have promoted an authoritative relationship, which can result in bias and potentially lead to participants not providing open and honest responses (Råheim, 2016). Having the researcher's details could increase the risk of participants responding to questions how they thought the researcher would want them to respond, leading to bias and threatening the study's internal validity (Resnik, 2016). Furthermore, providing the researcher's details may have also impacted how openly and honestly the participants responded to questions on organisational culture. To mitigate this risk, the researcher's details were withheld during the initial recruitment stage.

Due to the small size of the organisation, there was a risk of participant identification. As there were only a small number of pharmacists in the target population, this could potentially have led to anonymity being compromised. To reduce this risk the

radiology technologists and pharmacists were grouped together as 'other'. To reduce the risk of bias, the study flyer was sent to staff members by a member of the administration team. Throughout the study, strict confidentiality and professionalism was adhered to in relation to engagement with the participants by ensuring that the researcher was not actively involved in seeking participation.

3.7.4 Potential Harm

The psychological safety of the participants was particularly important in this study, as recognised above and in Chapter 1. Clinical error can be a sensitive topic and recalling these events has the potential to cause a participant emotional distress. This was a key consideration and one of the reasons a survey was used for data collection. Labott et al. (2016) recognised that surveys have one of the lowest risks of harm attached and are generally considered more of an inconvenience as opposed to being harmful. Given the sensitive nature of the study topic, it was important to ensure that all participants had access to support if they experienced distress or anxiety, therefore measures were put in place to ensure that participants were provided with contact details for AUT Student Counselling and Mental Health. Sanjari et al. (2014) highlighted the importance of preventive measures to protect participants, including providing access to support programmes. Additionally, it was acknowledged in the participant information sheet that recalling past events may be traumatic. Furthermore, the researcher was also cognisant that sensitive information might be shared during the study that may relate to patient harm that would need to be acted upon. This was discussed with the researcher's supervisors. If such a situation arose, a step-by-step approach would have been put in place to keep the participant safe whilst following the correct protocols.

3.7.5 Minimising Bias

As discussed in section 3.5, several steps were taken to reduce bias in this study, including the researcher recognising their own positionality. The researcher's philosophical position was made clear, and the research process was underpinned by reflexivity to ensure that the researcher's own preconceptions were acknowledged and managed using a reflective practice. Additionally, any concerns about the researcher's role were discussed at regular meetings with the supervisors throughout the research process.

Throughout the research process clear steps were taken to ensure the credibility of the study, and ensuring transparency and rigour throughout. The purpose of the research was clearly defined, and sampling strategy, instrument selection, methodology and data analysis were supported with a clear rationale, demonstrating trustworthiness and offering a reflexive account (Kalu & Bwalya, 2017). Ethical processes were followed, and consultation occurred with key specialists to ensure an ethical opinion and biostatistical support was obtained, to ensure that the data was appropriately collected and analysed.

For transparency, on completion of the study all staff who were invited to participate will be notified that the findings are available, and that they can request a copy by emailing the researcher. This will enable participant validation, strengthening the credibility of the data and results (Merriam & Tisdell, 2016). Participant validation is the process of the researcher sharing the data from the preliminary findings with the participants (Lindheim, 2022).

3.8 Data Analysis

3.8.1 Data Collection

The survey was conducted via the web-based distribution of a survey built on the Qualtrics platform and distributed via Mailchimp. An initial email containing the study flyer was sent out to all potential participants, to advertise the study (see Appendix F). The survey was re-sent after two weeks. The study flyer contained a link to the participant information sheet (see Appendix G), and the participant information sheet contained a QR code and link to the survey. To protect the anonymity of the participants, a statement included on the participant information sheet confirmed that completion of the attached survey would be taken as indicating their consent to participate. The research was conducted over a two-week period where the survey was accessible to participants, from 14 June 2023 to 30 June 2023, and a reminder was sent out after 10 days.

Initially only 36 participants responded to the survey. The low rate of participation could be related to length of the survey, staff members' lack of time to complete the survey, the sensitivity of the questions, lack of interest in the research topic, or concerns about confidentiality (Wu et al., 2022). In addition, the participant information sheet suggested the survey would take approximately 30 minutes to complete, which may have

been a barrier to participation. In fact, 30 minutes was an overestimate, and the actual time required was 10–15 minutes.

Due to the low number of respondents, further ethics approval was sought and granted for the survey to be sent out a second time with an amendment to the survey completion time reduced to 15 minutes, and the survey was redistributed to 255 participants and remained open for a two-week period between 16 October 2023 and 30 October 2023 (see Appendix B). Following this a further nine participants completed the survey.

3.8.2 Data Analysis

A clear strategy for data analysis in this study was formulated, under the guidance of a biostatistician. Next, the data analysis variables, measures and statistical tests from similar studies were reviewed and used to guide the data analysis approach in this study (Burlison et al., 2017; Mok et al., 2019.). In the first steps, data was downloaded from Qualtrics into a password-protected Excel file and checked for inconsistencies. Internet protocol (IP) addresses were checked to help identify any duplications. A unique ID were generated for each participant for future analysis and to ensure no data was duplicated. No duplicate records were found.

The data was screened for missing values, and out of range values were identified prior to analysis (Pallant, 2020). Partially completed survey responses were accepted and included in the data analysis. Participants who had only completed the demographic questions were removed. The data were further checked to ensure all values entered were within the expected scale range (Pallant, 2020). The data was then uploaded to Statistical Package for Social Sciences (SPSS 29) (IBM Corp., 2023).

The qualitative data were checked to ensure there were no identifiable data. Due to the sensitive nature of the study, any information that could potentially identify an individual (such as someone's name, title, ethnicity) were removed to ensure confidentiality and anonymity (Ong & Weiss, 2000). Finally, before downloading data into SPSS, manual checks of the data were performed to ensure the data were aligned correctly under each question domain, to check for missing data, and to confirm that each question had the correct Likert scale values.

All the data collected was handled in accordance with the Privacy Act 2020. Any information collected was handled strictly in accordance with the consent given. Every reasonable step was taken to prevent unauthorised use or disclosure of information, with any identifiable data immediately removed from the study. Independent and dependant variables were identified, and statistical analysis was completed using SPSS 29.

The data were categorised into domains using ordinal and nominal variables. Tests for normality using the Shapiro-Wilk test were performed looking at distribution, skewness and kurtosis. The data were viewed as normally distributed if the histogram represented a bell-shaped curve. This "given distribution" is usually but not always the normal population (Salkind & Frey 2019). In the Shapiro-Wilk test, a significant value of $p > 0.05$ indicated normality. For domains that showed skewed data, non-parametric tests were conducted using the t-test and/or Mann-Whitney U. Descriptive statistics were used to summarise frequencies, means and standard deviations. These were presented as means, median and standard deviation for each question and domain. Demographic data detailing baseline characteristics (e.g., gender, age, discipline, years of experience) were presented as percentages in a summary.

Further analysis of the data in the sample was conducted to draw inferences about the population as a whole and identify differences between demographics. Inferential tests were used to show if any relationships existed in scores between the different demographic variables and domains. The t-test was used to compare two group means, looking for differences between the demographics and variables. For example, nurses' views on workplace culture compared to doctors or the difference between doctors and nurses in desired support for those involved in a clinical incident. A p value <0.05 was considered to indicate significance.

Data from the two open-ended free-text questions was analysed using a narrative approach. Firstly, the researcher reviewed the free-text data and grouped the comments by identifying key words 'culture', 'safety', 'support', 'debrief', 'no blame', 'supervision', 'reporting', 'training', 'management', and 'counselling'. Any comments that could potentially lead to identification of a participant were removed. Next, the researcher searched for key themes within the free text. The free-text data and emerging

themes were discussed with the supervisory team. The researcher used the findings to develop key themes which were grouped and integrated with the quantitative data. This provided deeper insights into the participants' views on safety culture and their desired support.

3.9 Chapter Summary

This chapter has outlined the research methods used in this study and the rationale for why a mixed-method approach was the best fit to answer the research questions. I have outlined my own positionality and steps for mitigating bias, and have detailed the audit trail to ensure the rigour and credibility of the study, including the protection of participant identities and maintaining ethical standards. Chapter Four presents the findings of the study.

Chapter 4: Findings

4.0 Introduction

Chapter 4 presents the quantitative and qualitative findings from the survey responses. Data was collected and analysed using the methods outlined in Chapter 3.

This study seeks to answer the following questions:

I. What psychological impact does involvement with clinical error have on New Zealand health professionals?

II. What impact does organisational culture have on the recovery of health professionals following a clinical error?

III. What support do health professionals want following a clinical error?

4.1 Data Management

To ensure the quantitative data was analysed with rigour, a biostatistician reviewed all steps throughout the analysis process. Following the steps outlined in Chapter 3 section 3.8 no changes had to be made. For all questions, low scores on each dimension reflected greater agreement or greater importance for the support domain. A checklist for reporting results of internet e-surveys (CHERRIES) was used to report the findings of the web-based survey (see Appendix I).

4.1.2. Response Rate

Forty-five participants from 255 invited staff opened the survey, 39 participants completed the survey, and two participants partially completed the survey resulting in an overall response rate of 16%.

4.2 Quantitative Data

The results from the Shapiro-Wilk test (see Table 2) were significant for two domains, psychological distress (p=.006) and colleague support (p=.003), which did not follow a normal distribution. The remainder of the domains were normally distributed with p values within the range .013–.116. The findings from the distribution datasets determined the most appropriate parametric or non-parametric tests to use.

Table 2

Normality Shapiro-Wilk Test

Domain		Test	Statistic	df	Sig (p value)
1	Psychological Distress	Shapiro-Wilk	.918	41	.006
2	Physical Distress	Shapiro-Wilk	.928	41	.013
3	Defensive medicine	Shapiro-Wilk	.938	41	.027
4	Colleague Support	Shapiro-Wilk	.907	41	.003
5	Desired Support	Shapiro-Wilk	.951	41	.079
6	Workplace culture	Shapiro-Wilk	.954	39	.116

Note. df = degree of freedom; Sig (p value of >0.05) indicated normality.

4.2.3 Demographics

Descriptive statistics were used to illustrate the characteristics of participants. Table 3 displays the participants' demographic characteristics.

Table 3

Participant Demographic Characteristics

Characteristics	**N**	**%**
Gender		
Male	n=14	31%
Female	n=31	69%
Age Range		
20-29	n=2	4.44%
30-39	n=11	24.44%
40-49	n=17	37.78%
50+	n=15	33.38%
Professional Group		
Doctor	n=12	26.67%
Nurse	n=15	33.33%
Other	n=18	40%
Years in Practice		
<10	n=3	6.82%
10-20	n=17	38.64%

20+	n=24	54.55%

4.2.4 Demographics Summary

Forty-five participants completed the demographic information, yet only 41 participants continued to complete the survey. The demographics showed female as the dominant gender with 69% of participants identifying as female. The largest age group was 40-49 (37.78%), with most participants having practiced for over 20 years. In terms of profession, most participants identified as belonging to the professional group 'other' (40%), which included medical imaging technologists and pharmacists.

4.3 Descriptive Findings Across Six Domains

The descriptive statistics are presented below for each of the six domains. The Likert scale for each of the psychological, physical, colleague support, defensive medicine and safety culture domains ranged from 1-5, where 1 represents 'strongly agree' and 5 'strongly disagree'. The Likert scale for desired support ranged from 1-6, where 1 represents 'extremely useful' and 5 'not at all useful', with an additional option 6 being 'not offered'.

4.3.1 Psychological Distress

In the Likert scale of 1-5, 1 represents 'strongly agree' and 5 'strongly disagree'. The psychological distress questions had mean score 1.96, median 2.0, variance 0.54, standard deviation (SD) 0.734, range 3.40 (min 1.0-max 4.4), and interquartile range 0.80. The findings for each psychological distress question were heavily weighted towards strongly agree/agree, with most responses lying close to the mean (see Table 4). The exception is Q9 '*the mental weight of my experience is exhausting'*, with 17.4% of respondents selecting 'somewhat disagree'. The mean for the individual questions ranged between 1.68-2.24, median 1-2, and standard deviation 0.882-1.135.

The skewness of the scores for Q5 to Q9 ranged from 0.70-2.06 and kurtosis 0.10-4.51, representing non-normality; this can be explained by questions (Q5, Q6 and Q8) being peaked and right-skewed (see Table 5).

Table 4

Psychological Distress Domain

Question	Response	Mean	Median	Standard Deviation
Domain Psychological Distress	**41**	**1.96**	**2.00**	**.734**
Q5. I have experienced embarrassment from these instances.	41	1.68	1.00	1.011
Q6. My involvement from these types of instances has made me fearful of future occurrences.	41	1.83	2.00	1.022
Q7. My experience made me feel miserable.	41	2.05	2.00	0.921
Q8. I feel deep remorse/guilt for my past involvement in these types of events.	41	1.85	2.00	0.882
Q9. The mental weight of my experience is exhausting.	41	2.24	2.00	1.135

Table 5

Psychological Distress Score Range, Skewness, Kurtosis

Question	Minimum	Maximum	SD	Statistic	SE	Statistic	SE
Q5. I have experienced embarrassment from these instances.	1	5	1.011	2.06	0.36	4.51	0.72
Q6. My involvement from these types of instances has made be fearful of future occurrences.	1	5	1.022	1.68	0.36	3.10	0.72
Q7. My experience made me feel miserable.	1	4	.921	0.70	0.36	0.10	0.72
Q8. I feel deep remorse/guilt for my past involvement in these types of events.	1	5	.882	1.44	0.36	3.19	0.72
Q9. The mental weight of my experience was exhausting.	1	5	1.135	0.78	0.36	0.96	0.72

Note. SD = standard deviation; SE = standard error.

4.3.2 Physical Distress

In the Likert scale of 1-5, 1 represents 'strongly agree' and 5 'strongly disagree'.

The overall mean score for physical distress questions was 2.91, median 2.67, variance 1.18, standard deviation 1.09 (1.33-5.0), range 3.36 and interquartile range 1.67, as represented in Table 6. The findings for each question within physical distress were evenly distributed yet heavily weighted towards agree, with most responses lying close to the mean. Most mean scores of the questions in this domain are between 2 and 3 which indicates that most participants answered 'somewhat agree' or 'neither agree nor disagree'. The mean for the individual questions ranged from 2.66-2.98, median 2-3, and standard deviation 1.26-1.39.

The skewness of the scores for Q10 to Q12, ranged from 0.22 to 0.46 and kurtosis 0.92 to -1.02 representing normal distribution (see Table 7).

Table 6

Physical Distress Response, Mean, Median, Standard Deviation

Question	Response	Mean	Median	Standard Deviation
Domain Physical Distress	**41**	**2.91**	**2.67**	**1.09**
Q10. The stress from these situations has made me feel queasy or nauseous.	41	2.66	2.00	1.27
Q11. Thinking about these situations can make it difficult to have an appetite.	41	2.95	3.00	1.26
Q12. I have had bad dreams as a result of these situations.	41	2.98	3.00	1.38

Table 7

Physical Distress Range Scores, Skewness, Kurtosis

Question	Minimum	Maximum	SD	Statistic	SE	Statistic	SE
Q10. The stress from these situations made me feel queasy or nauseous.	1	5	1.277	.460	.369	.992	.72

Q11. Thinking about these situations made it difficult to have an appetite.	1	5	1.264	.330	.369	.962	.72
Q12. I have had bad dreams as a result of these situations.	1	5	1.387	.223	.369	-1.208	.72

Note. SD = standard deviation; SE = standard error.

4.3.3 Defensive Medicine

In the Likert scale of 1-5, 1 represents 'strongly agree' and 5 'strongly disagree'. The overall mean score for defensive medicine questions was 3.41, median 3.50, variance 1.29, standard deviation 1.13 (1.0-5.0), range 4.0 and interquartile range 2.0. The findings for each question within defensive medicine had a similar distribution and were heavily weighted towards somewhat disagree/disagree, with most responses lying close to the mean. The mean for the individual questions ranged from 3.15 to 3.63, median 3-4, and standard deviation 1.142-1.276.

