

Prevention of inpatient suicide through
environmental safeguards: An Integrative
Literature Review

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Abstract

Inpatient suicide accounts for a proportionately small but clinically significant fraction of all suicides. Psychiatric inpatient suicide rates in New Zealand, Australia, the United States of America (USA) and the United Kingdom (UK) range between 0.1 and 0.4 percent of all psychiatric hospital admissions. Studies show that those living with a mental illness have a greater risk of suicide; this risk increases significantly for inpatients, especially those with multiple admissions to hospital. Moreover, inpatient suicide causes immense physical, emotional and legal turmoil for family, friends and health professionals, as hospitals are expected to be safe. There are many strategies that can be implemented to prevent inpatient suicide; however, studies show that the environment of care is implicated in many inpatient suicides. This study aims to identify the environmental safeguards used to prevent inpatient suicide and their effectiveness. An integrative review of the literature was conducted, focusing on the environmental safeguards currently utilized in psychiatric environments to prevent inpatient suicide and suicide attempts, and their effectiveness. A comprehensive, systematic search of electronic databases was conducted to identify relevant literature. Nineteen articles, which met the review's inclusion criteria were critically appraised, using the Joanna Briggs Institute's suite of tools which resulted in thirteen articles being

included in the review. A six-step thematic analysis of extracted data was conducted, and the four main themes identified were:

- Methods used
- Common hazards
- Off the ward suicides
- Environmental safeguards

This study found that the use of environmental safeguards such as elimination of hanging hazards was associated with a significant decrease in the rates of inpatient suicide. However, environmental safeguarding can be expensive, ethically and morally insensitive, and lacking in patient voice and representation. Furthermore, environmental safeguards are interlinked with other procedural risk management strategies and all these are more effective when implemented together.

Preface

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There are a few people I wish to acknowledge for supporting and motivating me in completing this dissertation.

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Lastly, my dearest husband and our beautiful daughter Savannah, thank you for being there. Gary, thank you for your endless love, support and being there for me at my lowest moments. Thank you for believing in me and my choices. Savannah, I hope you haven't noticed my absence and the extra time in daycare, so mummy could study. My hope is to make up for this time from here on.

Personal statement

As a registered nurse with five years of experience in acute mental health care, I encounter suicidal patients daily. Therefore, inpatient suicide prevention is an everyday part of my job and I can attest to the complexity of preventing inpatient suicide. There are a variety of preventative strategies used in my area of practice including environmental safeguards. However, despite the availability and use of these strategies, my colleagues and I still encounter serious suicide attempts regularly. We have experienced the emotional stress of losing a patient to suicide recently. As a result, I wanted to see what else can be done within the environment of care apart from the usual assessments, pharmacological and medical interventions. Knowing the most common methods that inpatients use to attempt suicide and complete suicide, I decided to focus on environmental safeguards and determine what research says about their use and how effective they are in preventing inpatient suicide.

Furthermore, the CDHB who is my employer are currently running the “Zero Suicide” initiative which focuses on decreasing the rate of suicide among inpatients and mental health services consumers. Providing a safe environment for inpatients with a high risk of suicide is one of the proposed elements of service delivery and my hope is to contribute to this initiative through this review, by providing further data on environmental safeguarding as a means of preventing inpatient suicide.

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List of abbreviations

CDHB	- Canterbury District Health Board
DHB	- District Health Board
Healthcare Organisations	
JACHO	- Joint Commission on Accreditation of
JBI	- Joanna Briggs Institute
MAStARI	- Meta-Analysis of Statistics Assessment
Review Instrument	
MHEOCC	- Mental Health Environment of Care
Checklist	
MHS	- Mental Health Services
MOH	- Ministry of Health
NCI	- National Confidential Enquiry in to Suicide
by people with mental illness	
NHS	- National Health Service
NSSI	- Non-suicidal Self Injury
NZ	- New Zealand
PICO	- Patient Intervention Comparison Outcome
QARI	- Qualitative Review and Assessment
Instrument	
SUMARI	- System for the Unified Management
Assessment and Review of Information	
UK	- United Kingdom

- USA - United States of America
- VHA - Veteran Health Administration
- WHO - World Health Organization

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Chapter One: Introduction and Background

1.1 Introduction

1.1.1 Overview

This chapter provides an overview of the research topic of inpatient suicide prevention through environmental safeguards and their effectiveness. It is intended to give the reader an understanding of the extent of suicide, globally and within New Zealand. This includes the prevalence of suicide within inpatient mental health settings, its prevention through environmental safeguards and the effectiveness of these environmental safeguards. Also, in this chapter is the research aim, significance of research, mental illness as a risk factor for suicide, and the current inpatient suicide rates and trends.

1.1.2 Research aim

The main aim of this integrative review was to determine what environmental safeguards are effective in reducing the incidence of suicide and suicide attempts among inpatients. The secondary aim is to list/describe safeguards which have been identified as potentially useful, and if such data exists then describe how safeguarding is typically undertaken currently in different parts of the world. Working definitions of these concepts are provided in Section 1.1.3. In completing this research, the author aims to identify the common methods used to commit suicide by inpatients, the common items used and how psychiatric facilities reduce or limit availability of these hazards on their units and what impact these preventative measures have on the rate of inpatient suicide and suicide attempts.

1.1.3 Definition of terms

- Suicide is the “act of deliberately killing oneself” (World Health Organisation, 2016, p.131). Determining whether a death is a suicide can be a complex task for forensic pathologists, medical examiners and coroners (Rockett, Kapusta, & Bhandari, 2011). To classify a death as suicide, the examiner must conduct a thorough investigation to determine if the fatal injury was self-inflicted and that the deceased deliberately intended to take their own life (Rockett et al., 2011). Reaching this conclusion is difficult, especially without strong corroborative evidence such as witnesses, history of suicide attempts, a suicide note, or the use of a more obvious method, like hanging or shooting. When the evidence is inconclusive, unexplained deaths are sometimes classified as accidental, undetermined or open verdicts (Gray et al., 2014; Rockett et al., 2011).
- A suicide attempt is a “broader term referring to intentionally self-inflicted poisoning or injury, which may or may not have a fatal intent or outcome” (World Health Organisation, 2016, p. 131). A suicide attempt is different from self-harm, which is sometimes referred to as non-suicidal self-injury (NSSI). Non-suicidal self-injury is “a preoccupation with deliberately hurting oneself without a conscious suicidal intent, often resulting in damage to the body tissue” (Muehlenkamp 2005, p. 324). Furthermore, unlike suicide attempts, self-harm occurs more frequently, is less severe and is usually a

response to a stressor or used as a coping mechanism (Klonsky, May, & Glenn, 2013).

- Inpatient suicide according to Thomas (2017) is “the suicide of a patient during inpatient treatment, both inside and outside of the hospital setting, e.g. during a leave, outings, or trial discharge” (p. 1.).
- Environmental safeguards according to Cardell, Bratcher and Quinnett, (2009) are any modifications to the structural/physical environment of a psychiatric unit to:
 - Remove hazards that can be accessed by suicidal patients to attempt or complete suicide
 - Limit access to means in which patients can use to attempt or complete suicide.
 - Provide external control for suicidal inpatients especially in acute suicidality when patients may be unable to control their impulses; including measures utilised to prevent absconding suicides such as monitoring of ward exits and locking of doors (Cardell et al., 2009).
- A sentinel event is “an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof” (The Joint Commission, 2007, p. 5.).

1.1.4 Dissertation Structure

There are four main chapters in this dissertation. These chapters will be discussed below.

Chapter One introduces the topic of inpatient suicide prevention through environmental safeguards and sets out the aim of this dissertation. Background literature on inpatient suicide and the use of environmental safeguards is provided, including the New Zealand context. Common methods of inpatient

suicide are discussed as well as the environmental safeguards utilised. A rationale for undertaking this research is also outlined in this chapter.

Chapter Two consists of discussions on the methodology chosen and the methods applied in the completion of this dissertation. The integrative methodology is discussed as well as the rationale for choosing it over others. The research methods undertaken are also outlined including aims, inclusion and exclusion criteria, search strategy, data extraction and data analysis strategies. Also included are the strengths and limitations of different aspects of the methodology and research methods employed.

Chapter Three presents the findings of the research undertaken. The themes and subthemes that emerged from data analyses will be presented and summarised.

Chapter Four is a discussion of the findings including consideration of the implications and significance associated with these. The implications for practice and recommendations for future research on the use of environmental safeguards to prevent inpatient suicide will be discussed. The strengths and limitations of this research will also be summarised.

The appendices contain the JBI tools utilised for quality appraisal, table of excluded articles and the table of extracted data.

1. 2 Background

1. 2.1 The extent of the problem

Suicide is a global health concern. According to the World Health Organisation (WHO), approximately 800,000 people die by suicide every year and it is estimated this will rise to 1.5 million by 2020 (World Health Organisation, 2018). It is estimated that suicide claims a life every 40 seconds and is the second leading cause of death among youth and young adults. It is also associated with high economic, social and health cost for families, communities and countries (Bachmann, 2018; World Health Organisation, 2018). Low and middle income countries have higher rates of suicide compared to richer countries; similar disparities also exist between certain ethnic groups and suicide rates are especially concerning for youth (World Health Organisation, 2018). Although suicide can occur at any time during the lifespan, suicide rates are usually low in individuals aged younger than 15 and higher for those aged 70 and over (Zalsman et al., 2016). Males complete suicide more often than females while females attempt suicide more than males (Zalsman et al., 2016). There are many risk factors for suicide including genetic, cultural and religious factors. Mental illness, trauma, physical illness, alcohol and drugs dependence and psychosocial stressors also play a role (Zalsman et al., 2016).

In particular, the risk of suicide is high for those living with a mental illness, with nearly 90% of people who commit or attempt suicide having some form of diagnosable mental illness at the time of death (Thomas, 2017; Tishler &

Reiss, 2009; Windfuhr & Kapur, 2011). When compared to the risk of suicide in the general population, the risk increases by 15-fold among those living with a severe mental illness (Baxter, Page, & Whiteford, 2011; Windfuhr & Kapur, 2011).

1.2.2 Suicide among psychiatric inpatients

Most suicides occur among people who are living in the community at the time of their death. However, a significant minority of suicides occurs among people receiving care in a psychiatric hospital (De Leo & Sveticic, 2010).

Inpatient suicide is particularly tragic because it occurs in an environment that is expected to be safe, and around health professionals entrusted with the care of mentally vulnerable individuals (Bose et al., 2016). This adds to the emotional distress felt by family, friends and health professionals (Ballard et al., 2008; Bose, Khanra, Umesh, Khess, & Ram, 2016). It is considered a “sentinel event” (definition in section 1.4.2) in most countries, including New Zealand. It is one of the top five sentinel events frequently reported to the Joint Commission on Accreditation of Healthcare Organisation (JCAHO) in the USA (Cardell, Bratcher, & Quinnett, 2009; Thomas, 2017). In New Zealand, Australia, the UK and the USA, inpatient suicide rates account for between 0.1 and 0.4 percent of all admissions to psychiatric hospitals (Thomas, 2017).

Although varying in the literature, the general rates of inpatient suicide suggest an increase of inpatient suicide over the past few years (Bachmann, 2018). A suicide rate of 147 per 100,000 inpatient years was shown in a study completed by Walsh, Sara, Ryan and Large (2015). Furthermore, in

comparison to the general population, inpatient suicide rates are reported to be nearly thirteen times more than the general population suicide rate (Madsen, Erlangsen, & Nordentoft, 2017). This can be attributed to various factors, including shorter periods for inpatient treatment, increased substance abuse and greater rates of mental illness (Madsen et al., 2017).

The risk factors for inpatient suicide are distinct from those of the general population and can be grouped into individual factors and treatment-related factors. Individual factors include a history of suicide attempts, chronic mental illness, psychosocial stressors, substance abuse, family history of suicide and gender (De Leo & Svetlicic, 2010; Windfuhr & Kapur, 2011). Treatment related factors include length of admission (either long or too short), noncompliance to treatment, multiple hospital admission, unsafe ward environment and rapid changes to treatment (De Leo & Svetlicic, 2010; Tishler & Reiss, 2009).

As stated earlier, approximately 90% of people who die by suicide suffer from an undiagnosed mental disorder at the time of their death, with a majority of them having suffered from mental illness for at least two years prior to suicide (Sakinofsky, 2014; Tishler & Reiss, 2009). Therefore, it is unsurprising that a significant proportion of suicides occur among people receiving inpatient care. The absolute risk of suicide in different psychiatric disorders has been reported to range from 2% and 8%, with mood disorders such as depression, bipolar disorder, personality disorders and anxiety disorders associated with a higher suicide risk, followed by schizophrenia, alcohol and substance dependence, and eating disorders (Nordentoft, Mortensen & Pedersen, 2011).

However, according to Tishler and Reiss (2009), the link between depression and suicide is more pronounced as depression is common and usually occurs with other psychiatric disorders such as schizophrenia and substance abuse. This is supported by Bowers, Banda and Nijman, (2010) who state that the presence of hopelessness and worthlessness on top of any mental illness increases the risk of suicide substantially.

Furthermore, Sakinofsky, (2014) in his qualitative review of inpatient suicide reached a similar conclusion, adding that inpatients with a history of self-harm, suicide attempts and family history of suicide are at high risk.

Moreover, studies in which inpatients who commit suicide are compared with those who do not, suicide is associated with suicidal acts or acts of self-harm preceding or during admission (Bowers et al., 2010; DeJong, Overholser, & Stockmeier, 2010). Similarly, research undertaken on suicide attempts state that most people who attempted suicide had recent contact with primary health care, although not reporting mental health issues at that time (Fleischmann et al., 2008; Jacobs et al., 2010; Nock et al., 2009). De Santis, Myrick, Lamis, Pelic, Rhue and York (2015) while acknowledging the link between mental illness and suicide also add that risk factors for suicide among inpatients in the hospital differ from patients receiving mental health care in the community. This according to Sakinofsky (2014) can be attributed to components of service delivery within the hospital, severity/acuity of mental illness or hospitalization itself.

The risk of suicide increases significantly for those with short and multiple admissions to the hospital (Windfuhr & Kapur, 2011). The severity of suicide

risk among inpatients fluctuates through the admission. The recognised risky periods are the first week of admission and a week post discharge (Nordentoft et al., 2011; Qin & Nordentoft, 2005). Hence why it is important to distinguish between acute and chronic suicidality as this informs risk management strategies (Tishler & Reiss, 2009).