The skewness of the scores for Q13 to Q15, ranged from -.060 to -.650 and kurtosis -.394 to -1.131 representing normal distribution (see Table 9).

Table 8

Defensive Medicine Response, Mean, Median, Standard Deviation

Question	Response	Mean	Median	Standard Deviation
Domain Defensive Medicine	**41**	**3.41**	**3.50**	**1.13**
Q13. After my experience I became afraid to attempt difficult or high-risk procedures.	41	3.15	3.00	1.276
Q14. I no longer enjoy my job because of my involvement with a patient safety error.	41	3.46	4.00	1.142
Q15. These situations have negatively affected my performance at work.	41	3.63	4.00	1.157

Table 9

Defensive Medicine Score Range, Skewness, Kurtosis

Question	Minimum	Maximum	SD	Statistic	SE	Statistic	SE
Q13. After my experience I became afraid to attempt difficult or high-risk procedures.	1	5	1.276	-.060	.369	-1.131	.72
Q14. I no longer enjoyed my job because of my involvement with a patient safety error.	1	5	1.142	-.170	.369	-1.026	.72
Q15. These situations have negatively affected my performance at work.	1	5	1.157	-.650	.369	-.394	.72

Note. SD = standard deviation; SE = standard error.

4.3.4 Colleague Support

In the Likert scale of 1-5, 1 represents 'strongly agree' and 5 'strongly disagree'.

The overall mean score for colleague support questions was 2.46, median 2.50, variance 0.31, standard deviation 0.55 (1.5-3.5), range 2.0 and interquartile range 1.0. Q16 was reversed, suggesting that a lower score would be viewed more negatively. The Q16 mean was 2.98, standard deviation 1.084, suggesting that most participants were neutral or disagreed with this question.

The findings for Q17 were heavily weighted towards strongly agree/agree, with most responding value close to the mean. The mean for the individual questions ranged from 1.93 to 2.98, median 2-3, and standard deviation 0.88-1.08.

The skewness of the scores for Q16 and Q17 ranged from .174 to .614 and kurtosis -.363 to .466, representing minor non-normality (see Table 11).

Table 10

Colleague Support Response, Mean, Median, Standard Deviation

Question	Response	Mean	Median	Standard Deviation
Domain Colleague Support	**41**	**2.46**	**2.50**	**.55**

Q16. My colleagues can be indifferent to the impact these situations had on me.	41	2.98	3.00	1.084	
Q17. My colleagues help me feel that I am still a good healthcare provider despite any mistakes I have made.	41	1.93	2.00	.877	

Table 11

Colleague Support Score Range, Skewness, Kurtosis

Question	Minimum	Maximum	SD	Statistic	SE	Statistic	SE
Q16. My colleagues can be indifferent to the impact these situations had on me.*	1	5	1.084	.174	.369	.466	.72
Q17. My colleagues help me feel that I am still a good healthcare provider despite any mistakes I have made.	1	4	.877	.614	.369	-.363	.72

Note. SD = standard deviation; SE = standard error; * = reverse question.

4.3.5 Desired Support

The Likert scale for desired support ranged from 1-5, 1 ‘extremely useful’ and 5 ‘not at all useful’, and there was an additional option of ‘not offered’ included. The desired support questions had mean score 3.11, median 2.83, variance 1.68, standard deviation 1.30 (1.0-6.0), range 5.0 and interquartile range 1.5. The findings for each question within desired support had a similar distribution and participants were: strongly against ‘having access to counselling services’ (mean 4.02, SD 1.038); neutral on ‘having an opportunity to discuss what happened with their line manager’ (mean 3.35, SD 1.83) or ‘having access to support immediately following the event’ (mean 3.44, SD 2.074); and strongly agreed/agree with ‘having validation from a peer around the decision-making process’ (mean 1.98, SD 1.33). The mean for the individual questions ranged between 1.98-4.02, median 2-4, and standard deviation 1.04-2.08. The item with the lowest mean (most useful) was ‘having validation from a peer around the decision-making process’ (mean 1.98, SD 1.33), which indicates that a significant number of participants wanted a peer to provide support following a clinical error.

The skewness of the scores for questions 18 to 23 ranged from -.052 to 1.974 and kurtosis -1.476 to 4.223 overall representing normality; however, two questions (Q18 and Q20 were moderately skewed with more extreme values (see Table 13).

Table 12

Desired Support Response, Mean, Median, Standard Deviation

Question	Response	Mean	Median	Standard Deviation
Domain	**41**	**3.11**	**2.83**	**1.30**
Q18. Having opportunity to discuss what happened with colleagues.	41	2.12	2.00	1.288
Q19. Having opportunity to discuss what happened with my Line Manager.	40	3.35	3.00	1.827
Q20. Having validation from a peer around my decision-making process.	41	1.98	2.00	1.332
Q21. Having access to counselling services.	41	4.02	4.00	1.037
Q22. Having access to support immediately following the event.	41	3.44	3.00	2.074
Q23. Having ongoing access to support for several months following the event.	41	3.90	3.00	1.841

Table 13

Desired Support Score Range, Skewness, Kurtosis

Question	Minimum	Maximum	SD	Statistic	SE	Statistic	SE
Q18. Having an opportunity to discuss what happened with my colleagues.	1	6	1.288	1.974	.369	4.171	.72
Q19. Having opportunity to discuss what happened with my Line Manager	1	6	1.875	.370	.374	-1.449	.73
Q.20 Having validation from a peer around my decision-making process.	1	6	1.332	2.048	.369	4.223	.72

Q21. Having access to counselling services.	1	6	1.837	-.190	.369	-1.476	.72
Q22. Having access to support immediately following the event.	1	6	2.074	.276	.369	-1.665	.72
Q23. Having access to support for several months following the event.	1	6	1.841	-.052	.369	-1.532	.72

Note. SD = standard deviation; SE = standard error.

4.3.5.1 Participants' Qualitative Responses Desired Support

- Several participants mentioned the words '*peer',* '*colleague*', *'training'*, '*debriefing*', and/or '*counselling'* in relation to 'desired support'.
- Participants wanted to 'talk through the case in confidence with a trusted peer' where they were 'supported' with 'empathic peer review back up by professional clinical supervision'.
- Participants mentioned the need to have the 'opportunity to talk through the incident with a clinical member straight after the incident' in 'a timely manner' to 'allow participants to recall actions and decisions and reflect on learnings.'
- In addition, the support needed to be the 'correct type of support' covering 'what happened, what went wrong, how it went wrong and reflection.' Some participants stated 'counselling' as helpful, yet others stated counselling 'could be more harmful than supportive'.
- Some participants referred to reviewing the incident with 'colleagues' or a 'clinical leader' as they would 'understand the impact of these on the healthcare worker' and can 'empathise with the situation because they have (likely) encountered it in the past.'
- Participants varied in their need for desired support with some wanting *'peer learning',* '*counselling',* '*support from managers',* and *'more training'* with others wanting '*no counselling', 'confidentiality'* and *'independent reviews'* where there was no blame as *'to err is human.'*

4.3.6 Workplace Culture

In the Likert scale of 1-5, 1 represents 'strongly agree' and 5 'strongly disagree'. A lower mean therefore indicates a stronger safety culture. Only 39 of the 41 participants

completed the workplace culture questions. The workplace culture domain had mean score 2.05, median 2.00, variance 0.46, standard deviation 0.68 (1.0-4.0), range 4.0 and interquartile range 1.0. The findings for each question within desired support followed a similar distribution and were heavily weighted towards strongly agree/agree, with most responses lying close to the mean. The mean for the individual questions ranged from 1.69 to 2.28, median 2, and standard deviation 0.88-1.17.

The questions with the lowest means, 'I believe that most adverse events occur because of multiple system issues' (mean 1.69, SD .800) and 'the staff in the organisation took responsibility for patient safety' (mean 1.90, SD .882), indicate a positive safety culture.

Q27, 'I am encouraged to report any safety concerns I may have', had the highest mean (mean 2.28, SD 1.16).

The skewness of the scores for Q25 to Q29 ranged from .664 to1.146 and kurtosis -.297 to 2.73, representing normality (see Table 15).

Table 14

Workplace Culture Response, Mean, Median, Standard Deviation

Question	Response	Mean	Median	Standard Deviation
Domain Workplace Culture	**39**	**2.05**	**2.00**	**.676**
Q25. The culture of the organisation makes it easy to learn from the mistakes of others.	39	2.10	2.00	0.968
Q26. I feel comfortable reporting a clinical error.	39	2.13	2.00	1.056
Q27.I am encouraged to report any safety concerns I may have.	39	2.28	2.00	1.169
Q28. I believe that I believe that most adverse events occur because of multiple system issues and not attributable to one person's action.	39	1.69	2.00	.882
Q29. The staff in the organisation take responsibility for patient safety.	39	1.90	2.00	.882

Table 15

Workplace Culture Score Range, Skewness, Kurtosis

Question	Minimum	Maximum	SD	Statistic	SE	Statistic	SE
Q25. The culture of the organisation made it easy to learn from the mistakes of others.	1	5	.968	1.43	.378	2.737	.74
Q26. I felt comfortable reporting a clinical error.	1	5	1.056	1.146	.378	1.259	.74
Q27. I was encouraged to report any safety concerns I had.	1	5	1.169	.664	.378	-.297	.74
Q28. I believe that most adverse events occur because of multiple system issues and not attributable to one person's actions.	1	4	.800	1.278	.378	1.783	.74
Q29. The staff in the organisation took responsibility for patient safety.	1	4	.882	.692	.378	-.235	.74

Note. SD = standard deviation; SE = standard error.

4.3.6.1 Participants' Qualitative Responses Safety Culture

Participants provided numerous recommendations for how the workplace culture could be improved around managing clinical errors. These included:

- 'debrief meetings with whoever oversees clinical safety to go through traumatic cases and offer support there and then', 'group meetings', 'regular discussions around near misses and what could be put in place to prevent them'.
- 'open, clear and non-blaming communication'.
- 'auditing clinical incidents', 'provision of constructive clinical reviews from a critical thinking and learning perspective', with 'regular clinical error training sessions'.

Several participants mentioned the words '*debriefing sessions',* '*group meetings', 'regular discussions'*, '*tabling incidents',* and/or '*better processes'* in relation to changing

the ‘workplace culture’ from blame, guilt and embarrassment to reflection, education and learning opportunities.

Participants also expressed the importance of shifting the focus of blame to reflection and education, where staff were encouraged and supported to report clinical errors.

One participant offered the following observation: ‘no blame, easy reporting system, with people encouraged to report things, and active messaging that we are not out to “get” healthcare workers who make errors or who work in a system with insufficient safety nets to make errors.’

Some strategic clinical actions recommended were ‘having better structures in place, eg. personal alarms close to hand’, ‘regularly double checking each other’s work: ie infusion rates, clamps, patency of veins etc.’ and ‘safer staffing levels’.

4.4 Inferential Statistics

The Independent Samples Median non-parametric test was used to examine any relationship between the different demographic variables (gender, age groups, discipline, years of experience groups) and domain total scores for psychological distress, physical distress, defensive medicine, colleague support, desired support, and workplace culture.

4.4.1 Gender

The Independent Samples Median test found a statistically significant relationship between gender (male/female) and the domains physical distress (0.045) and desired support (0.002) (see Table 16). Females reported having higher physical distress (median 2.66) than males (mean 3.66) (see Figure 1) and desired more support (median 2.41) than males (median 4.33) (see Figure 2).

Table 16

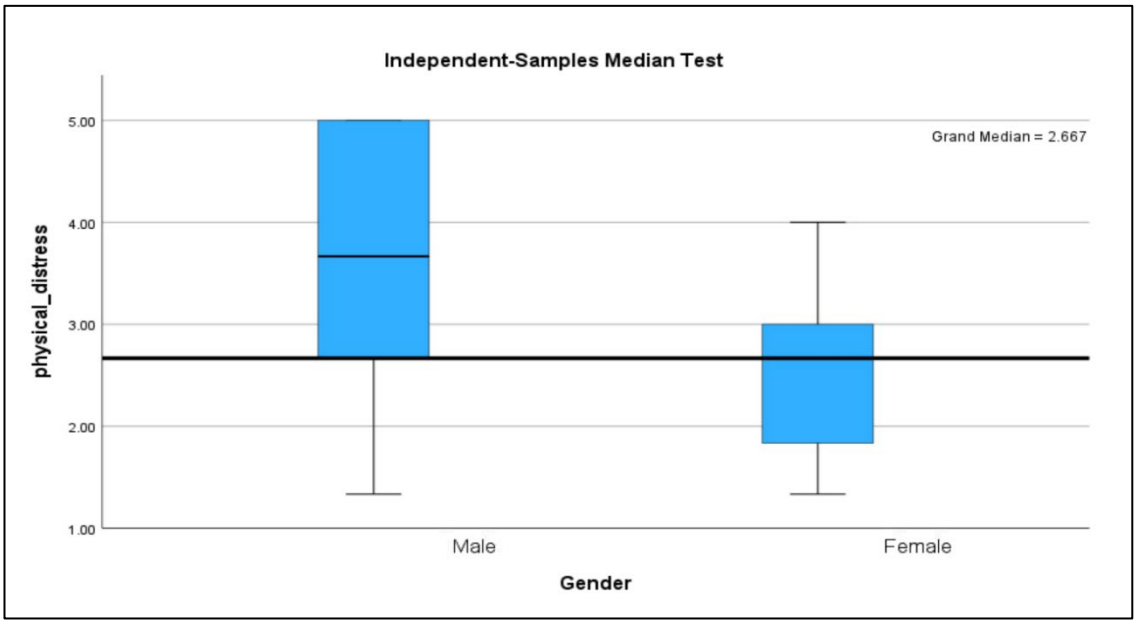
Independent Samples Median Test Gender

Domain	Total	Median	Test Statistic	Asymptomatic Sig (2-sided test)
Psychological Distress – Gender	41	2.0	0.097	0.756
Physical Distress – Gender	41	2.7	4.001	**0.045**

Defensive Medicine - Gender	41	3.0	0.196	0.658
Colleague Support - Gender	41	2.5	0.158	0.691
Desired Support – Gender	41	3.2	9.784	**0.002**
Workplace Culture - Gender	39	2.0	0.052	0.819

Figure 1

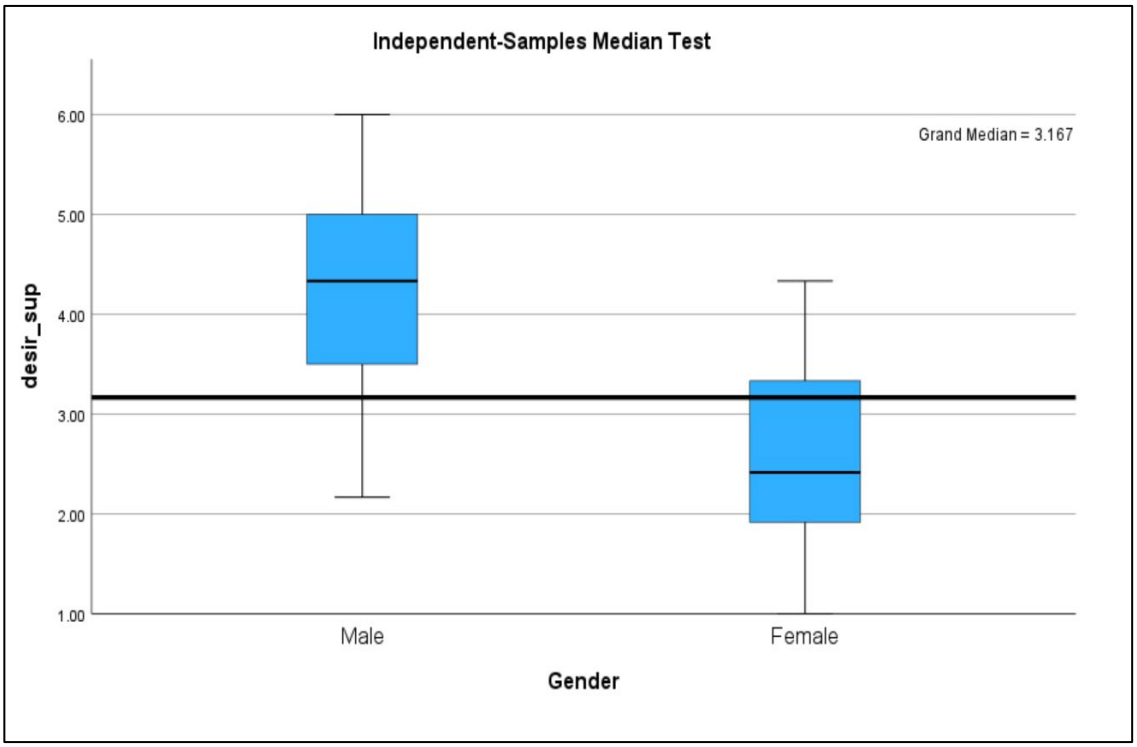
Physical Distress – Gender



Note. Lower score = higher physical distress.