1.2.3 New Zealand context

Suicide is a serious health concern in New Zealand and its prevention is among the top health priorities according to the Ministry of Health (2013). Compared to other countries in the Organisation for Economic Operation and Development (OECD), NZ has a high rate of suicide, with youth suicide rates ranking third after Finland and Ireland (Ministry of Health, 2016). High suicide rates are prevalent in males, especially Māori. Research shows that Māori have a higher prevalence of mental illness, suicide, suicidal ideation and attempts (Ministry of Health, 2016). High suicide rates are also prevalent in those living in the most deprived areas than those living in the least deprived areas (Ministry of Health, 2016). Although the number of suicides has increased, the rate of suicide has remained relatively stable between 2006-2015, 12.2 per 100,000 in 2006 and 11.1 per 100,000 in 2015 (Ministry of Health, 2017).

In 2014, there were 532 recorded suicide deaths and approximately 46% of them had contact with primary health care in the year before their death, although not necessarily reporting mental health care issues (Ministry of Health, 2015). Between 2001 and 2014, 215 mental health service users died

by suicide, 49 died while in hospital and 166 died within a week of discharge from the hospital (Ministry of Health, 2015).

1.2.4 Access and care provision for suicidal patients in New Zealand

Individuals experiencing suicidality can access care through various avenues in New Zealand, that is, the general practitioner, suicide prevention phone lines and websites, crisis resolution or the emergency department. Not all suicidal patients are cared for in a psychiatric hospital. Some families prefer to care for their loved ones at home with input and supervision from health professionals either through crisis resolution, community case management or general practitioner care.

Patients who present to the emergency department with suicidality are usually assessed by a qualified health professional (psychiatric registrar or consultant, psychiatric nurse or social worker). If the risk cannot be safely managed in the community or the short-term risk of suicide is considered high (characterised by prior attempt, presence of a mental disorder, a plan to for further attempts and the ability to carry out the plan), patients are usually admitted to an acute inpatient unit (New Zealand Guidelines Group and Ministry of Health, 2003).

In the unit they will be assessed by a consultant psychiatrist to determine the level of risk, treatment and preventative measures to be implemented. If the risk is high and the patient still harbours a strong desire to commit suicide, they are normally closely monitored by a nurse through nursing observations. The level of nursing observations implemented depends on the risk level, presence of a plan and other risk factors such as absconding, impulsiveness and self-harm. For instance, level one observations (within arm's length) for a

highly suicidal patient making multiple attempts. If the risk is assessed as low, patients are still monitored closely and normal policy around prohibited items and removal of means that a patient can use to harm themselves is applied. Reassessment of risk should occur every shift and nursing observations are adjusted to match the risk (New Zealand Guidelines Group and Ministry of Health, 2003).

Restrictive measures such as locked doors are not commonly used for suicidal patients in the absence of other behavioural risks. However, if applied, the use of locked doors occurs in conjunction with other interventions such as nursing observations to prevent absconding and other related risks (New Zealand Guidelines Group and Ministry of Health, 2003). Discharge planning is undertaken in conjunction with community teams and family members to ensure adequate follow up (New Zealand Guidelines Group and Ministry of Health, 2003).

Suicide prevention in New Zealand is guided by the Suicide Prevention Strategy 2006-2016 which provides a framework for suicide prevention including strategies to reduce suicide rates, the effects of suicide, and related inequalities (Ministry of Health, 2016). However, many of the preventative strategies implemented by the Ministry of Health focus on preventing suicide in the community (Ministry of Health, 2016). Although the role that mental health services play in the prevention of suicide is acknowledged and is a major component of the suicide prevention strategy implemented by the Ministry of Health, there is a lack of studies within New Zealand exploring how mental health services prevent inpatient suicide (Beautrais et al., 2007).

An even bigger gap exists in the New Zealand literature exploring the use of environmental safeguards as a way of preventing inpatient suicide. However, although not specifically focusing on suicide prevention through environmental safeguards, Beautrais et al. (2007) found that environmental factors such as locked doors play an important part in ensuring safety for psychiatric inpatients. Furthermore, Manuel et al. (2018) found that one of the main recommendations made by the coroner to NZ mental health services was risk containment; including limiting access to means and ward safety to reduce inpatient suicide, which further illustrates the significance of this review.

1.3 Methods of inpatient suicide and suicide attempts

The literature reviews on this topic identify hanging as the most common method of inpatient suicide, accounting for almost 75% of all suicides occurring within the hospital (De Santis et al., 2015; Lieberman et al., 2004; Sakinofsky, 2014; Tishler & Reiss, 2009). Other methods utilized by inpatients who attempt or complete suicide within the hospital are jumping from heights, cutting with a sharp object and self-poisoning with medication or chemicals. According to research this is influenced by availability of means (Bowers et al., 2010; De Santis et al., 2015; Lieberman et al., 2004; Tishler & Reiss, 2009). That is, a hospital situated close to a river may experience more drowning suicides and suicide attempts, while one near tall buildings may experience more jumping suicides (Bowers et al., 2010).

1.3.1 Inpatient suicide occurring outside the hospital

As per the inpatient suicide definition in section 1.1.3, not all inpatient suicides occur in hospital. However, studies present varying rates of inpatient

suicides occurring off the ward (Bowers et al., 2010; Lieberman et al., 2004; Tishler & Reiss, 2009). This review aims to explore and summarise the evidence in this area. In addition, the literature reviews on this topic tend to discuss off the ward suicides in relation to prevention strategies but not the demographic factors, clinical characteristics, service delivery aspects or psychosocial factors (Cardell et al., 2009; De Santis et al., 2015; Lieberman et al., 2004), all of which may be beneficial to prevention, so this review will explore this further. Furthermore, research suggests that methods used by inpatients off the hospital differ from those in the hospital (Bowers et al., 2010; Huber et al., 2016; Hunt, Appleby, & Kapur, 2016). Also, according to Huber et al., (2016) and Hunt et al., (2016), there is a difference in methods used by patients who abscond and those on leave. This review aims to explore further if methods of suicide differ between inpatients committing suicide within the hospital and away from hospital. Moreover, research also suggests a demographic difference between inpatients who commit or attempt suicide within the hospital and those away from hospital on leave or after absconding (Chartrand, Kim, Sareen, Mahmoudi, & Bolton, 2016; Huber et al., 2016), which this review also aims to explore further.

The recent change in mental health provision which advocates for less restrictive care might lead to increased off the ward inpatient suicides (Hunt et al., 2016; Lieberman et al., 2004). Clinicians are faced with the challenge to provide safety while being less restrictive and keeping admissions short. Consequently, this may increase the possibility of patients absconding, being granted leave without adequate assessment and untimely discharge (Huber et

al., 2016; Tishler & Reiss, 2009). However, it is unclear whether the use of restrictive measures such as locked units influence absconding and suicide rates (Bowers et al., 2010; Sakinofsky, 2014). This review hopes to explore this further and possibly provide a better understanding on this matter.

1.4 Inpatient suicide prevention

This section will briefly discuss inpatient suicide risk management strategies in general, however the next section will focus on the environmental aspects as per aim of this review.