Figure 2

Desired Support – Gender



Note. Lower score = stronger desire for support.

4.4.2 Age

The Independent Samples Median test found no statistically significant relationship between age groups of the participants and psychological distress score, physical distress score, defensive medicine score, colleague support score, desired support score, and workplace culture score (see Table 17). However, it is important to note that the younger age groups (20–29yrs) agreed somewhat more with the psychological distress (see Figure 3), and physical distress (see Figure 4) domain questions and disagreed more with the workplace culture domain questions than the other age brackets.

Table 17

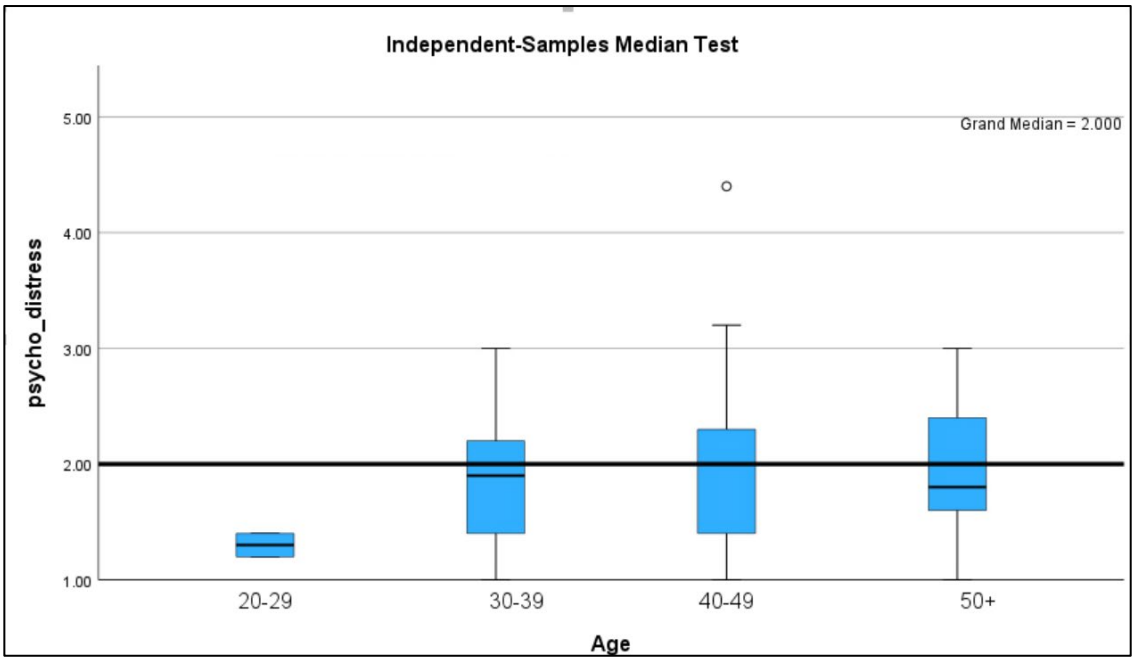
Independent Samples Median Test Age

Domain	Total	Median	Test Statistic	Asymptomatic Sig (2-sided test)
Psychological Distress – Age	41	2.0	1.335	0.721
Physical Distress – Age	41	2.7	3.727	0.292

Defensive Medicine – Age	41	3.0	6.522	0.089
Colleague Support – Age	41	2.5	0.467	0.926
Desired Support – Age	41	3.2	2.704	0.672
Workplace Culture – Age	39	2.0	1.543	0.440

Figure 3

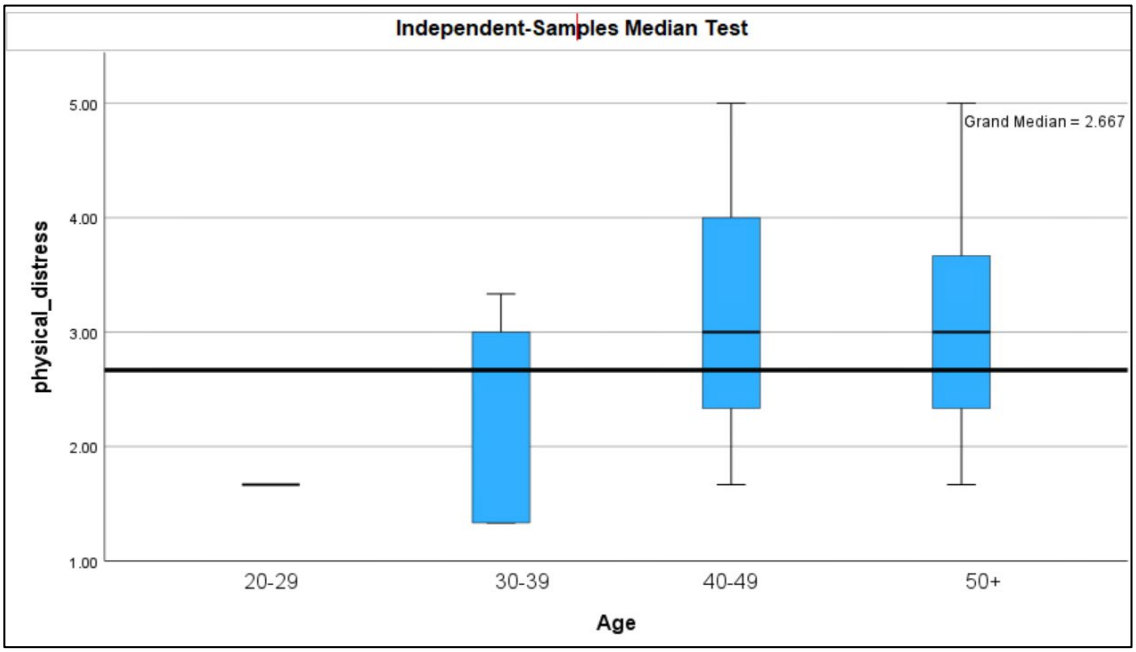
Psychological Distress – Age



Note. Lower score = higher psychological distress.

Figure 4

Physical Distress – Age

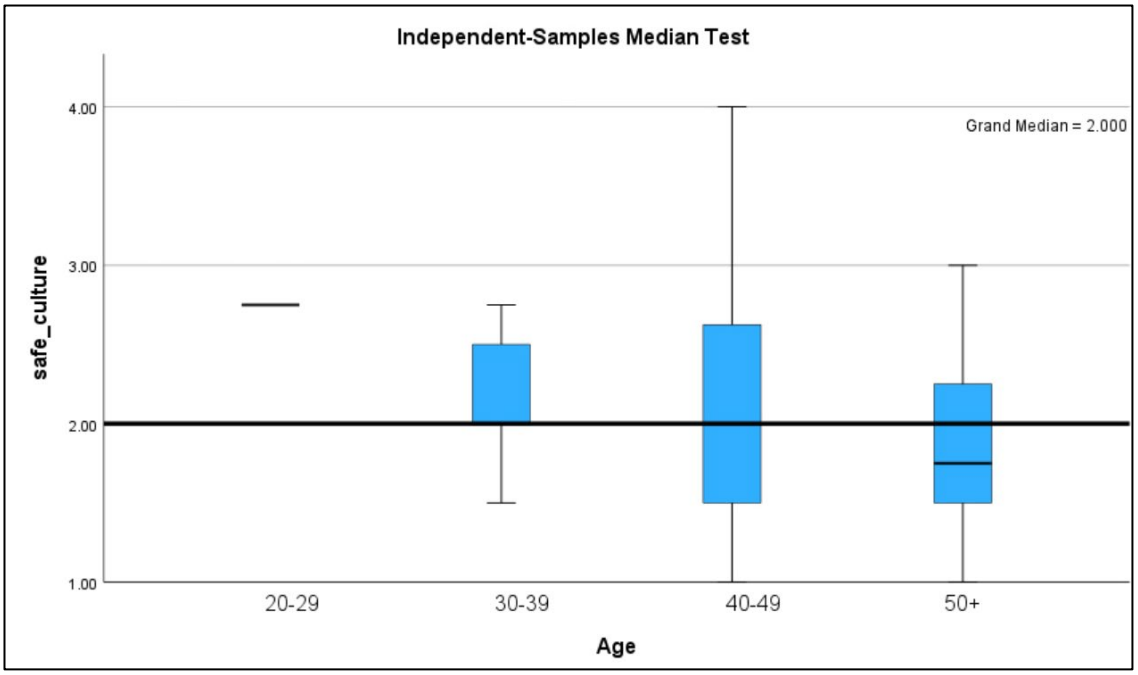


Note. Lower score = higher physical distress.

Figure 5

Safety Culture – Age

Note. Lower score = stronger safety culture.



4.4.3 Discipline

The Independent Samples Median test found a statistically significant relationship between discipline (doctor, nurse, other) and the domain desired support (p=0.037) (see Table 18). Nurses and other reported higher desired support (median 2.55 and 2.50) than doctors (median 4.33) (see Figure 3); and higher physical distress nurses and other (median 2.33 and 2.66) than doctors (median 3.66) (see Figure 4).

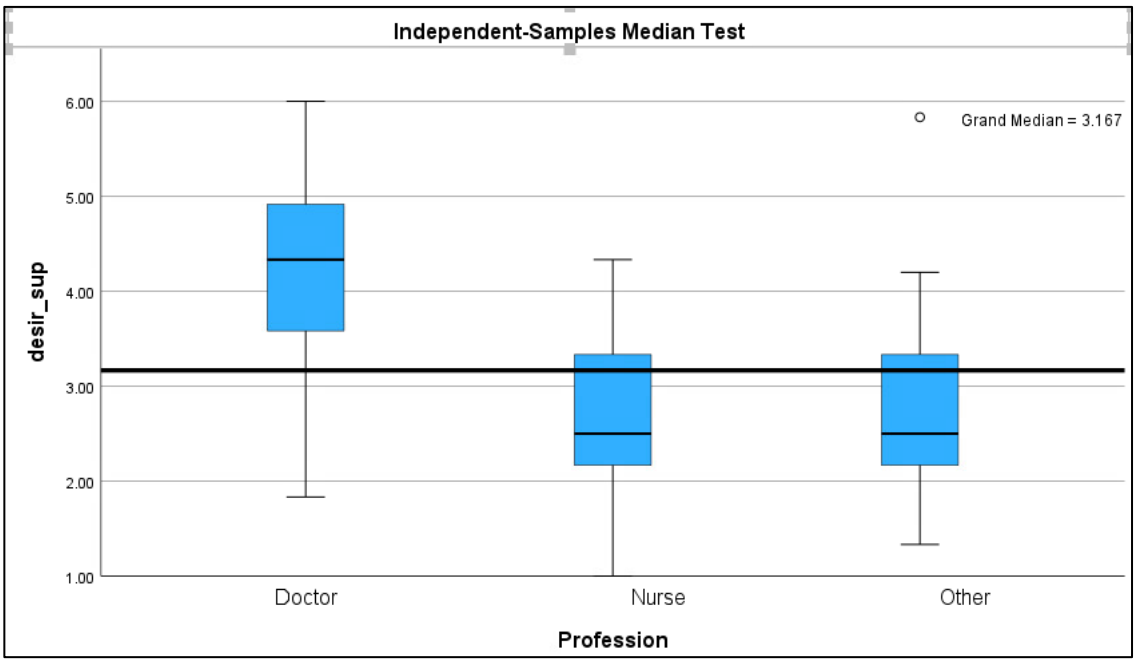
Table 18

Independent Samples Median Test Discipline

Domain	Total	Median	Test Statistic	Asymptomatic Sig (2-sided test)
Psychological Distress – Discipline	41	2.0	0.671	0.715
Physical Distress - Discipline	41	2.7	4.239	0.120
Defensive Medicine - Discipline	41	3.0	0.202	0.904
Colleague Support - Discipline	41	2.5	1.106	0.575
Desired Support - Discipline	41	3.2	6.597	0.037
Workplace Culture - Discipline	39	2.0	0.519	0.771

Figure 6

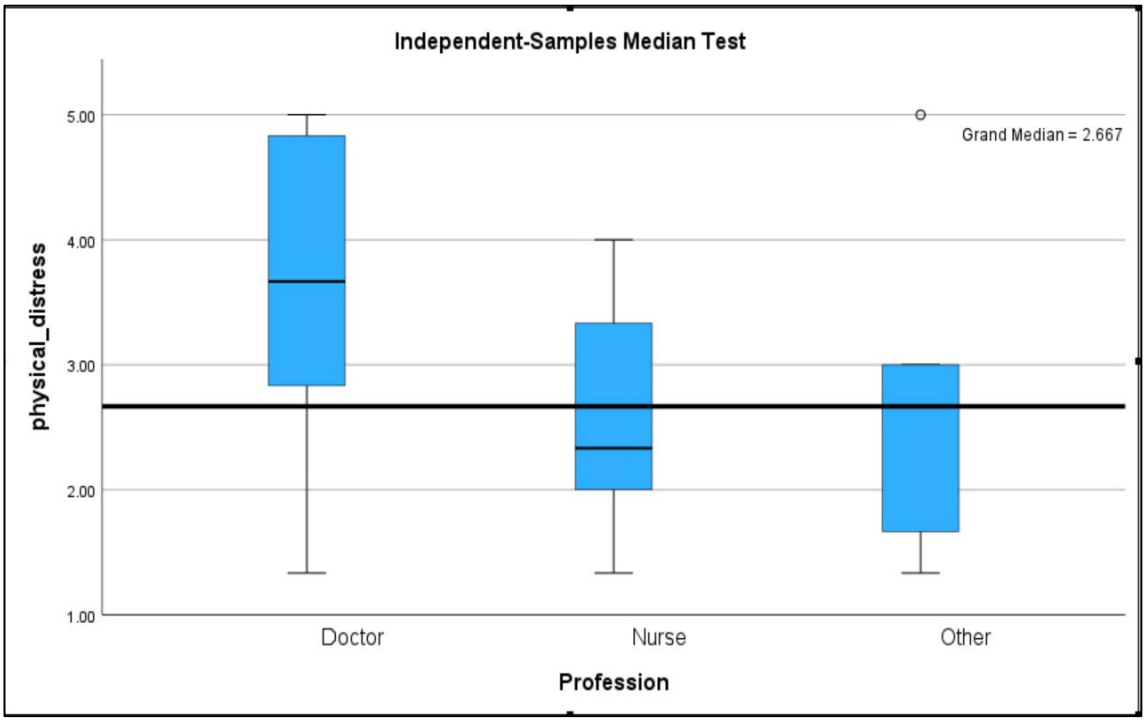
Desired Support – Discipline



Note. Lower score = stronger desire for support.