1.4.1 Procedural and relational aspects of suicide risk prevention

The reviewed wider literature on inpatient suicide prevention identifies procedural aspects of service delivery such as risk assessment, inadequate treatment of underlying illness, ward design, and relational aspects such as, staff training and competency, staff-patient relationships and communication among staff, families and caregivers as factors that may increase the incidence of inpatient suicide (De Leo & Sveticic, 2010; Janofsky, 2009; Jayaram, 2014; Lieberman et al., 2004; Tishler & Reiss, 2009), therefore, prevention measures should aim to address these.

According to Tishler and Reiss (2009), prevention of inpatient suicide begins with effective risk assessment to ascertain the level of risk so that appropriate interventions can be implemented. However, De Leo and Sveticic (2010) and Sakinofsky (2014) warn against depending on risk assessment alone to identify patients at risk as research shows risk assessment can be inaccurate and inconsistent. Instead, they suggest that emphasis should be on staff

availability to patients as this will allow for the development of therapeutic relationships and objective assessments rather than depending on subjective information provided by the patient (De Leo & Sveticic, 2010).

Knowing the strong link between mental illness and suicide, some researchers suggest that prevention can be achieved by aggressively treating the underlying mental illness such as depression and schizophrenia (Tishler & Reiss, 2009; Wasserman et al., 2012). This, however, might prove inadequate in the acute stages when a patient may be more impulsive and likely to benefit from restrictive preventative measures such as nursing observations (Lieberman et al., 2004; Sakinofsky, 2014). Nursing observations, although routinely used in psychiatric hospitals to prevent inpatient suicide, lack an evidence base, are poorly regulated and controversial in literature, with some studies stating they are ineffective and expensive (Bowers et al., 2010). There are many preventative measures currently utilized in psychiatric hospitals some of them not mentioned here. What is apparent however, is that none of these interventions are effective in isolation, effectiveness is considerably improved when implemented together and tailored to each individual patient's needs (Bowers et al., 2010; De Leo & Sveticic, 2010; Sakinofsky, 2014; Tishler & Reiss, 2009).

As established above, inpatient suicide prevention is multifaceted, and this review does not intend to discuss this in depth. Therefore, the following section will discuss the use of environmental safeguards in the prevention of inpatient suicide.

1.4.2 Environmental safeguards

The concept of restricting access to means to prevent inpatient suicide was first introduced by Farberow, Shneidman and Leornard (1961), who, in their study to determine the demographic characteristics of inpatients who committed suicide, also listed the common methods utilised. Hanging was the most common method of inpatient suicide, and this was influenced by availability of means within the hospital. The authors then proposed reduction and elimination of available means as a step towards inpatient suicide prevention.

The first significant study on the use and effectiveness of environmental safeguards was completed in 1973 by Benensohn and Resnik. The researchers asked psychiatric inpatients to assist them “suicide proof” a unit. By doing so, they obtained inside information from the patients on features of the hospital environment that patients could use to attempt or complete suicide. They also discovered that patients were more aware of the environmental hazards than staff. Patients felt safer when measures were taken to reduce environmental hazards within the hospital (Benensohn & Resnik, 1973).

Recent studies on the prevention of inpatient suicide agree that availability of means to suicide or attempt suicide influences the rate of inpatient suicide as well as methods used. These studies also advocate for the use of environmental safeguards and expand on earlier studies on this topic (Cardell et al., 2009; De Santis et al., 2015; Lieberman et al., 2004; Sakinofsky, 2014; Tishler & Reiss, 2009; Yeager et al., 2005). In addition, Yeager et al. (2005) not only list environmental safeguards but also provides illustrative pictures on

how to suicide proof a unit. Some safeguards recommended are, installing breakaway hardware and assessing them regularly, high secured windows with non-breakable glass, locking utility and secluded rooms when not in use, restricting and monitoring use of sharp items such as razors and craft scissors, locking away chemicals and prohibiting access to clinic rooms where medications are stored (Cardell et al., 2009; Lieberman et al., 2004; Tishler & Reiss, 2009).

However, what is less clear is the extent to which these safeguards can be feasibly, and cost effectively implemented in psychiatric units (Sakinofsky, 2014). “Suicide proofing” a unit can be very expensive for already resource stretched mental health facilities (Yeager et al., 2005). It might also be difficult to balance between preserving patients’ privacy, dignity and autonomy and the use of restrictive interventions such as locking of doors (Bowers et al., 2010). Furthermore, it is not clear that environmental safeguarding and restricting access to means are effective as inpatient suicides still occur in psychiatric facilities. De Leo and Svetlicic (2010) add that, restricting access to one means of suicide through unit design or environmental safeguards might just mean that patients find other creative ways of harming themselves. Moreover, Sakinofsky (2014) states that overly restrictive interventions can cause patients to become dependent on staff to keep them safe instead of developing coping methods.

Moreover, the use of environmental safeguards in the prevention of inpatient suicide is contradictory to the efforts by health organisations to use least restrictive measures in the provision of mental health care (Beaglehole,

Beveridge, Campbell-Trotter, & Frampton, 2017). As stated above, autonomy and basic human rights are at times overlooked and overridden in the process of suicide prevention. This is especially true for patients admitted to the hospital involuntarily (Bowers et al., 2010; Sarkar, 2013). The lack of the patient's voice and input in restrictive preventative measures is further highlighted in the literature where policies and procedures for unit design and use of environmental safeguards are discussed as being the responsibility of organisational management, shareholders and staff, not patients (Jayaram, 2014; Sarkar, 2013).

Having said that, hospitals have a duty of care; it is their responsibility to ensure safety especially given that the most common reason for admission to a psychiatric hospital is suicidal intent or ideation, accounting for almost 60% of all admissions (Lieberman et al., 2004; Sakinofsky, 2014; Tishler & Reiss, 2009). To prevent these patients committing or attempting suicide, many facilities have over the years implemented environmental safeguards (Cardell et al., 2009), however, their effectiveness still needs to be explored and weighed against the disadvantages stated above.

1.5 Significance of Research

The research question to be explored for this study is: "What are the environmental safeguards utilised in the prevention of inpatient suicide and their effectiveness?" The goal of answering the research question is as per the aim of this review in section 1.1.2.

This research is significant in many ways. As established earlier, inpatient suicide is traumatic and tragic for families, friends and health professionals

(Sakinofsky, 2014). Hospitals are supposed to be safe, where patients should not succumb to preventable fatalities, especially psychiatric facilities that are purposefully built to manage and prevent suicide and suicide attempts (Lieberman et al., 2004). While family and friends often assume that admission to hospital will prevent harm, research suggests that the risk of suicide or other harm to one's self remains high from the time of admission to discharge (Safinosky, 2014).

As outlined above, the use of environmental safeguards in the prevention of inpatient suicide is not a new phenomenon, but rather unpopular within this field of research, with many studies preferring to focus on risk assessment and treatment of depression to reduce inpatient suicide despite the environment of the hospital being implicated in most inpatient suicide and suicide attempts (Cardell et al., 2009). This lack of research creates a gap in knowledge, and consequently discourages evidence-based practice due to lack of scientific guidance. No literature reviews on inpatient suicide employing the integrative review methodology were identified, so this integrative review will attempt to fill this knowledge gap or add to what is already known about environmental safeguards and their effectiveness from a broad review approach.

1.6 Chapter summary

This chapter has established that suicide is a significant health, social and economic concern in New Zealand and worldwide with those suffering from mental illness being at high risk. Most people who die by suicide have had contact with psychiatric services within the year before their death, with some

of them under inpatient care at the time of death. Inpatient suicide remains a concern for mental health facilities and prevention is a high priority.

This dissertation is an integrative review exploring environmental safeguards used in psychiatric services to prevent inpatient suicide and their effectiveness.

An integrative review was chosen as it allows the use of diverse primary research methods this is especially beneficial for a research topic where there are limited experimental data available (Whittemore & Knafl, 2005).

The next chapter will explain further the methods used in completing this review.

Chapter 2 Methodology and Research method

2.1 Introduction

The focus of this chapter was to describe the research methods used to complete this integrative review, beginning with the rationale for choosing an integrative methodology over others. This chapter will also discuss the research methods employed in completing this review; that is the search strategy, inclusion and exclusion criteria, data appraisal and data extraction as it relates to the aim of this review.

2.1.1 Choice of Methodological approach

According to Whitemore and Knafl (2005), the choice of methodological approach depends on the type of question asked by the researcher. The researcher can choose to collect quantitative or qualitative data depending on the topic and aim of the study. Quantitative methods focus more on objectivity, prediction and control, seeking causal relationships using numerical data and statistical analyses (Polit & Beck, 2010; Whitemore & Knafl, 2005). Contrary to this, qualitative methods lean towards social enquiry and are interested in human experiences, behaviours and feelings to inform research. It gathers these human experiences, behaviours and feelings on a topic of interest then analyses these data to generate themes (Boland, Cherry, & Dickson, 2017; Tufanaru et al. 2017).

An integrative review was the methodological approach employed to review the use and effectiveness of environmental safeguards in the prevention of inpatient suicide. This approach was chosen as it allows the inclusion of both quantitative and qualitative literature on the topic, as the reviewer had

anticipated that some of the literature might employ methodologies that would potentially be difficult to evaluate using traditional quantitative systematic review methods (Soares et al., 2014; Souza, Silva, & Carvalho, 2010; Torraco, 2005; Whitemore & Knafl, 2005). An integrative review is described as a “specific review method that summarises past empirical or theoretical literature to provide a more comprehensive understanding of a particular phenomenon or healthcare problem” (Whitemore & Knafl, 2005, p. 546). It has varying objectives including the definition of concepts, review of theories and evidence as well as analysis of any methodological problems on a topic. More importantly, the reviewer chose the integrative review methodology because it allows the use of various study methodologies, which adds to the breadth and depth of findings (Whitemore & Knafl, 2005).

As stated above, this integrative review followed a systematic framework outlined by Whitemore and Knafl (2005). This included establishing a topic of interest, which is the use of environmental safeguards in the prevention of inpatient suicide and their effectiveness. Following this, a comprehensive literature search was conducted to identify relevant articles. The identified studies were evaluated for quality and relevance to the topic. Once a final sample of articles was determined, data were extracted, synthesised and presented as themes relating to the question asked by this review. Each of the phases employed in this integrative review will be explored and discussed in more detail in this chapter.

2.1.2 Research aim and objectives

The aim of this integrative review was to identify the environmental safeguards currently utilised in psychiatric facilities to prevent patients from attempting and completing suicide, and their effectiveness. To accomplish this aim, the objectives were to:

- Identify what evidence exists that demonstrates the use of environmental safeguards in the prevention of inpatient suicide.
- Systematically synthesise this evidence to determine the effectiveness of the utilised environmental safeguards.

2.1.3 Definition of environmental safeguards

As defined in Chapter One, section 1.1.3, environmental safeguards are features within the physical environment of care that prevent or limit means with which patients can commit or attempt suicide, this involves restructuring or elimination of structural features that may be used to complete or attempt suicide (Cardell et al., 2009).

2.1.4 The measured outcomes

The outcome measured was inpatient suicide or suicide attempts.

As defined in Chapter One, section 1.1.3, inpatient suicide is a suicide death that occurs between the time of admission to inpatient care and discharge from that episode of care, including periods of leave or unapproved absence from the hospital (Thomas, 2017).

2.1.5. Establishing the research question

The author's background in psychiatric acute care influenced this interest in the use of environmental safeguards to prevent inpatient suicide and suicide

attempts. Further detail on this can be found in the personal statement in the preface.

The Population, Intervention, Comparison and Outcome (PICO) format by Bettany-Saltikov (2012) was utilised to develop the question for this review.

Table 2.1. The PICO as applied in this review.

P	Inpatients in psychiatric hospitals from the point of admission to discharge, including those on leave or absent without leave.
I	The use, or implementation, of environmental safeguards. Service delivery changes to improve ward safety
C	Incident of suicide and suicide attempts with or without environmental safeguards. This could be before or after implementation of safeguards or a comparison between settings with and without safeguards
O	Inpatient suicide or suicide attempts.

The research question developed for this review was “What are the environmental safeguards utilised in the prevention of inpatient suicide and their effectiveness?”.

2.2 Inclusion and exclusion criteria

The inclusion and exclusion criteria were influenced by the PICO, which is to establish what environmental safeguards are utilised and are effective in the prevention of inpatient suicide.

Table 2.2 Inclusion and exclusion criteria

Inclusion criteria

- Articles whose sample is of patients under psychiatric inpatient care such as acute inpatient units, forensics, rehabilitation facilities.
- Articles that studied inpatient suicide prevention, including the methods utilised by inpatients that attempted or completed suicide.
- Articles related to the use of environmental safeguards for suicide prevention.
- Studies that measured a decrease in completed or attempted suicides in relation to the implementation of environmental safeguards or service changes focusing on suicide prevention.
- Articles relating to inpatients off the ward at the time of death either having absconded or on agreed leave.
- Peer reviewed articles published between 2007-2017.

Exclusion criteria

- Articles that did not focus on psychiatric inpatient facilities.
- Not related to the use of environmental safeguards to prevent inpatient suicide/suicide attempts.
- Articles whose sample was not clearly defined.
- Articles that included self-harm as a measured outcome.
- Unclear on how self-harm and suicide attempt were determined.
- Without any extractable data pertaining to the topic.
- Non-peer reviewed.
- Review articles.
- Non-English language.

2.2.2 Literature search method

The second stage of the integrative review methodology is the literature search stage. Whitemore and Knafl (2005) describe this stage as critical to the rigour of the literature review, therefore, needs to be clearly defined and able to be replicated. In this review, this has been achieved by clearly documenting the databases searched, search terms used, and the inclusion and exclusion criteria employed to determine relevant sources.

A comprehensive search strategy utilises at least three separate search methods to capture as much data as possible (Souza et al.,2010; Whitemore & Knafl, 2005). This integrative review employed a three-search strategy to comprehensively search for all available literature on the prevention of inpatient suicide through environmental safeguards.

2.2.3 Search strategy

A comprehensive systematic search was completed to identify literature relevant to the aim of this study. A pilot search did not identify any recent literature reviews, theses or dissertations undertaken on inpatient suicide prevention through environmental safeguards. A three-step search strategy was used to search for relevant literature as recommended by Aromataris and Munn (2017) and Whitemore and Knafl (2005). An initial pilot search of OVID and CINAHL databases was undertaken using the terms inpatient suicide, hospital suicide and environmental safeguards, to identify keywords by examining retrieved articles. The keywords identified were then used in a more comprehensive and systematic search of the electronic databases PsychINFO, CINAHL, MEDLINE and EMBASE between January 2007 to

December 2017. The second step was a search of Google Scholar™ using similar search terms. Thirdly, the reference list of all identified key articles was searched for additional studies not identified by the primary search strategy. This search strategy revealed that there was minimal robust literature available addressing the prevention of inpatient suicide through environmental safeguards. As a result, the search was broadened to include studies completed as early as 2003 but no studies suitable for inclusion were found.