Figure 7

Physical Distress – Discipline



Note. Lower score = stronger desire for support.

4.4.4 Years of Experience

The Independent Samples Median test found no statistically significant relationship between participants' years of experience and psychological distress score, physical distress score, defensive medicine score, colleague support score, desired support score, and workplace culture score (see Table 19). However, it is important to note that participants with less than 10 years of experience agreed somewhat more to the physical distress domain questions than the other groups (see Figure 5). Additionally, participants with less years in practice disagreed more with the colleague support domain questions than participants who had more than 10 years of experience (see Figure 6).

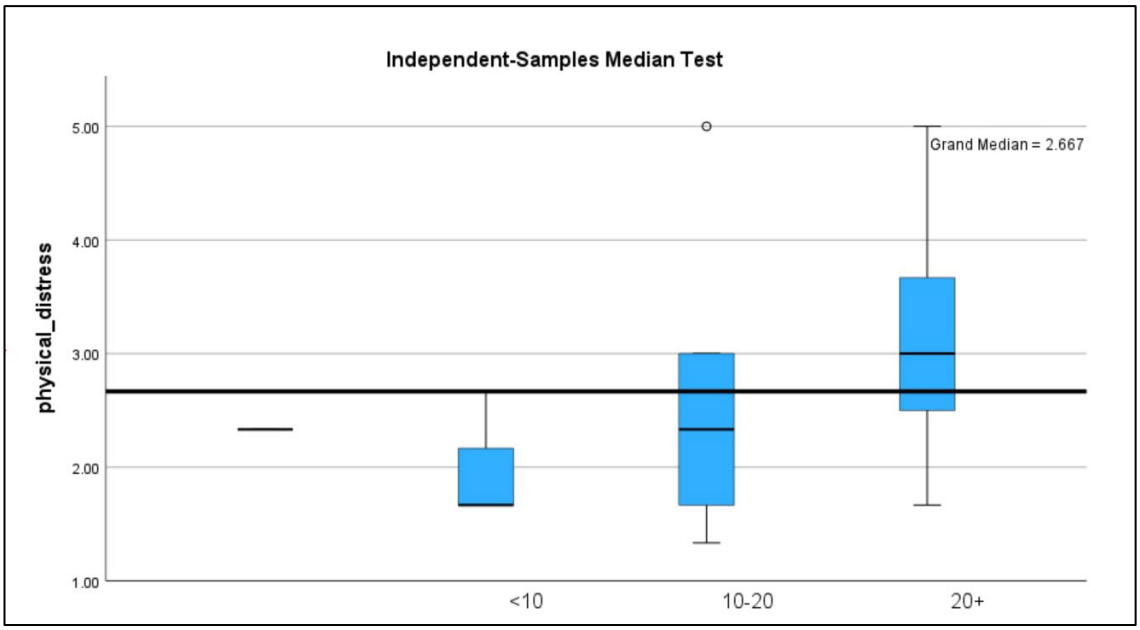
Table 19

Independent Samples Median Test Years of Experience

Domain	Total	Median	Test Statistic	Asymptomatic Sig (2-sided test)
Psychological Distress – Years of experience	41	2.00	2.343	.504
Physical Distress - Years of experience	41	2.667	6.043	.110
Defensive Medicine - Years of experience	41	3.00	1.987	.575
Colleague Support - Years of experience	41	2.50	1.133	.769
Desired Support - Years of experience	41	3.167	4.370	.224
Workplace Culture - Years of experience	39	3.00	3.164	.367

Figure 8

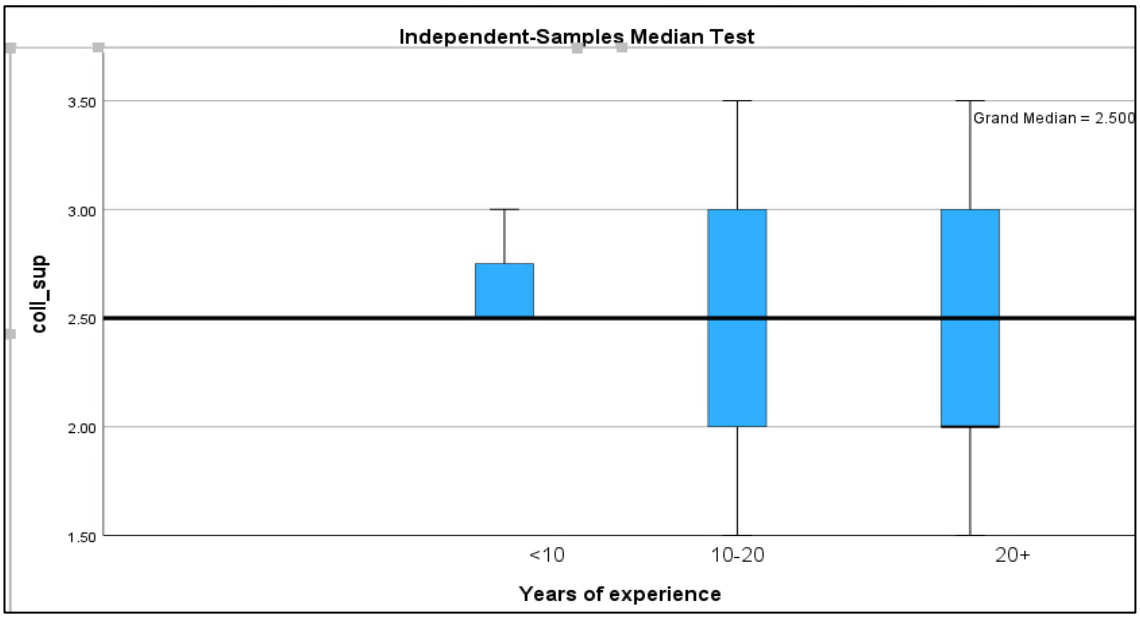
Physical Distress – Years of Experience



Note. Lower score = higher level of physical distress.

Figure 9

Colleague Support – Years of Experience



Note. Lower score = stronger colleague support.

4.5 Chapter Summary

This chapter has presented the findings from the study. Notable findings include that most participants reported greater psychological distress compared to physical

distress following a clinical error, with female health professionals experienced a greater degree of both psychological and physical distress compared to males. The fear of embarrassment was the highest rated psychological symptom. Additionally, a higher level of distress was reported in the groups ‘other’ and nurses compared to doctors. These findings are critically discussed with reference to the wider literature in Chapter 5.

Chapter 5: Discussion

5.0 Introduction

Clinical errors cause harm to patients and health providers every day (WHO, 2019). Valuable insights can be gleaned from Chapter 2 on the current state of the problem, including health professionals' perspectives and attitudes towards error, variations in error reporting, the impact of professional sub-cultures on organisational culture, the prevalence and severity of the second victim phenomenon, and the limited support for second victims. The burden of clinical error is an ongoing issue globally and in New Zealand (Leitch, 2021; Panagioti et al., 2019). The WHO Global Patient Safety Action Plan 2021-2030 highlights the significant role safety culture plays in improving patient safety (WHO, 2023).

The literature highlights the positive effect that open safety cultures have on patient safety, including increased error reporting and better patient outcomes (DiCuccio , 2015; Kakeman et al., 2021)). By contrast, punitive and closed safety cultures have been proven to have a negative impact on patient safety and present a barrier to transparency and reporting of clinical errors (Flotta et al., 2012). One of the biggest barriers to open disclosure is the fear of negative consequences, including the potential professional and legal repercussions (Aljabari et al., 2021; Flotta et al., 2012; Oliveira et al., 2024; Wise, 2018). These detrimental effects can be further exacerbated by the complaints process; as Grissinger (2014) pointed out, the way in which the healthcare industry responds to errors tends to punish and/or isolate those involved. Furthermore, as discussed in Chapter 1, there are important complexities impacting specific professional groups that stem from societal beliefs, social dynamics and historic principles that present barriers to reporting errors but also accepting that they happen and accessing appropriate support (Pepper et al., 2012; Sirriyeh et al., 2012).

Studies examining the individual impact of clinical error have confirmed the significant emotional toll that clinical errors can have on those involved, with health professionals referred to as 'second victims' (Ullström et al., 2013; Van Gerven, Bruyneel et al., 2016; Wu, 2000). Furthermore, authors recognise the broader consequences of clinical errors and the negative impact that clinical error can have on the organisation, colleagues and future patients (Quillivan et al., 2016; Ullström et al., 2013; Van Gerven, Bruyneel et al., 2016). Quillivan et al. (2016) examined the relationship between safety

culture and the second victim response, finding that safety culture has a direct impact on the second victim response and recovery.

The limitations of the existing body of work are, first, that several publications draw on research conducted in the US or Europe, limiting generalisability to the New Zealand healthcare system. Furthermore, the research has been predominantly undertaken in secondary care and focused on specialist high-risk settings, with limited research conducted outside of the hospital setting (Slawomirski et al., 2017 Sundwall et al., 2020).

This final chapter critically discusses the findings presented in Chapter 4 in the context of the literature cited in Chapter 2 and any further recent literature. This chapter also discusses the strengths and limitations of this study, and highlights opportunities for further research and directions for practice, including recommendations to improve the support of healthcare workers involved with clinical errors.

5.1 Purpose of this Research

This study seeks to answer the following questions:

I. What psychological impact does involvement with clinical error have on New Zealand health professionals?

II. What impact does organisational culture have on the recovery of health professionals following a clinical error?

III. What support do health professionals want following a clinical error?

The study surveyed nurses, doctors, medical imaging technologists and pharmacists in an outpatient setting in New Zealand. The survey tool was developed by combining questions from three existing validated tools, the SVEST (Burlison et al., 2017), the SAQ (Sexton et al., 2006) and the SCS (Hutchinson et al., 2006), with the inclusion of new questions to answer the research question and gain an understanding of the current situation in New Zealand. To the best of the author's knowledge, this is the first study in New Zealand to look at the second victim phenomenon and safety culture, across several professional groups, in an outpatient setting. Therefore, it is a foundational piece of work that serves as the basis for further research in a wider population.

Overall, 41 potential participants completed the full survey, yielding a response rate of 16%. Most respondents identified as female 69% (n=31), with 31% (n=14)

identifying as male. Interestingly, 40% (n=18) of respondents were from the professional group 'other', made up of medical imaging technologists and pharmacists, closely followed by nurses at 33.33% (n=15) and doctors at 26.67% (n=12). Most participants were over the age of 40, with over 20 years in practice. Furthermore, the nurses and others that completed the survey were largely female, whilst the 14 doctors were represented by males 71.4% (n=10).

Although low, the response rate for this type of research was in line with similar studies. Low response rates have been highlighted as a limitation in previous studies (Van Gerven, Bruyneel et al. 2016). Van Gerven, Bruyneel et al. (2016) second victim study had a response rate of 7%, and Gauld and Horsburgh's (2020) safety attitudes survey had a 25% response rate.

However, the response rate was low in comparison to Quillivan et al.'s (2016) 47.2%; similarly, Baas et al. (2018) had a response rate of 42.8%. According to two systematic reviews, response rates to safety culture surveys vary between 4.2% to 100%, suggesting significant variability exists (Ellis et al., 2022; Olesen et al., 2024).

The demographic data for this study is consistent with previously published studies. In studies that have included several professional groups, nurses and women had a greater response rate than other professions and males (Ullström et al., 2013; Van Gerven, Bruyneel et al., 2016). However, these findings must be considered in the context of a largely female workforce. Another potential explanation for this is that males have largely dominated the medical workforce. As cited in the literature, the medical workforce may face additional barriers stemming from societal expectations, the notion that doctors 'do no harm', and the fear of failure (Ozeke et al., 2019). These issues could have negatively influenced the response rate and limited recruitment by potentially acting as a barrier to doctors completing the survey. These findings further support the direct influence of subcultures posing as a potential barrier within certain professional groups (Sirriyeh et al., 2012).

5.2 Second Victim Effects

5.2.1 Psychological and Physical Effects

Psychological effects. This study found that most participants reported greater psychological distress compared to physical distress following a clinical error. The

psychological distress domain contained five questions with a five-point Likert scale (1=‘strongly agree’, 5=‘strongly disagree’). The severity of psychological distress for the combined domain score (mean=1.96) indicated that most participants either somewhat agreed or strongly agreed with questions in the psychological domain:

1. I have experienced embarrassment from these instances.
2. My involvement from these types of instances has made me fearful of future occurrences.
3. My experience made me feel miserable.
4. I feel deep remorse/guilt for my past involvement in these types of events.

This confirms that health professionals involved with a clinical error are experiencing significant levels of psychological distress.

Physical effects. The combined domain scores mean for physical effects was 2.91, suggesting most participants agreed with or were neutral about questions in this domain. The highest scoring physical symptom was feeling queasy/nauseous with n=24 (58.53%) of participants strongly or somewhat agreeing (mean 2.66, SD 1.26). However, upon closer examination of individual item scores, a more nuanced picture materialises between demographic groups. One notable difference was the level of physical distress experienced by females compared to males, which was statistically significant (<0.05). One explanation for this could be that physical distress may be directly related to the level of psychological distress, suggesting that a greater the level of psychological distress could exacerbate physical symptoms (Mathelbula et al., 2022).

Overall, the findings from this study are consistent with those previously published. Several studies reported that participants experienced greater psychological distress than physical distress (Seys et al., 2013; Van Gerven, Bruyneel et al., 2016; Wu, 2000). However, the findings from this study contradict those of Burlison et al. (2017) where participants showed a higher rate of physical distress n=30 (10.3%) compared to psychological distress n=22 (7.4%). A possible explanation for the higher level of psychological distress reported in this study could be linked to the current situation in the health workforce. In a recent survey conducted by the Royal New Zealand College of General Practitioners across New Zealand, n=966 (31%) reported experiencing burnt-out (Tu, 2020). Furthermore, 14% of healthcare workers in New Zealand reported experiencing at least one form of psychological distress ‘all the time’ (Worksafe, 2023).

This level of persistent distress and burnout may be reflected in the survey responses and the higher reported rates of psychological distress in this study.

One notable finding was that the fear of embarrassment was the highest rated psychological symptom, with n=37 (90%) of participants strongly agreeing or somewhat agreeing with Q5, 'I feel embarrassment from these types of incidences' (mean 1.68, SD 1.011). This is significantly more than previous studies have reported. A systematic review that included 13 studies found the fear of embarrassment was reported by 52% of respondents (Busch et al., 2021). Kappes et al. (2023) used the SVEST tool to investigate the second victim phenomenon across intensive care settings, finding that 69% of participants' most prevalent symptom was feeling embarrassed about the incident. The fear of embarrassment is a concerning finding as it may be a potential barrier to reporting and may prevent or delay health professionals from asking or accessing support (Oweidat al., 2023).

Another notable finding indicated that female health professionals experienced a greater degree of both psychological and physical distress compared to males, the difference between males and female for the physical domain being statistically significant (p0.045). These results align with those of Baas et al. (2018), Seys et al. (2013) and Van Gerven, Bruyneel et al., (2016) suggesting that female health professionals are more likely to experience severe psychological effects compared to males. Benham et al. (2017) offered a possible explanation in suggesting that females may be at higher risk because of their involvement with more vulnerable patient groups, pointing out that a larger number of females work in specialities such as obstetrics and with neonates. Additionally, Seys et al. (2013) found that females are more concerned about damage to professional reputation following an error, which may explain the increased severity of psychological and physical symptoms reported by females. Furthermore, Gupta (2019) suggested that female health professionals who have family responsibilities may be at increased risk. Schroder et al. (2019) offered an explanation in suggesting that this could be because female healthcare professionals who were mothers themselves related more closely to those who were harmed by the event. Coughlan et al. (2017) and Rivera-Chiauzzi et al. (2022) found that health professionals caring for women with foetal or neonatal loss and/or maternal death were more likely to experience greater second victim distress. However, it is important to consider the reliability of this claim, as both this study and most published studies have a larger number of female participants. The unequal

distribution across genders could be viewed as a limitation; however, as health workforces in general have higher numbers of females, it may not affect the generalisability of the results.

A higher level of distress was also reported in the groups 'other' and nurses. This may partly be explained by the number of females within these two groups. Another explanation for the higher levels of distress reported by nurses is that nurses are at the forefront of patient care, and they often establish deeper relationships and connections with patients and their whānau that are sustained over a prolonged period. This may increase their feelings of guilt and self-blame when a clinical error occurs, making them more vulnerable to greater personal distress. This theory is supported by Harrison et al. (2015) who suggested the greater level of distress experienced by nurses may relate to the greater intimacy and frequency of contact which may heighten their distress when patients come to harm. Furthermore, Harrison et al. (2015) stated that nurses are at greater risk of being blamed for an adverse event because they provide the most direct patient care, further increasing the level of distress. A possible reason for the level of distress in the group 'other' was that this group contained medical imaging technologists and pharmacists. For confidentiality purposes, the breakdown of roles was not able to be explored in this study; however, this group contained medical imaging technologists including sonographers involved with obstetric imaging. As pointed out by Coughlan et al. (2017), health professionals exposed to foetal loss in the course of their professional duties are more at risk of greater second victim distress.

Conversely, findings from this study do not support those reported of Mathebula et al. (2022), who reported a higher level of psychological distress among doctors. They suggested that this might be due to doctors having a higher degree of personal responsibility, which may influence the level of distress that they experience. The different findings in the present study could be explained by the sensitivity of the topic and the stigma attached to errors, which may have influenced the doctors' decision to participate in the survey. Previous studies have suggested that doctors may be particularly vulnerable to shame and guilt, which could have affected not only their participation but also how openly they responded to the survey questions, resulting in them downplaying the severity of the impact an error had on them (Harrison et al., 2015). Similarly, Detsky et al. (2013) suggested that whilst doctors know disclosure is ethically correct, in certain situations they may not admit to making an error. This aligns with previous research that

highlights the fear of punishment from error (Flotta et al., 2012; Quillivan et al., 2016). Although this study did not directly ask participants about their reporting practices, the differences in responses among professional groups may be significant.

There were no statistically significant differences amongst age groups. However, the overall pattern of results from this study suggests that younger health professionals (20-29) experienced more severe levels of physical distress following involvement with clinical error when compared to the other age groups. However, this finding must be interpreted with caution as there were only two participants in this group. The published literature highlights the negative effects on junior staff, suggesting junior health professionals may be at a greater risk of severe second victim effects (Scott et al., 2009; Ullström et al., 2013; West et al., 2009). This finding could also be explained by junior doctors being at greater risk of burnout. A 2022 study found that doctors aged 20-30 were at a greater risk of burnout, which may double the risk of being involved with a patient safety incident (Hodkinson et al., 2022). This is supported by a recently published 2025 study conducted by the American Society of Clinical Oncology looking to understand the prevalence of burnout in oncology fellows. The study found that first-year fellows, essentially those with less years in practice, reported more emotional exhaustion (21%), compared to third-year fellows (17%) and second-year fellows (16%) (Schenkel et al., 2025)

These findings could be explained by the fact that younger health professionals having less clinical experience, making their first experience of error more traumatic. This theory is supported by several authors who indicate the concept of clinical error is not widely discussed at undergraduate level, and there is limited education about error, which may result in less experienced health professionals being underprepared to deal with the psychological distress of clinical error (Singh et al., 2024; Yates, 2020). Another possible explanation for this is that coping styles often develop over time, suggesting that the more experienced the health professional, the more likely it is that they will have developed resilience from ongoing exposure to errors in practice (White & Delacroix, 2020).

These findings suggest that inadequate preparation during training could be a potential contributor to second victim distress. It highlights an opportunity to increase awareness of the second victim phenomenon during undergraduate training so that, before entering the profession, health professionals develop skills which can be applied in

clinical practice (Sánchez-Garcia et al., 2023). Interestingly, despite the differences across age groups, years in practice did not show any statistically significant or notable differences across the psychological domain. However, participants with less years of experience (<10 years) agreed more with the physical distress domain questions. Again, it is important to note that in this study only two participants had less than 10 years' experience. These findings are supported by Marung et al. (2023), who found that fewer years in practice positively correlated with a higher symptom load. However, research conducted by Trieber and Jones (2018) highlighted similar levels of distress experienced between new health professionals and those with 40 years' experience. Nonetheless, it is important to note that the findings from the present study indicate that the younger age group experienced a higher level of distress, and this group is most likely to have less years in practice.

5.2.2 Professional Effects

Involvement with a clinical error can result in reputational damage and the development of harmful professional behaviours, including obsessive checking, avoidance of complex or high-risk procedures, the over-recommending and performing of diagnostic tests (also referred to as defensive medicine), and withdrawal from practice (Ozeke et al., 2019). Bourne et al. (2019) suggested that medical error and the practice of defensive medicine are interconnected with the concept of becoming a second victim.

In this study, despite the high levels of psychological and physical distress reported, the mean for the defensive medicine domain was 3.14 (SD 1.13), suggesting that the responses were evenly split. Furthermore, the defensive medicine domain did not uncover any statistically significant findings, with n=15 (43.9%) of participants either strongly disagreeing or somewhat disagreeing (mean 3.15, SD 1.276) with the question 'After my experience I became afraid to attempt difficult or high-risk procedures', while n=26 (63.42%) of respondents strongly disagreed or somewhat disagreed (mean 3.63, SD 1.157) with the statement 'these situations have negatively affected my performance at work'. Furthermore, n=21 (51.22%) of participants strongly disagreed or somewhat disagreed (mean 3.46, SD 1.142) with the question 'I no longer enjoyed my job because of my involvement with a patient safety error'. There were no statistically significant differences across the demographics. However, it is important to note that there was a slight variation in the defensive medicine domain between professional groups, with doctors having a lower mean score compared to nurses: doctors (mean 3.13, SD 1.340)

nurses (mean 3.46, SD 0.90) and other (mean 3.5, SD 1.10). Additionally, doctors had a wider dispersion of results, suggesting variation between respondents. This difference could be explained by the fact doctors are likely to be more involved with performing high-risk procedures and responsible for ordering more diagnostic tests, and therefore the practice of defensive medicine is more relevant to this group.

Notably, the defensive medicine findings from this study did not strongly align with the findings from other studies. A survey conducted by Baas et al. (2018) found that one in two doctors changed their practice after an error or significant event by becoming more defensive in their decision-making. A 2017 survey found that half of doctors admitted that they practice defensively after a clinical error (British Medical Association, 2018). However, it is important to note that comparing the findings of this study to other professional groups outside of doctors is challenging, as the practice of defensive medicine has predominantly been extensively researched in the medical profession only. However, Manuel & Crowe, 2014 suggest that risk aversion in nursing is a form of defensive practice and is a known issue across other specialities. A possible explanation for the findings from this study could be that they are due to the low number of doctors participating, therefore meaning that study may not have captured the full extent of the issue. Furthermore, those doctors who did respond did not report significant levels of psychological or physical distress, which may be reflected in the defensive medicine findings. As Panella et al. (2016) pointed out, being a second victim is the strongest predictor of practising defensive medicine.

5.2.3 Summary

The findings from this research provide further insight into the experience of health professionals involved with a clinical error. It supports the view that the second victim phenomenon is a real and prevalent phenomenon in New Zealand. The results of this study uncovered differences between genders, professional groups and age groups. Overall, this study supports the findings from similar studies suggesting that certain demographic factors can heighten the distress experienced by healthcare workers. Significant findings were that female health workers were more at risk of experiencing stronger negative effects as a consequence of clinical error.

Secondly, participants who identified as members of the professional group ‘other’ reported higher levels of distress than nurses and doctors. The additional insights

this study gathered into other professional groups require further exploration, but they highlight that second victim effects are not isolated to doctors and nurses. More work is required to understand the effects across the wider multi-disciplinary workforce. Furthermore, the most commonly reported symptom in this study was embarrassment, suggesting that there is still much work to be done to remove the stigma and shame felt by healthcare workers in order to remove barriers and enable these workers to speak up.

More needs to be done to normalise error and remove the stigma of error, starting with initiating these conversations during training, supporting wide-reaching acceptance that clinical errors will occur and that mistakes should be talked about openly to aid learning and reflection. Moreover, the second victim phenomenon exists and healthcare staff working in outpatient settings appear to have the same level of distress as those in high-risk secondary care settings. This may be due to the long-term relationships established with patients in primary care settings compared to the more acute episodic care provided in hospital settings.

5.3 Safety Culture

The second question this study sought to answer was to understand what impact organisational culture has on second victim effects and recovery. Safety culture refers to the individual attitudes, values and practices that guide behaviour and the way an organisation collectively views patient safety (Lima & Bates, 2024). The ability to form effective safety cultures relies heavily on health organisations adopting just cultures where psychological safety is prioritised and healthcare staff can be transparent about error without fear of punishment.

Interestingly, only 39 of the 41 respondents completed the workplace culture questions. The safety culture questions used a five-point Likert scale (1='strongly agree', 5='strongly disagree'). Most respondents agreed or strongly agreed, suggesting that they had a positive view on the culture within the organisation. All staff groups responded positively about reporting errors with n=29 (74%) reporting that they were comfortable reporting errors. The mean response to the questions in the safety culture domain was 2.05 (SD .676). In this study n=24 (61%) participants reported that that that they were encouraged to report safety concerns. Therefore, the findings from this study suggest that workplace culture was positive overall, suggesting that, in this study, safety culture had no direct correlation with the level of second victim distress (mean 1.69, SD .882).

However, the free text suggests that there are opportunities for improvement by improving incident feedback, debriefing after events, discussing near misses, and taking the opportunity to conduct constructive clinical reviews using critical thinking to aid learning.

The finding from this study differs to those of Quillivan et al. (2016) and Van Gerven, Bruyneel et al. (2016); both of these studies reported a direct link between safety culture and the second victim phenomenon. Their findings suggest that respondents with a stronger organisational culture experience lower psychological distress, and that punitive work cultures can increase the severity of symptoms and lead to the non-disclosure of unexpected events. This is supported by Zhang et al. (2019), who stated that the second victim experience may be greatly reduced by cultivating a positive safety culture. This is further supported by Coughlan et al. (2017) who suggested that negative safety culture is directly correlated with burnout and the second victim experience. Furthermore, Roussin et al. (2018) suggested punitive cultures may be a key factor preventing staff from feeling safe enough to speak up, report mistakes and ask for support. Several studies have linked a positive safety culture to more favourable patient outcomes (Kakeman et al., 2021). However, the findings from the present study suggest that having a strong workplace culture may not be sufficient support for staff involved with clinical errors. A positive patient safety culture needs to be supported by the development of official guidelines and models that promote and oversee both patient and staff safety within diverse healthcare environments (Schroder et al., 2018).

Furthermore, there were no statistically significant associations between the demographics and workplace culture score. The only notable variation, although not statistically significant, was with the 20-29 age group, who disagreed more with the workplace culture domain questions than other age groups. Notably, Torbenson et al. (2021) found junior doctors were concerned that their “colleagues” were indifferent to them following a clinical error. This may be explained by underlying cultural and workplace factors that less experienced staff members have limited exposure to. Furthermore, it could also imply that younger, less experienced staff may have a different perception of safety culture compared to more experienced colleagues. Participant responses to the question ‘are there any improvements that you feel would make a positive impact on workplace culture’ backed the quantitative findings, with responses supporting organisation openness around clinical error and there being no judgement of staff

involved or blame directed towards them. Several participants mentioned the importance of safety training.

5.3.1 Summary

Whilst positive safety cultures have been shown to improve incident reporting and promote continuous learning, the research on the impact safety culture has on the second victim experience is limited (Quillivan et al., 2016; Van Gerven, Bruyneel et al., 2016). This study did not uncover a link between the severity of second victim distress and workplace culture, suggesting that, even with a positive safety culture, staff involved with clinical errors need more than a positive safety culture alone. Furthermore, whilst not analysed the findings from this study indicate that a positive safety culture potentially reduces the impact of defensive medicine, but further work would be required to test this theory. This research has highlighted that whilst there are several benefits of having a positive safety culture, including increased incident reporting, patient outcomes, a positive safety culture is not on its own the solution to managing the effects of the second victim phenomenon. These findings support the need for more focused research to gain a deeper understanding of the extent to which both organisation and professional cultures are linked to the second victim phenomenon.

5.4 Desired Support

Finally, this study sought to understand what support health professionals want following a clinical error. The desired support domain used a six-point Likert scale (from 1='extremely useful' to 5='not at all useful', with 6='not offered'). Participants were asked to rate the usefulness of four support options: discussion with colleagues, discussion with line manager, validation from a peer around decision-making, and access to counselling services. Participants were also asked to rate the usefulness of the timing of the support, i.e., should it be provided immediately, following the event or several months after the event?

Peer support. The findings from this study show that 38 (78%) of the participants emphasised the importance of discussing with a colleague (mean 2.12, SD 1.288) and validation from a peer around their decision-making was rated the most useful (mean 1.98, SD 1.332). Analysis of the free-text data further supported the quantitative findings: several participants mentioned the words '*peer',* '*colleague*', *'training'*, '*debriefing*', and/or '*counselling'* in relation to 'desired support'. One participant commented that

'counselling services after a particularly bad event would be useful' whilst another stated that '*counselling support is not what is needed and could be more harmful than supportive'*.

Participants mentioned 'opportunity to talk through the incident with a clinical member straight after the incident' in 'a timely manner' to 'allow participants to recall actions and decisions and reflect on learnings'.

The findings from this study support the work of Burlison et al. (2017) who found that a having validation from a peer was the most desired form of support for n=33 (80.5%) participants (mean 1.98, SD 1.332). Baas et al. (2018) also found peer support to be the most used coping strategy after emotional events. The importance of validation around decision-making, and the second victim feeling respected by their peers in the aftermath of a clinical error, are supported throughout the literature (Fisseni et al., 2007; Kappes et al., 2023; Torbenson et al., 2021). Both Quillivan et al.'s (2016) and Ullström et al.'s (2013) work emphasised the importance of peer support from colleagues, line managers and the organisation. Quillivan et al. (2016) also reported that support was found to have a complete mediation effect on physical and professional distress and a partial mediation effect on psychological distress. Zhang et al. (2019) reported similar findings, suggesting that organisational support reduces second victim distress. Furthermore, it is important to note that whilst peer support programmes are generally well received, they are not suitable for all situations (Dukhanin et al., 2018; Edreeset al., 2017).

Line Manager Support. In this study Line Manager support was not as strongly desired as peer support, with a mean score of 3.35 (SD 1.837). However, this contradicts Mathebula et al.'s (2022) study, where 65.5% of participants' most desired form of support was discussing the event with a supervisor or manager. This is supported by Ullström et al. (2013) recognising health professionals' need for support and understanding from their manager/employer after a clinical error. Kubheka et al. (2020) suggested that the ability to do this is dependent on the quality of the relationship between the staff member and their line manager. Another factor that may limit line manager support is that some line managers may not have clinical knowledge or current clinical practice status, limiting their ability to fully understand or empathise with the situation (Edrees et al., 2013).

Counselling. The least desired support was counselling, with n=19 (46%) of participants rating counselling as useful (mean 4.02, SD 1.037). This result aligns with findings from the previous studies reviewed in Chapter 2, which suggested that there is limited take-up of these services (Gallagher et al., 2003). Nydoo et al. (2020) highlighted the potential limitations of counselling such as the inability to relate to clinical providers because they feel that counsellors do not know what they go through after an event. Edrees et al. (2016) highlighted that another barrier is getting timely access to appointments. However, in a study conducted by Waterman et al. (2007), more than 80% of participants expressed an interest in counselling after a serious error.