Furthermore, no experimental studies were identified; most of the studies being identified as observational studies, text opinion and practice guidelines. This further supported the use of the integrative methodology given the diversity of literature identified. Full text articles not held locally were requested and provided through the library; if no full text were available, articles were excluded.

2.2.4 Search terms

The search terms used were: suicide, inpatient suicide, hospital suicide, suicidal inpatients combined with environmental safeguards, suicide risk management, suicide prevention, hospital care of suicidal patients, and suicide proofing. An initial pilot search combining these search terms identified a very large number of articles, the majority of which were not of direct relevance to this review. Therefore, to refocus the search Boolean terms were used to combine and define the relationships between the search terms, that is “suicide” OR “hospital suicide” OR “psychiatric inpatient suicide” AND “prevention” AND “environmental safeguards”. Appropriate truncation symbols were used to include various word endings and spellings.

Consequently, the search results were narrowed by eliminating irrelevant articles. The results were further narrowed down by reviewing the titles of identified articles for relevance to the topic of inpatient suicide prevention through environmental safeguards. Google Scholar™ was searched using search terms such as “preventing inpatient suicide”, “psychiatric environmental safeguards for suicide prevention” and “psychiatric hospital environmental safeguarding as a suicide prevention method for inpatients”. The results were similar to what was found through the above databases despite the use of more specific search terms such as “removal of ligature points to prevent inpatient suicide” or “modifying the physical environment to prevent inpatient suicide in psychiatric inpatients”. Lastly, reference searches of key articles also identified articles possibly relevant to the topic. These were combined with the sample of articles identified through the databases and Google Scholar™ searches.

2.2.5 Article retrieval and review

The titles and abstracts of all potentially relevant articles were screened to determine if they included information related to the aim and objectives of this review. Articles were considered relevant if they met the inclusion criteria outlined in Table 2.1. After reviewing the titles and abstracts, the remaining articles were compiled and read in full text.

2.3 Data evaluation

2.3.1 Quality appraisal

The main objective of critical appraisal was to assess the methodological quality of each study and determine the extent to which a study has addressed

the possibility of bias in its design, conduct and analysis (Joanna Briggs Institute, 2017). Critical appraisal methods and tools utilised differed depending on the evidence being appraised. For example, with evidence established by qualitative methods, the focus was on authenticity and trustworthiness while the focus was on reliability and validity in quantitative studies (Polit & Beck, 2010; Prasad, 2013). Explicit criteria were utilised to assess the quality of each individual study; this guided the researcher in determining the studies eligible for inclusion in this review (Polit & Beck, 2010; Prasad, 2013).

Critical appraisal was undertaken using the JBI (2017) quality assessment tools from the System for Unified Management, Assessment and Review of Information (SUMARI). To determine the appropriate tool, the reviewer first determined the study design of each article. Quality assessment was conducted independently by the reviewer and a supervisor, and disagreements about study design or quality were resolved by consensus. No cut-off point was applied; however, most of the articles met the recommended 70% of the criteria. Each of the utilised tools measures and critiques methodological quality, rigour and reliability of an article using a numerical checklist. The checklists effectively evaluated quality through a standardised and systematic framework ensuring that a similar protocol suited for that methodology is applied to all articles. This was particularly important for this integrative review as it aimed to reduce bias, improve rigour and enhance the quality of the review's findings, considering that most of the identified articles were observational, mixed method studies (Whittemore & Knafl, 2005).

2.3.2 Quantitative articles assessment

The JBI, MASTARI (Meta Analyses of Statistical Assessment and Review Instrument) for analytical cross-sectional studies, quasi experimental (before and after studies), case series, and case controls were used to appraise the quantitative articles. Further details about these checklists are summarised below. Copies of the tools utilised are in Appendix B.

2.3.2.1 Analytical Cross-sectional studies

The analytical cross-sectional checklist assesses the quality of articles using eight questions that address issues of methods, sampling, inclusion criteria, confounding factors, assessment of outcomes and statistical analyses.

2.3.2.2 Quasi-experimental (non-randomised experimental) checklist

The quasi-experimental checklist uses nine questions to determine the quality of articles. It focuses on determining whether the “cause and effect” were clearly identified, similarities between compared participants, treatments received and if a control group was available. It also assesses how the outcomes were measured, completeness of follow-up and if appropriate statistical analysis was used.

2.3.2.3 Case series checklist

The case series checklist uses ten questions to assess the quality of the articles. Its focus is to address issues pertaining to inclusion, standardised condition measurement for participants, reporting of outcomes and the use of appropriate statistical analysis.

2.3.2.4 Case-control checklist

The case-control checklist also utilises ten questions to determine the selection of the control groups, how they were identified and matched with cases, the exposure measurement between controls, confounding factors identification and the strategies utilised to deal with them, as well as assessment of outcomes and the use of appropriate statistical analysis.

2.3.2.5 Qualitative article assessment

There was only one qualitative article included in this review. This was assessed using the JBI QARI (Qualitative Assessment and Review Instrument) tool. In line with the methods of qualitative studies, this tool assesses the appropriateness of the methodology used and its congruity to the phenomenon studied, research question, data collection and analyses as well as the findings of the research. This tool also addresses ethical issues, representation of participants, author's/authors' culture and their influence on the research.

2.3.3 Data extraction

The JBI data extraction tools were used to extract data relevant to the aims of this review (see Appendix C). Each article was repetitively reviewed for complete familiarisation with data to enable the reviewer to extract and summarise key findings.

Data were extracted from each article as below.

- Author/s name
- Year of publication
- Country of origin
- Aim

- Sample-control/comparison
- Methods used (further detail on methods can be found in Table 3.1)
- How the intervention/exposure and the outcome were measured
- Key findings
- Author conclusions and recommendations

2.3.4 Data Synthesis

The main objective of data analysis for this review was to facilitate the synthesis of gathered data without bias. Strategies for data analysis in the integrative review can be challenging depending on the diversity of the primary sources included (Soares et al., 2014; Souza et al., 2010; Whittemore & Knafl, 2005). The studies included for analyses utilised different methodologies, measured the intervention and outcomes differently and used a broad definition of inpatients to include patients who died by suicide while on leave or after absconding. To enhance analysis, the researcher identified and utilised thematic analysis to synthesise the collected data into themes.

Descriptive statistics were used to report quantitative data.

2.3.5 Thematic analysis

Braun and Clarke's (2006) six-step thematic analysis was undertaken to identify key themes across the reviewed articles, as Whittemore and Knafl (2005) state that analysis methods appropriate for mixed methods and qualitative designs are commonly used in integrative reviews. This is because they allow the researcher to assess and compare similarities across multiple

primary sources. Below is a graph showing the stages of thematic analysis as employed in this review.