An important finding in this study is the difference between genders, which is statistically significant (**p=0.002**), with female respondents reporting a much stronger desire for post-event support than males. A possible explanation for this is that females report a greater level of psychological and physical distress than males. Therefore, this group is more likely to need and access support. Additionally, as previously discussed in this thesis, most male participants identified as doctors, which may have contributed to these findings, as the desired support domain showed statistically significant differences across the three professional groups (**p=0.037**), with doctors rating support mechanisms as less useful compared to nurses and other. Doctors responded more neutrally across all support questions, with a tendency towards rating support mechanisms as 'not so useful' or 'not useful' or 'not offered'. This could be interpreted as doctors being less likely to want or to seek out support. However, from the support options presented in the survey, their most preferred option was peer support and validation from a colleague. These findings may again relate back to the complexities stemming from professional subcultures and societal expectations, as described in Chapter 1. Asking for support could be viewed as a sign of weakness and vulnerability (Ozeke et al., 2019).

Furthermore, fear of embarrassment and stigma are well-documented barriers to accessing help (Edrees et al., 2017) and admitting vulnerability and asking for help may be more challenging for medical professionals than others (Han et al., 2017). McGee (2020) raised awareness around the fear of failure in the medical profession, connecting this fear to the historic expectations, deeply engrained throughout the medical profession and society, that doctors 'do no harm', and stating that failure is not acceptable to them. Therefore, the fear of failure may be a significant barrier to seeking support following a clinical error. Han et al. (2017) connected this fear to the inability to seek support,

suggesting that that seeking out support could be viewed as an admission of failure and met with criticism from peers.

There are limited support programme evaluations available; however, published evaluations include significantly more females than males, making it difficult to generalise the benefits of second victim support programmes across genders (Torbenson et al., 2021; Schrøder et al., 2022). Furthermore, Wu (2022) highlighted that there may be additional benefits in a mentorship approach to patient safety, suggesting that this approach is well-established in the medical field and may be more widely accepted by the medical profession.

Participants were asked about their preferred timing of support, with n=26 (63.4%) of participants wanting immediate support after the event useful, n=21 (51.22%) of participants wanting ongoing access to support for months following the event, while 15 participants (36.59%) reported not being offered any support. The timing of support identified by participants in this study follows a similar pattern to the findings of Marung et al. (2023) who identified that second victim self-perceived time to full recovery was generally up to one month, according to n=123 (57.7%) of participants and more than one month for n=66 (31%) of participants. The findings from this study and other research suggest that the effects can be ongoing, and support needs to be tailored to the individual situation (Sachs & Wheaton, 2023; Vanhaechtet al., 2019). Therefore, allowing unrestricted access and ongoing psychological support is paramount (WHO., 2021). Although the present study did not gather information about the severity of the clinical error, similar studies suggest that the severity of the event is directly linked to the duration of effects (Vanhaecht et al., 2019).

5.4.3 Summary

These findings illustrate the importance of support and the differences between professional groups. The qualitative data from respondents supports the quantitative findings. Respondents clearly indicated that their most preferred support was peer support, indicating that access to counselling was less desirable. What is clear is that ‘one size does not fit all’, as discussed in Chapter 2. This is supported by Gauld and Horsburgh (2020) and Hafezi et al. (2022), who discussed the variations among different demographics, indicating the need for more research and the potential for targeted

interventions. As outlined in Chapter 2, established support programmes are limited internationally and non-existent in New Zealand.

5.5 Strengths

To the best of the author's knowledge, this study was the first of its kind to study the second victim phenomenon in New Zealand. Whilst it employs a small sample, this study has provided unique insights into the experiences of New Zealand health professionals involved with clinical error. Additionally, it has provided a unique opportunity to look at the prevalence of the 'second victim phenomenen' within an outpatient setting, where there is a lack of research (Slawomirski et al., 2017; Sundwall et al., 2020). Furthermore, this is the first study internationally to look at the impact of clinical error on medical imaging technologists, highlighting some significant findings withing this professional group.

The methodology used was a strength of this research, utilising a mixed-methods approach to provide greater insight and depth in the study's findings. Overall, these findings provide valuable information for New Zealand healthcare professionals in outpatient settings.

5.6 Limitations

There were several limitations of the study, including the low sample size. Low response rates can reduce the effectiveness of a study's sample size, which can result in bias; for example, non-responders may be systematically different from responders (Kellerman, 2001). Additionally, it is important to note that the small sample size may have had an adverse effect on the statistical power of the study, resulting in type II errors; however, with type II errors there may still be a difference in the population (Salkind &Frey, 2019).

However, as highlighted in Chapter 4, a possible explanation for the low response rate could be explained by the sensitivity of the topic and the stigma attached to reporting clinical errors (Fisseni et al., 2007). This may have influenced both the decision to participate and the openness and honesty of the survey responses (Ellis et al., 2022). Another potential reason for the low response rate, as discussed in Chapter 1, is the target population would only be approximately half of those who were sent the survey (Seys et al., 2013). Therefore, the relatively low response rate could be explained by the estimated

number of health professionals involved with clinical errors being in the region of 50%, so only half of the invited participants would be eligible to complete the survey. Consequently, if the number of potential participants is halved to 127 to provide a more realistic representation, then the response rate increases to approximately 57 % (Eysenbach, 2004).

Furthermore, whilst survey tools are widely used in health research settings, they are known to have limitations, including the variation in response rate that can range between 23% and 100% (Weaver et al., 2013). Phillips et al. (2016) stated that a low response rate may result in biased findings that can impact the quality and generalisability of the study. However, Meterko et al. (2015) state that the representativeness of participants is more important than response rate itself. Suggesting that the response rate does not necessarily determine the strength of a survey. Additionally, questionnaire length and survey fatigue may have been another reason for the low response rate (Ellis et al., 2022).

It is important to note that the study was conducted at the researcher's workplace, and despite the survey being anonymised to protect the identity of participants, this may have impacted the response rates and restricted the openness of responses. Additionally, there could also be a potential for selection bias as the study used an email to recruit participants, and only staff with an interest in the research subject may have completed chosen to complete survey. The time taken to complete the survey may have resulted in some staff who worked in busier sites not having the time to complete the survey. Additionally, participants were being asked to recall historical events, and this may be a limitation as it could lead to recall bias (Althubaiti, 2016). Furthermore, while the impact of this study on Kaupapa Māori was considered, there was no consultation that occurred with Māori, which is highlighted as a limitation of the study.

Another limitation was the merging of selected questions from three existing tools and the inclusion of new questions about desired support. The survey items may not have reflected all aspects of the second victim phenomenon or safety culture, which limits the findings. The SVEST and the SAQ, and SCS were individually validated, and the new modified tool was piloted; however, there was no further validation. Furthermore, the five-point Likert scale was incorrectly entered in the survey platform with the scale items in ascending order instead of descending, meaning that positive answers were coded using smaller numbers, and the negative coded using large numbers. This made comparison

difficult with similar studies; nonetheless, this was always kept in mind when interpreting other studies' results. Finally, this study was conducted at one organisation across two specialities, making it is difficult to generalise the findings to other settings. Expanding this research to a larger sample would enhance the generalisability of the findings.

5.7 Recommendations

This study has generated valuable information and offers significant implications for practice, education and research. Additionally, this research has contributed to the existing second victim and safety culture literature. Most importantly, this work has gained insights into the second victim experience of New Zealand health professionals and highlighted significant differences between demographic groups that warrant further exploration.

The research provides the basis for opportunities to improve the experience of New Zealand healthcare staff impacted by clinical error, with several opportunities for improvement as well as important factors that should be considered at a local and national level to drive positive change for health professionals and patient safety. The provision of national level guidance would assist with influencing national practice, supporting health organisations to address the unmet need that currently exists, and improving outcomes for health professionals.

5.7.1 Implications for Practice

This research has highlighted the damaging effects of becoming a second victim, the unmet needs of healthcare staff involved with clinical error, and the importance of a positive safety culture. Additionally, this study highlights the importance of staff well-being and supports further research into the implications of burnout. The literature outlines the vicious circle of burnout leading to error and involvement with error leading to burnout, and the negative impact that this has on patient care (Kakemam et al., 2021; Lyndon, 2015). At a time when healthcare services face significant pressures and under-resourcing, it is critical that organisations ensure that they have support services in place for staff involved with clinical error, complaints and traumatic events (Pratt et al., 2012). To do this, a wider strategy is needed that includes leadership, education, training, and the development of appropriate and accessible resources for staff. This research makes the following recommendations for practice improvement.

1. Develop local, easily accessible and confidential support systems for staff involved with clinical error, including the development of clear escalation pathways for supporting second victims such as immediate and longer-term interventions.
2. Train leaders and line managers on the second victim phenomenon inclusive of the practical application of support services, and dissemination of information in practice.
3. Raise awareness at a local level of the second victim phenomenon across all levels of the organisation from the frontline workforce to governance board level.
4. Raise awareness of the second victim phenomenon at a national level by educating government organisations. This would shift the focus from a blame-and-shame approach to a learning approach, whereby organisational failures are shared across health providers for the purpose of continuous learning to improve the delivery of care, prevent future failures, and reduce the harm caused to patients, health professionals and organisations.
5. Develop a peer support training programme to allow peers to support second victims, including confidential online support tools for both the second victim and peer support.
6. Continue to deliver the survey two-yearly to monitor the situation, review progress and enable continuous improvement.

At a national level there are significant challenges around the sharing of information across all healthcare sectors. The recommendation from this research is that second victim support should be considered a priority and included in national policy relating to staff well-being and healthcare strategy. Furthermore, clear standards should be set and national-level guidance provided around the contents of second victim support programmes, to ensure consistency across healthcare sectors and to share learnings. Furthermore, there needs to be cohesion between government agencies, professional bodies and healthcare providers to ensure that the well-being of healthcare staff is seen as a fundamental component of processes. This could be achieved the creation of national level guidance to call for institutions to create systems to support clinicians after clinical errors. Finally, a review of the current independent complaints system is needed, to provide a more holistic approach that includes support for patients, their whānau and the

second victim. Internationally, there is an opportunity to develop guidance to support organisations to care for second victims.

5.7.2 Implications for Education

In relation to increasing the knowledge of second victim phenomenon at undergraduate level, several publications have highlighted the importance of early patient safety training, starting at undergraduate level (Sánchez-Garcia et al., 2023). This study further highlights the increased risk of the second victim effects in less experienced/younger health professionals. Also, this group may not have developed the same level of peer support compared to more experienced colleagues, so access to structured support is vital. Additionally, ensuring that the importance of mental health is discussed proactively, and support available, is fundamental to supporting well-being (Krogh et al., 2023). Sánchez-García et al. (2023) suggested that more emphasis is needed in training to prepare healthcare professionals to manage the emotional response to clinical error.

5.7.3 Implications for Future Research

This thesis has presented novel insights into the current situation in regard to the impact of clinical error on New Zealand healthcare professionals, the impact of safety culture and health professionals' needs in the context of clinical error.. Therefore, it provides the foundations for more research to understand the extent of the problem.

Recommendations for possible future research include;

- Repeating the study using a larger sample size to understand the specific needs of the New Zealand healthcare workforce, with meaningful involvement from Māori at all levels.
- More detailed analysis of differences in the second victim experience between professional groups using a qualitative methodology.
- Collecting information relating to participant ethnicity and country of training, to understand if there are any variances or influences on healthcare professionals' perspectives on error, and if they impact the severity of second victim effects or coping strategies. This work could also provide an opportunity to customise and target second victim support programmes and training with cultural differences in mind.

- The inclusion of questions relating to the severity and type of incident and how long since the incident had occurred.
- Targeted mixed-methods research to look at the impact of safety culture and incident reporting across different professional groups, to investigate the relationship between safety culture and incident reporting.
- Focused research to understand whether a positive safety culture reduces the impact of defensive medicine.
- Undertaking a Delphi study to test the validity and reliability of the survey tool.

5.8 Conclusion

This study set out to answer the following questions:

I. What psychological impact does involvement with clinical error have on New-Zealand health professionals?
II. What impact does organisational culture have on the recovery of health professionals following a clinical error?
III. What support do health professionals want following a clinical error?

This study has provided valuable insights into the safety attitudes and culture within our organisation. Furthermore, despite its limitations, this study adds to the understanding of the second victim phenomenon and provides valuable insights into the challenges currently faced by New Zealand doctors, nurses, pharmacists and medical imaging technologists. This research will increase awareness of these issues at the local level and the national level, whilst adding to the international body of work. Overall, findings from this study suggest that the negative effects of clinical error are a real and prevalent problem within New Zealand. This study confirms that there is an unmet need for support for health professionals involved in clinical errors. Additionally, this study found important differences between genders, and professional groups.

At an individual level, we must acknowledge the distress that health professionals can experience following a clinical error. In addition to this, the wider effects must not be overlooked as the second victim phenomenon poses a significant risk not just to health professionals but to patient safety and health organisations. In the current climate, with

global workforce shortages, it is imperative that the health and well-being of health workers are seen as a priority. New Zealand is lagging behind the US, the UK and European countries that have taken steps to address the second victim phenomenon with the development of programmes to support staff involved with clinical errors. System-wide efforts at a national level are needed to better recognise the second victim phenomenon and identify those most at risk, with psychological safety becoming a priority for government organisations, professional councils and healthcare organisations.

A larger problem to tackle is removing the barrier of professional and societal expectations and the stigmatisation of error. To do this we need to shift away from blame-and-shame cultures, educate and foster reflection and learning, and provide a platform for continuous improvement. Staff well-being and psychological safety needs to be made a priority across all healthcare organisations. One suggestion is to embed a culture of compassion into health organisations to enable staff to speak out and seek help when they need it. Most importantly, we must acknowledge that patient and staff safety are interlinked, and to look after our patients we must look after our people.

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Appendices

Appendix A: Second Victim Experience and Support Tool (SVEST)

TABLE 3. Survey Item Loadings for the Revised 7-Factor Model With 25 Items

Variable	Psychological Distress	Physical Distress	Colleague Support	Supervisor Support	Organizational Support	Non–Work-Related Support	Professional Self-Efficacy
I have experienced embarrassment from these instances.	0.735						
My involvement in these types of instances has made me fearful of future occurrences.	0.694						
My experiences have made me feel miserable.	0.780						
I feel deep remorse for my past involvements in these types of events.	0.709						
The mental weight of my experience is exhausting.		0.805					
My experience with these occurrences can make it hard to sleep regularly.		0.827					
The stress from these situations has made me feel queasy or nauseous.		0.725					
Thinking about these situations can make it difficult to have an appetite.		0.780					
I appreciate my coworkers' attempts to console me, but their efforts can come at the wrong time.			0.564				
Discussing what happened with my colleagues provides me with a sense of relief.			0.485				
My colleagues can be indifferent to the impact these situations have had on me.			0.433				
My colleagues help me feel that I am still a good healthcare provider despite any mistakes I have made.			0.614				
I feel that my supervisor treats me appropriately after these occasions.				0.804			
My supervisor's responses are fair.				0.840			
My supervisor blames individuals.				0.681			
I feel that my supervisor evaluates these situations in a manner that considers the complexity of patient care practices.				0.845			
My organization understands that those involved may need help to process and resolve any effects they may have on care providers.					0.800		
My organization offers a variety of resources to help me get over the effects of involvement with these instances.					0.703		
The concept of concern for the well-being of those involved in these situations is not strong at my organization.					0.410		
I look to close friends and family for emotional support after one of these situations happens.						0.680	
The love from my closest friends and family helps me get over these occurrences.						0.965	
Following my involvement I experienced feelings of inadequacy regarding my patient care abilities.							0.858
My experience makes me wonder if I am not really a good healthcare provider.							0.817
After my experience, I became afraid to attempt difficult or high-risk procedures.							0.688
These situations do not make me question my professional abilities.							.401

TABLE 5. Desirability, Means, and SDs for the Support Options Chosen by Participants

Support Option	Desired, %	Not Desired, %	Mean	SD
1. A respected peer to discuss the details of what happened	80.5	4	3.59	1.15
2. A discussion with my manager or supervisor about the incident	73.8	9	3.75	0.98
3. A specified peaceful location that is available to recover and recompose after one of these types of events	67.1	10.5	4.06	0.91
4. The ability to immediately take time away from my unit for a little while	64	15.9	3.68	1.06
5. An employee assistance program that can provide free counseling to employees outside of work	62.4	12.4	3.88	0.98
6. The opportunity to schedule a time with a counselor at my hospital to discuss the event	48	20.7	3.32	1.10
7. A confidential way to get in touch with someone 24 hours a day to discuss how my experience may be affecting me	47.5	20.5	3.34	1.09

Source: Burlison et al. (2017).

Appendix B: Safety Attitudes Questionnaire

Table 3: SAQ item descriptives used for benchmarking

teamwork climate	% item missing data	mean (sd)	% agree (min agree-max agree)	% disagree (min disagree-max disagree)	factor loading (between)	factor loading (within)
It is easy for personnel in this ICU to ask questions when there is something that they do not understand.	**1.4**	4.17 (.96)	81 (42–100)	7 (0–35)	0.91	0.65
I have the support I need from other personnel to care for patients.	**2.2**	3.97 (.99)	74 (33–98)	9 (0–43)	0.90	0.65
Nurse input is well received in this ICU.	**1.6**	3.98 (1.05)	73 (24–100)	10 (0–55)	0.76	0.61
In this ICU, it is difficult to speak up if I perceive a problem with patient care.	**2.0**	2.40 (1.21)	22 (0–50)	60 (9–100)	-0.86	-0.42
Disagreements in this ICU are resolved appropriately (i.e., not *who* is right, but *what* is best for the patient)	**1.7**	3.53 (1.10)	57 (23–85)	18 (0–55)	0.85	0.61
The physicians and nurses here work together as a well-coordinated team.	**1.6**	3.78 (1.07)	68 (26–98)	14 (0–52)	0.76	0.63
safety climate						
The culture in this ICU makes it easy to learn from the errors of others.	**1.8**	3.95 (1.01)	72 (33–100)	10 (0–33)	0.94	0.59
Medical errors are handled appropriately in this ICU.	**2.2**	3.45 (1.06)	51 (14–92)	17 (0–57)	0.83	0.59
I know the proper channels to direct questions regarding patient safety in this ICU.	**1.6**	3.83 (1.01)	64 (24–100)	9 (0–38)	0.78	0.43
I am encouraged by my colleagues to report any patient safety concerns I may have	**1.4**	4.08 (.94)	78 (48–100)	7 (0–26)	0.94	0.60
I receive appropriate feedback about my performance.	**0.9**	3.20 (1.23)	46 (5–77)	31 (0–76)	0.73	0.58
I would feel safe being treated here as a patient.	**1.2**	4.05 (1.04)	75 (36–100)	9 (0–42)	0.54	0.62
In this ICU, it is difficult to discuss errors.	**1.6**	2.53 (1.13)	20 (0–46)	52 (21–92)	-0.69	-0.40
job satisfaction						
This hospital is a good place to work.	**0.9**	3.73 (1.08)	63 (5–100)	13 (0–59)	0.99	0.81
I am proud to work at this hospital.	**0.8**	3.78 (1.07)	62 (16–100)	11 (0–50)	0.97	0.80
Working in this hospital is like being part of a large family.	**0.5**	3.10 (1.30)	42 (0–94)	33 (0–80)	0.91	0.69
Moral in this ICU area is high.	**1.4**	2.96 (1.25)	39 (4–83)	37 (0–78)	0.69	0.61
I like my job.	**0.3**	4.37 (.88)	85 (61–100)	5 (0–18)	0.73	0.57
stress recognition						
When my workload becomes excessive, my performance is impaired.	**1.2**	3.83 (1.13)	72 (29–100)	15 (0–53)	0.96	0.60
I am more likely to make errors in tense or hostile situations.	**1.2**	3.74 (1.16)	67 (30–88)	17 (0–50)	0.74	0.57
Fatigue impairs my performance during emergency situations (e.g., emergency resuscitation, seizure).	**3.5**	3.00 (1.28)	40 (6–79)	36 (13–76)	0.51	0.45
I am less effective at work when fatigued.	**1.1**	3.97 (1.03)	77 (38–96)	11 (0–30)	0.92	.75
perceptions of management						
Hospital management does not knowingly compromise the safety of patients.	**1.9**	3.21 (1.22)	41 (9–87)	27 (5–91)	0.71	0.58
Hospital administration supports my daily efforts.	**0.8**	2.75 (1.15)	25 (0–93)	40 (0–100)	0.84	0.69
I am provided with adequate, timely information about events in the hospital that might affect my work.	**1.6**	3.16 (1.09)	42 (12–74)	27 (0–64)	0.76	0.52
The levels of staffing in this clinical area are sufficient to handle the number of patients	**1.7**	2.68 (1.34)	33 (0–85)	52 (4–96)	0.56	0.43
working conditions						
All the necessary information for diagnostic and therapeutic decisions is routinely available to me.	**2.3**	3.56 (1.08)	58 (17–90)	18 (0–67)	0.59	0.54
This hospital constructively deals with problem physicians and employees.	**1.7**	2.82 (1.12)	25 (0–83)	35 (0–80)	0.83	0.57
Trainees in my discipline are adequately supervised.	**2.7**	3.53 (1.17)	58 (10–100)	21 (0–63)	0.73	0.56
This hospital does a good job of training new personnel.	**1.1**	3.54 (1.18)	57 (16–96)	20 (0–61)	0.72	0.67

Table 3 Provides general descriptive information at the item level (likert scale: 1 = disagree strongly, 2 = disagree slightly, 3 = neutral, 4 = agree slightly, 5 = agree strongly): percent missing data; overall mean (standard deviation); overall percent agree (minimum agree-maximum Agree by clinical area); overall percent disagree (minimum disagree-maximum disagree by clinical area); standardized factor loadings at the between-area and within-area levels.

Source: Sexton et al. (2006).

Appendix C: Safety Climate Survey (SCS)

Table 1 Teamwork factors and % responses to items.

	Disagree strongly*	Disagree slightly*	Neutral*	Agree slightly*	Agree strongly*	Not applicable†
Teamwork factor 1: Input into decisions and collaboration with other staff (Cronbach's α=0.84)						
Nurse input is well received where I work.	1	3	6	23	66	4
Decision making where I work uses input from relevant staff	3	4	9	29	54	2
The doctors and nurses here work together as a well coordinated team	3	8	9	33	47	4
Disagreements where I work are resolved appropriately (i.e. not who is right, but what is best for the patient)	4	7	16	35	38	2
It is easy for staff here to ask questions when there is something that they do not understand	1	3	5	24	67	1
I have the support I need from other staff to care for patients	1	5	5	27	62	1
I am satisfied with the quality of collaboration that I experience with senior doctors where I work	5	9	12	35	40	11
Teamwork factor 2: Information handover (Cronbach's α=0.69)						
I know the first and last names of all the staff I worked with during my last shift/period of work	4	5	3	14	74	3
Important issues are well communicated at shift changes/between periods of work	3	7	11	37	42	11
Briefings are common where I work	4	7	13	34	41	8
I am satisfied with the quality of collaboration that I experience with nurses where I work	2	4	5	32	57	4

Table 2 Safety climate factors and % responses to items.

	Disagree strongly*	Disagree slightly*	Neutral*	Agree slightly*	Agree strongly*	Not applicable†
Safety climate factor 1: Attitudes to safety within own team; capacity to learn from errors (Cronbach's α=0.73)						
I am encouraged by my colleagues to report any patient safety concerns I may have	1	4	7	28	60	1
The culture where I work makes it easy to learn from the errors of others	4	7	21	35	32	3
I receive appropriate feedback about my performance	8	13	17	34	28	1
Medical errors are handled appropriately here	1	4	18	27	50	5
I know the proper channels to which I should direct questions regarding patient safety	1	4	6	30	59	1
Safety climate factor 2: Overall confidence in safety of organisation (Cronbach's α=0.70)						
The levels of staffing where I work are sufficient to handle the number of patients	22	23	11	25	19	2
I would feel safe being treated as a patient in this service	5	10	11	27	47	1
Management does not knowingly compromise the safety of patients	6	6	14	22	51	2
Safety climate factor 3: Perceptions of management's attitudes to safety (Cronbach's α=0.78)						
This organisation is doing more for patient safety now than it did one year ago	4	5	36	28	27	5
Leadership is driving us to be a safety centred organisation	4	7	32	34	23	3
My suggestions about safety would be acted upon if I expressed them to management	5	6	16	38	35	2

Table 3 Responses (%) to items omitted from final factor analysis.

	Disagree strongly*	Disagree slightly*	Neutral*	Agree slightly*	Agree strongly*	Not applicable†
Teamwork items						
Where I work, it is difficult to speak up if I perceive a problem with patient care‡	6	12	4	23	55	2
I am frequently unable to express disagreement with the senior clinical staff here‡	9	13	14	27	37	6
Briefing staff on handovers between shifts/periods of work (i.e. to plan for possible contingencies) is important for patient safety.	0.4	0.3	3	12	84	15
Safety climate items						
Staff frequently disregard rules or guidelines (e.g. hand-washing, treatment protocols/clinical pathways, etc) that are established for the area where I work‡	7	10	8	22	53	2
Where I work, it is difficult to discuss errors‡	4	11	9	30	46	1

Source: Hutchinson et al. (2006).

Appendix D: Ethics Approval

Auckland University of Technology Ethics Committee
(AUTEC)

20 April 2023

Rachel Macdiarmid
Faculty of Health and Environmental Sciences

Dear Rachel

Re Ethics Application: **23/67 Understanding the psychological impact that clinical error has on health professionals and how organisational culture influences the experience of the health care worker.**

Thank you for your responses to AUTEC's conditions.

Your ethics application has been approved for three years until 20 April 2026.

Non-Standard Conditions of Approval

1. Please send through confirmation of the location of data storage.

Non-standard conditions do not need to be submitted to or reviewed by AUTEC unless requested but must be completed before commencing your study.

Standard Conditions of Approval

1. The research is to be undertaken in accordance with the Auckland University of Technology Code of Conduct for Research and as approved by AUTEC.
2. All public facing documents must have the AUTEC approval number and be of a high standard of spelling and grammar. Dates on the Information Sheet(s) and Consent Form(s) must be consistent.
3. Any amendments to the project must be approved by AUTEC prior to being implemented.
4. A progress report is due annually on the anniversary of the approval date.
5. A final report is due at the expiration of the approval period, or, upon completion of project.
6. Any serious or adverse events must be reported to AUTEC, this includes unforeseen issues that might affect continued ethical acceptability of the project.
7. AUTEC grants ethical approval only. You are responsible for obtaining management permission for access from any institution or organisation at which your research is being conducted and you need to meet all ethical, legal, public health, and locality obligations or requirements for the jurisdictions in which the research is being undertaken.

The application number and title need to be referenced on all correspondence related to this project.

All forms are available online http://www.aut.ac.nz/research/researchethics

For any enquiries, please contact ethics@aut.ac.nz
(This is a computer-generated letter for which no signature is required)

The AUTEC Secretariat
Auckland University of Technology Ethics Committee

Cc: Emma.moore@canopycancercare.co.nz; sally.britnell@aut.ac.nz

Auckland University of Technology, D-88, Private Bag 92006, Auckland 1142, New Zealand.
T: +64 9 921 9999 ext. 8316: E: ethics@aut.ac.nz: www.aut.ac.nz/researchethics

Appendix E: Ethics Amendment

Auckland University of Technology Ethics Committee
(AUTEC)

9 June 2023

Rachel Macdiarmid
Faculty of Health and Environmental Sciences

Dear Rachel

Re: Ethics Application: **23/67 Understanding the psychological impact that clinical error has on health professionals and how organisational culture influences the experience of the health care worker.**

Thank you for your request for approval of amendments to your ethics application.

The minor amendments to survey have been approved.

Standard Conditions of Approval

1. The research is to be undertaken in accordance with the Auckland University of Technology Code of Conduct for Research and as approved by AUTEC.
2. All public facing documents must have the AUTEC approval number and be of a high standard of spelling and grammar. Dates on the Information Sheet(s) and Consent Form(s) must be consistent.
3. Any amendments to the project must be approved by AUTEC prior to being implemented.
4. A progress report is due annually on the anniversary of the approval date.
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The AUTEC Secretariat
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T: +64 9 921 9999 ext. 8316: E: ethics@aut.ac.nz: www.aut.ac.nz/researchethics

Appendix F: Study Flyer

SPEAK UP FOR SAFETY IN HEALTHCARE

Research to improve support for health professionals involved with clinical error.

This study aims to understand the impact that clinical error has on health professionals, to explore how workplace culture affects recovery, and improve the support services available.

ARE YOU ELIGIBLE?
Registered health care professionals holding a current practicing certificate are invited to participate.

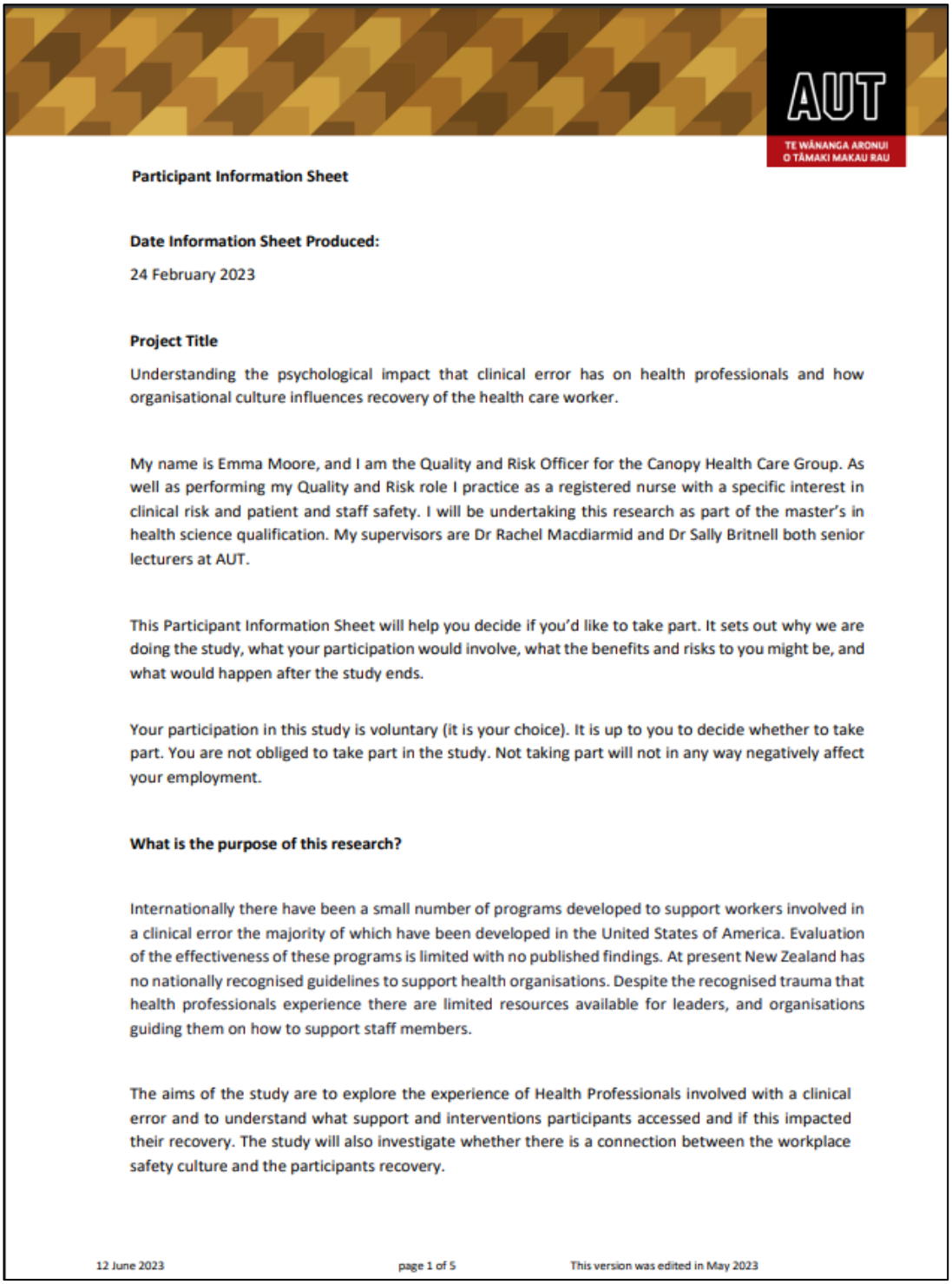
WHAT
To participate you will complete an anonymous online survey, that will take approximately 30 minutes to complete.