Table 2.3. **Phases of thematic analysis**

Braun and Clarke's (2006) six-step thematic analysis process



The first stage of thematic analysis is data familiarisation. For this review, primary articles were read multiple times for the reviewers to become familiar with the data. Then they were colour coded to help highlight similar findings across the articles. The reviewer took notes through the process to identify potential codes, which were systematically extracted and organised into clusters according to similarities. This process was non-linear, with the reviewer continually comparing identified codes with primary articles to ensure coding accuracy. From this stage the reviewer collated grouped codes into potential themes, which were reviewed across the entire data set to further identify new themes or eliminate any similar themes. Data were then organised into main themes and subthemes; a thematic map was developed as the themes were defined and named. To minimise bias and ensure validity and rigour, both academic supervisors independently evaluated the synthesised themes and subthemes.

2.3.6 Ethical considerations

This study did not require ethical approval because it did not directly involve human subjects. However, in acknowledgement of the original authors and

participants, data retrieved and discussed in this review have been treated ethically through accurate presentation and referencing of primary research.

2.3.7 Summary

The integrative methodology was employed to formulate a question, search the literature, collect and synthesise data. A three-step search strategy was utilised to identify potentially relevant articles. Critical appraisal was guided by the JBI suite of tools. Thematic analysis was used to synthesise extracted data it to themes and subthemes. The outcomes of these processes will be presented in the following chapter.

Chapter Three: Results /Findings.

3.1 Introduction

This chapter presents the findings of the search strategy, data appraisal, extraction and synthesis as outlined in Chapter Two. A description of the study characteristics will also be presented in this chapter. The JBI quality assessment tools from the SUMARI were used to critically appraise the included articles. Data were extracted from the articles which met the review's inclusion criteria and analysed using thematic analysis as outlined in Chapter Two, section 2.3.5. The themes and subthemes that emerged from the primary articles will also be presented and discussed in this chapter.

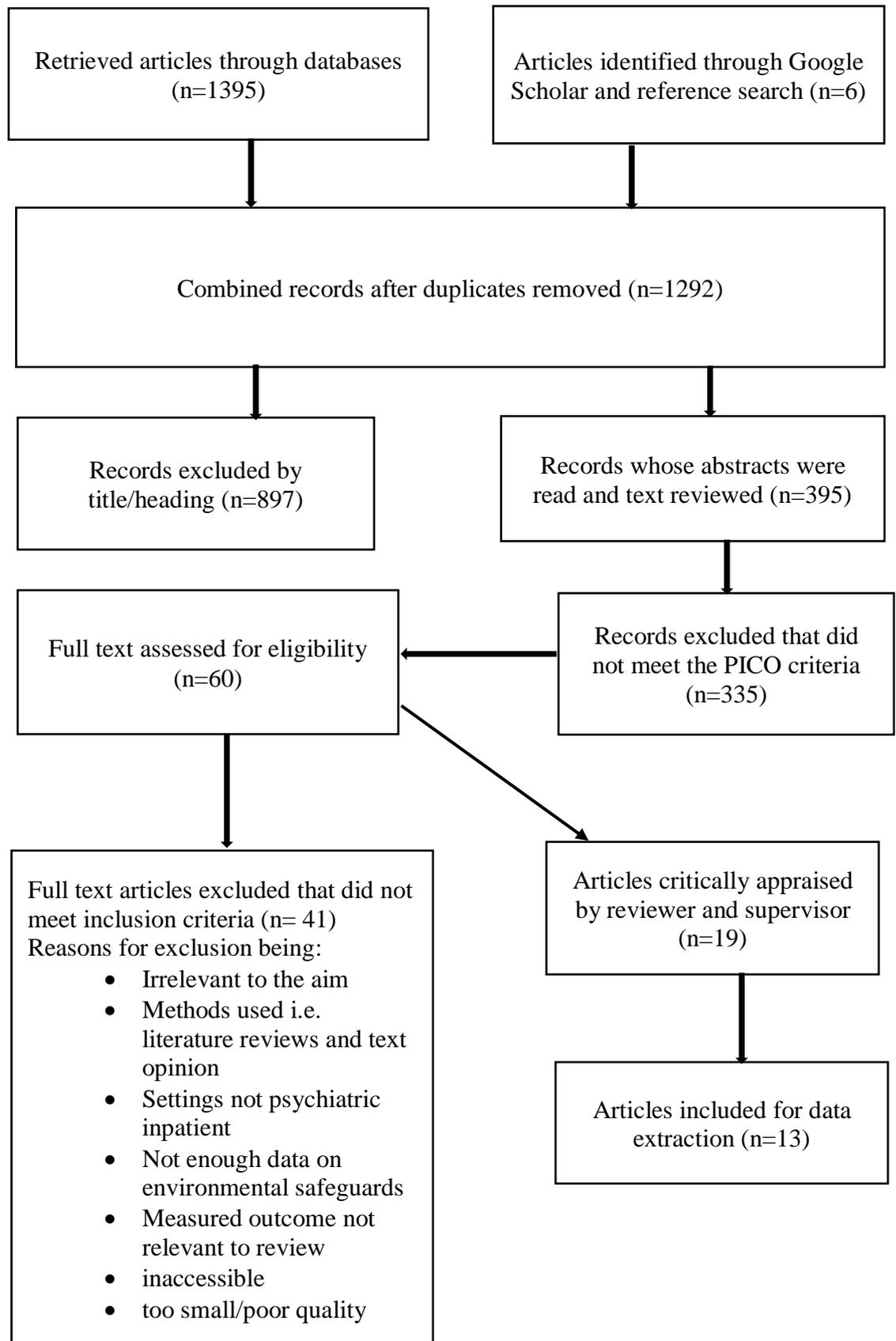
3.1.1 Study selection

As shown in Figure 3.1, the search strategy detailed in Chapter Two identified 1395 citations through database searches. Additional searches yielded a further six articles. After removing duplicates and combining the results, the remaining 1292 articles were screened by title and 897 were excluded due to lack of relevance to the research's aim. Abstracts of the remaining articles were read and a further 335 articles were excluded. Sixty full text articles were read, and a further 41 were excluded as they did not meet the inclusion criteria. Of the remaining 19 potentially relevant articles, six were excluded due to methodological quality issues identified during the quality appraisal phase of the study. The 13 articles included in this study were critically appraised using the appropriate appraisal tools from the JBI suite of tools. The

articles were independently appraised by both the reviewer and the primary supervisor.

Below is a flow chart illustrating the search strategy.

Figure 3.1 **PRISMA Flow Chart of the literature search**



3.1.2 Study characteristics

This section summarises the study characteristics including design, location, settings and participant characteristics. Some of the 13 articles referred to the same broad data set, including two studies from the UK' National Confidential Enquiry in to Suicide and Homicide by people with mental illness, and four studies from the USA's Department of Veteran Health Affairs. This is further discussed in section 3.1.4. Also, Table 3.1 further demonstrates this.

3.1.3 Study design

This integrative review included 13 peer reviewed articles published between January 2007 and December 2017. No randomised trials were identified. Twelve were quantitative observational studies and one was a qualitative study. Of the quantitative observational studies, there were five analytical cross-sectional studies, two non-randomised experimental (before and after analyses), three case-control studies, and two case series. The qualitative study was a content analysis of coronial recommendations for mental health services (MHS) caring for suicidal patients.

3.1.4 Study locations and aggregation of articles originating from the same dataset

As stated above, four of the studies were undertaken and published in the USA, eight in the UK (England and Wales) and one in New Zealand. This is further discussed below.