HOW?
If you are interested in participating in this study, please click on the link below to view the participant information sheet.

Link: Participant Information Sheet

AUT
TE WĀNANGA AROHUI O TĀMAKI MAKAU RAU

Appendix G: Participant Information Sheet



Participant Information Sheet

Date Information Sheet Produced:

24 February 2023

Project Title

Understanding the psychological impact that clinical error has on health professionals and how organisational culture influences recovery of the health care worker.

My name is Emma Moore, and I am the Quality and Risk Officer for the Canopy Health Care Group. As well as performing my Quality and Risk role I practice as a registered nurse with a specific interest in clinical risk and patient and staff safety. I will be undertaking this research as part of the master's in health science qualification. My supervisors are Dr Rachel Macdiarmid and Dr Sally Britnell both senior lecturers at AUT.

This Participant Information Sheet will help you decide if you'd like to take part. It sets out why we are doing the study, what your participation would involve, what the benefits and risks to you might be, and what would happen after the study ends.

Your participation in this study is voluntary (it is your choice). It is up to you to decide whether to take part. You are not obliged to take part in the study. Not taking part will not in any way negatively affect your employment.

What is the purpose of this research?

Internationally there have been a small number of programs developed to support workers involved in a clinical error the majority of which have been developed in the United States of America. Evaluation of the effectiveness of these programs is limited with no published findings. At present New Zealand has no nationally recognised guidelines to support health organisations. Despite the recognised trauma that health professionals experience there are limited resources available for leaders, and organisations guiding them on how to support staff members.

The aims of the study are to explore the experience of Health Professionals involved with a clinical error and to understand what support and interventions participants accessed and if this impacted their recovery. The study will also investigate whether there is a connection between the workplace safety culture and the participants recovery.

This research may be used to assist in the development of both local and national guidelines.

The findings of this research may be used for academic publications and presentations.

How was I identified and why am I being invited to participate in this research?

All registered healthcare professionals including Doctors, Nurses, Radiology Technicians and Pharmacists at Canopy Health Care Group are invited to take part in this research.

Whether or not you take part is your choice. If you do not want to take part, you do not have to give a reason, and it won't negatively affect your employment. If you do want to take part now, but change your mind later, you can pull out of the study up until the survey is completed and submitted.

How do I agree to participate in this research?

If you agree to participate in the research, you can click on the QR code at the end of this information sheet. This will take you directly to the survey.

The completion of the survey will be taken as indicating your consent to participate.

Please remember that your participation in this research is voluntary (it is your choice) and whether you choose to participate will neither advantage nor disadvantage you. You can withdraw from the study at any time up until you submit the survey. However, once you submit the survey removal of your data will not be possible.

What will happen in this research?

This research will require the completion of one online survey that will take approximately 30 minutes complete.

The survey also contains free text boxes for you to provide additional information should you wish to.

You will have 4 weeks to complete the survey.

Please ensure that you have read this information sheet before completing the survey.

What are the discomforts and risks?

Thinking about clinical error may cause distress.

Some participants may also feel uncomfortable about providing honest answers in relation to organisational culture.

All study data will be anonymous.

Results from the study will be used for organisational learning and the improvement of local and possibly national resources.

There will be no repercussions from participating in this study.

for issues that have arisen directly as a result of participation in the research and are not for other general counselling needs. To access these services, you will need to:

- drop into our centre at WB203 City Campus, email counselling@aut.ac.nz or call 921 9292.
- let the receptionist know that you are a research participant, and provide the title of my research and my name and contact details as given in this Information Sheet.
- You can find out more information about AUT counsellors and counselling on https://www.aut.ac.nz/student-life/student-support/counselling-and-mental-health
- Mental Health Support Line 1737

Participants that require more in-depth support can contact the organisations EAP program on on 0800 327 669 .This is a confidential service.

What are the benefits?

There are unlikely to be any direct personal benefits to you from this study. However, you will be contributing to some valuable research which may be used to create and improve local and national guidelines and resources for Health Professionals involved with clinical error.

How will my privacy be protected?

The survey is anonymous so we will not be able to know who you are. However, if we do feel that we can identify you as a participant, the research team will maintain confidentiality through our professional code of conduct (nursing).

The results of the study may be published or presented, but in a format that would be reasonably expected to protect your anonymity, not in a form that would reasonably be expected to identify you.

Security and Storage of Your Information

All anonymous survey results are held on the Qualtrics platform. Qualtrics is a secure online platform. Apart from the study researchers, no one else will have access to your information. After completion of the study all data, will be kept secure on AUT premises and destroyed six years after completion.

All storage and destruction of data will comply with all required security guidelines.

Risks

Although efforts will be made to protect your privacy, absolute confidentiality of your information cannot be guaranteed. Even with coded and anonymised information, there is no guarantee that you cannot be identified. The risk of people accessing and misusing your information is currently very small but may increase in the future as people find new ways of tracing information.

Rights to Access Your Information.

If you have any questions about the collection and use of information about you, you should ask [researcher].

Rights to Withdraw Your Information.

As the survey is anonymised, once you have submitted your survey you will not be able to access, correct or withdraw your information, even if you change your mind about it being used.

What are the costs of participating in this research?

The survey will require 30 minutes of your time to complete.

There will be no reimbursement for participation in this survey.

What opportunity do I have to consider this invitation?

You have one month to participate in the survey.

Access to the survey will close on 30 June 2023 at 5pm.

Will I receive feedback on the results of this research?

A url to the summary of the findings will be emailed to the same group that the study flyer was sent to.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor,

Rachel Macdiarmid Email rachel.macdiarmid@aut.ac.nz

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC, *ethics@aut.ac.nz* , (+649) 921 9999 ext 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet for your future reference. You are also able to contact the research team as follows:

Researcher Contact Details:

Name Emma Moore

Telephone number 0275780942

Email emoore@canopyhealthcaregroup.co.nz

Project Supervisor Contact Details:

Dr Rachel MacDiarmid

Email rachel.macdiarmid@aut.ac.nz

If you consent to participate in this study the survey can be accessed by clicking the link or scanning the QR code below.

https://qfreeaccountssjc1.az1.qualtrics.com/jfe/form/SV_0TIw7S63d6QJG7k

Download QR Code

Note: This distribution type cannot track identifying information.

Approved by the Auckland University of Technology Ethics Committee on *type the date final ethics approval was granted*, **AUTEC Reference number** *type the reference number*.

Appendix H: Survey Tool

Clinical Error Survey

Q1 **Thank you for participating in this AUT research study to understand the effects that clinical error has on Health Professionals and how workplace safety culture impacts recovery.**

Please answer the following demographic questions

- ○ Male (1)
- ○ Female (2)
- ○ Non-binary / third gender (3)
- ○ Prefer not to say (4)

Q2 Age range

- ○ Under 20 (1)
- ○ 20-29 (2)
- ○ 30-39 (3)
- ○ 40-49 (4)
- ○ 50+ (5)

Q3 Professional Group

- ○ Doctor (1)
- ○ Nurse (2)
- ○ Other (3)

Q4 Years in practice

- ○ less than 10 (1)
- ○ 10-20 (2)
- ○ 20 + years (3)

End of Block: Default Question Block

Start of Block: Block 1

Q5 **Thinking about a clinical error that you have been involved with please rate the following statements.**

I have experienced embarrassment from these instances

- ○ Strongly agree (1)
- ○ Somewhat agree (2)
- ○ Neither agree nor disagree (3)
- ○ Somewhat disagree (4)
- ○ Strongly disagree (5)

Q6 My involvement with these types of instances has made me fearful of future occurrences

- ○ Strongly agree (1)
- ○ Somewhat agree (2)
- ○ Neither agree nor disagree (3)
- ○ Somewhat disagree (4)
- ○ Strongly disagree (5)

Q7 My experience made me feel miserable

- ○ Strongly agree (1)
- ○ Somewhat agree (2)
- ○ Neither agree nor disagree (3)
- ○ Somewhat disagree (4)
- ○ Strongly disagree (5)

Q8 I felt deep remorse /guilt for my past involvement in these types of events

- ○ Strongly agree (1)
- ○ Somewhat agree (2)
- ○ Neither agree nor disagree (3)
- ○ Somewhat disagree (4)
- ○ Strongly disagree (5)

Q9 The mental weight of my experience was exhausting

- ○ Strongly agree (1)
- ○ Somewhat agree (2)
- ○ Neither agree nor disagree (3)
- ○ Somewhat disagree (4)
- ○ Strongly disagree (5)

Q10 The stress from these situations made me feel queasy or nauseous

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q11 Thinking about these situations made it difficult to have an appetite

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q12 I have had bad dreams as a result of these situations

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q13 After my experience I became afraid to attempt difficult or high-risk procedures

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q14 I no longer enjoyed my job because of my involvement with a patient safety error

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q15 These situations have negatively affected my performance at work

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q16 My colleagues can be indifferent to the impact these situations had on me

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q17 My colleagues help me feel that I am still a good healthcare provider despite any mistakes I have made

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

End of Block: Block 1

Start of Block: Block 2

Q18 **Thinking about support after the event please rate the usefulness of the following support mechanisms.** Having an opportunity to discuss what happened with my colleagues.

- ○ Extremely useful (1)
- ○ Very useful (2)
- ○ Somewhat useful (3)
- ○ Not so useful (4)
- ○ Not at all useful (5)
- ○ Not offered (6)

Q19 Having opportunity to discuss what happened with my Line Manager

- ○ Extremely useful (1)
- ○ Very useful (2)
- ○ Somewhat useful (3)
- ○ Not so useful (4)
- ○ Not at all useful (5)
- ○ Not offererd (6)

Q20 Having validation from a peer around my decision-making process

- Extremely useful (1)
- Very useful (2)
- Somewhat useful (3)
- Not so useful (4)
- Not at all useful (5)
- Not offered (6)

Q21 Having access to counselling services

- Extremely useful (1)
- Very useful (2)
- Somewhat useful (3)
- Not so useful (4)
- Not at all useful (5)
- Not offered (6)

Q22 Having access to support immediately following the event

- ○ Extremely useful (1)
- ○ Very useful (2)
- ○ Somewhat useful (3)
- ○ Not so useful (4)
- ○ Not at all useful (5)
- ○ Not offered (6)

Q23 Having ongoing access to support for several months following the event

- ○ Extremely useful (1)
- ○ Very useful (2)
- ○ Somewhat useful (3)
- ○ Not so useful (4)
- ○ Not at all useful (5)
- ○ Not offered (6)

Q24 Are there any support mechanisms that you feel would be beneficial to health workers involved with clinical error?

_____

_____

_____

_____

End of Block: Block 2

Start of Block: Block 3

Q25 **Thinking about the safety culture of the workplace you were in when the error occurred. Please rate the following statements**. The culture of the organisation made it easy to learn from the mistakes of others.

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q26 I felt comfortable reporting a clinical error

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q27 I was encouraged to report any safety concerns I had

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q28 I believe that most adverse events occur because of multiple system issues and not attributable to one person's actions

- Strongly agree (1)
- Somewhat agree (2)
- Neither agree nor disagree (3)
- Somewhat disagree (4)
- Strongly disagree (5)

Q29 The staff in the organisation took responsibility for patient safety.

- ○ Strongly agree (1)
- ○ Somewhat agree (2)
- ○ Neither agree nor disagree (3)
- ○ Somewhat disagree (4)
- ○ Strongly disagree (5)

Q30 Are there any improvements that you feel would make a positive impact on workplace safety culture?

_____

_____

_____

_____

_____

End of Block: Block 3

Appendix I: Checklist for Reporting Results of Internet E-Surveys

Checklist for Reporting Results of Internet E-Surveys (CHERRIES)

Item Category	Checklist Item	Explanation	Location in paper
Design	Describe survey design	Describe target population, sample frame. Is the sample a convenience sample? (In "open" surveys this is most likely.	3.5.1 3.5.2 3.5.3
IRB (Institutional Review Board) approval and informed consent process	IRB approval Informed consent	AUTEC approved 3.7 Appendix D Voluntary informed consent via PIS. Hyperlink and QR code to QUALTRICS survey. 3.7.1 Appendix G Length of survey time included in PIS Investigators names included in PIS	
	Data protection	Anonymous distribution and collection. No identifiable data All data was stored	3.7.2 Participant Confidentiality
Development and pre-testing		The survey was developed by combining questions from 3 existing tools (SVEST, SAQ, Safety culture survey). The final adapted survey tool was piloted on health and non-health professionals.	3.5.4, 3.5.5, 3.5.6 and 3.5.7
Recruitment process and sampling		Target population medical doctors, registered nurses, medical imaging technologists and pharmacists.	3.4.2 3.4.3

		Convenience sampling technique Population size 255. With an eligible population size of 127.5. Aim was to recruit a sample between 80 -100 which allows for a confidence level of 95%, and a margin of error 5%.	
	Contact mode	Initial contact with participants was by distribution of the study flyer which included a link and QR to the PIS and survey.	3.4.2
	Advertising	Both participant privacy and confidentiality were of paramount importance throughout the study and strict measures were put into place to protect the confidentiality of participants	3.8.1 Appendix C
Survey Administration		distribution of the study flyer which included a link and QR to the PIS and survey.	Appendix C
	Context	The study flyer was sent by an admin staff member to all eligible participants. The study flyer contained links to the PIS and the PIS linked to the survey.	
	Incentives	There were no incentives offered to participate in the study.	3.7.1
	Timeframes	The survey was initially ran for a 2 week period 14 June 2023 to 30 June 2023	

		A second period of 2 weeks 16 October 2023-30 October 2023	
	Mandatory or voluntary	Participation was voluntary	
	Number of items	30 questions 28 Likert scale questions and 2 free-text	
	Number of screens/ pages		
	Completeness check	Answering all questions was not mandatory. Participants could skip questions.	3.5.1
	Review step	Up until submission the respondents were able to review and change their answers.	
	Response rates	The number of participants that opened the survey could be viewed.	
Participation rate (Ratio unique survey page visitors/agreed to participate)		45 participants opened the survey 41 completed the survey.	
Preventing multiple entries		IP addresses were checked for duplications	

from the same individual			
	IP check	IP rates were reviewed to ensure there were no duplications.	
	Log file analysis	There were no additional techniques used to analysed log file.	
	Registration	Due to strict anonymity requirements participants were not required to log-in to the survey.	
Analysis	Handling of incomplete questionnaires	All questionnaires received were included in the analysis.	
	Questionnaires submitted with an atypical timestamp	There was no time restriction for this survey.	
	Statistical correction	None used	

Source: Eysenbach, G. (2004). Improving the quality of web surveys: The checklist for reporting results of internet e-surveys (CHERRIES). *Journal of Medical Internet Research, 6*(3)e34 Https://doi.org/10.2196/jmir.6.3.e34