3.1.4.1 USA studies

The USA studies were based on Root Cause Analyses reports (RCA) of suicides or suicide attempts that occurred in the Veteran Health Administration (VHA). Suicide was classified as death with a returned verdict of suicide from the coroners' enquiry. Suicide attempt was defined as "an incomplete suicide where action had been taken, (e.g., neck in noose, cut wrists) versus a threat or gesture" (Mills et al., 2013, p. 529.).

These studies were completed and published between 2008 and 2013. They all analysed RCAs collected by the VHA for their studies. Mills et al. (2008) reviewed RCA reports of inpatient suicide and suicide attempts submitted between 1999-2006 to understand methods utilised in these events and make recommendations for prevention. In 2010, Mills and colleagues used the same data set to analyse common methods of inpatient suicide within the VHA then used that knowledge to create a checklist to help identify inpatient suicide hazards in veteran hospitals (Mills et al., 2010). Mills et al. (2013) employed the same methods for the same purpose as Mills et al. (2008) but they looked at RCA reports submitted between 1999 and 2011 with a secondary aim to measure the impact of the Mental Health Environment of Care Checklist (MHEOCC) developed and implemented by Mills et al. (2010). Lastly, Watts et al. (2012) utilised the same dataset as above and collected RCA reports up to 2011 with the main purpose of examining the effectiveness of the MHEOCC in reducing suicide on mental health units.

As outlined above, these four studies referred to the same dataset, and their findings were largely similar and repetitive. As a result, these articles were

evaluated as one article and were combined for data extraction. This is illustrated in the summary of reviewed articles in the table below.

3.1.4.2 UK studies

The studies in the UK employed various designs and methodologies to study outcomes relating to the prevention of inpatient suicide through environmental safeguards utilising data regularly collected by the National Health Services (NHS) and the National Confidential Inquiry into Suicide and Homicide by People with Mental Illness. The authors then collected further information (demographic characteristics) on their sample utilising questionnaires sent to relevant personnel such as psychiatric consultants. Two of these studies (Kapur et al., 2016; While et al., 2012) were similar in their methods, dataset used, and outcomes measured, so they were also evaluated as a single study and their findings were aggregated during data extraction. While et al. (2012) completed a descriptive, cross-sectional, before-and-after analysis of national suicide data to examine the uptake of key recommendations and investigate how that influenced inpatient suicide rates. Kapur et al. (2016) undertook a before-and-after analysis to examine the effect of service changes and organisational factors on inpatient suicide rates. Suicide was classified as “death that received a suicide or open verdict at the Coroner’s inquest” (Kapur et al., 2016, p. 528.).

3.1.4.3 New Zealand study

The study from New Zealand was based on coronial recommendations to Mental Health Services (MHS) in relation to inpatient suicide prevention as

well as an examination of clinicians' and consumer family representatives' responses to these recommendations (Manuel, Crowe, Inder, & Heneghan, 2017).

3.1.5 Sampling methods

Ten of the articles used the purposive sampling method to obtain information on all inpatient suicide and suicide attempts in the specified time frames within each study. In the VHA studies, purposive sampling was employed to obtain RCA reports on inpatient suicides and suicide attempts. Mental health units studied were also identified using purposive sampling; that is, all mental health units in the VHA (113). The studies completed within the NHS used purposive sampling to gather reports of inpatient suicides, recruit psychiatric consultants and mental health units studied. The three case control studies used consecutive sampling to identify cases and controls but applied, purposive sampling to recruit psychiatric consultants, whom they sent questionnaires to.

3.1.6 Settings and sample sizes

The sampling sizes were not always clearly stated. In the VHA studies sample sizes ranged from 185 to 243 RCA reports, and the outcomes were measured across 113 VHA mental health facilities. The mental health units within the VHA were general psychiatric inpatient care units, psychiatric intensive care and detoxification units. The majority of the sample were male; no age range was provided.

In the UK, the case control studies' samples varied from 107-222 cases matched with controls. The other studies varied from 448 to 1942 inpatient suicide reports collected from the National Confidential Inquiry into Suicide database run by the NHS. All NHS mental health services were surveyed excluding privately-run facilities (Kapur et al., 2016).

The settings in the UK studies were similar to the VHA but also included forensic and rehabilitation units. Sample ages ranged from 16 to 65.

In the New Zealand study, the sample consisted of sixteen participants (clinical leaders responsible for implementing coronial recommendations) who were recruited across 12 DHBs and local family workers from three different non-organisational services from local DHB areas.

3.2 Categories and quality of literature

3.2.1 Quantitative articles

Four JBI MASTARI (Meta-Analysis of Statistical Assessment and Review Instrument) checklists were used to appraise the observational articles; that is, analytical cross-sectional, case-control, case series and quasi-experimental checklists. Quality appraisal was completed by both the reviewer and the primary supervisor. The results of the quality assessment are presented in the summary of findings table below.

3.2.2 Qualitative article

There was only one qualitative article included in this review. The JBI QARI (Qualitative Assessment and Review Instrument) tool was utilised to assess this article. The article addressed most of the questions on the checklist;

however, it did not clearly locate the researcher both culturally and theoretically. Furthermore, the article did not address the researcher's influence.

Table 3.1 Summary of reviewed articles

Study	Aim	Sample	Method	Key findings	JBI tool used/Score
Bowers, et al. (2011) England	To identify the mechanism by which attempted inpatient suicides are prevented, so that its use can become more widespread	Purposive sampling of all reports of attempted suicides occurring between January 2009 and December 2009 in mental health inpatient units	Quantitative Cross-sectional Analysis Collected data on attempted suicides from the reporting and learning system, occurring from January-December 2009	Most common method was strangulation (82.4%), followed by suffocation-9.4% and self-poisoning (2.9%). Jumping, exsanguination and car accidents were less common. 56.2% of self-strangulation cases tied the ligature around their neck while 40.5% used some kind of ligature point. Commonly used ligature points were: windows, doors, beds, and bathroom rails. Most commonly used objects were things readily available to patients such as clothing, plastic bags, bed linen, electrical cables, phone chargers and medications. Common locations were bedrooms, bathrooms, showers with only a few happening in ward common areas.	MASTARI Case series 5/10
Hunt et al. (2013) England	To identify risk factors for suicide among inpatients within the first week of admission	Consecutive sampling of 107 current psychiatric inpatients in England who died by suicide within a week of admission, matched on	Quantitative National population-based Case control Questionnaires for clinical data Conducted within the National Confidential Inquiry into suicide by people with mental	120 patients died by suicide within a week of admission. Hanging was the most common method of suicide (47%) followed by jumping from heights or moving vehicle (29%), drowning-(8%), poisoning (7%). Common substances for poisoning were opiates. 11% died on admission date and 40% died within 3 days of admission. 46% died on the ward and majority died by hanging; 20% were on agreed leave and 34% had absconded from the ward. More cases than controls died off the ward after absconding.	MASTARI Case-control 10/10

		admission date with 107 living controls. Purposive sampling of responsible psychiatrists	illness. Cases- consecutive sample of individuals aged 18-65 dying from suicide between 2001 and 2006. Controls- identified using the Hospital Episode Statistics	No difference in level of observations, legal status or ward environment issues between cases and controls.	
Hunt, et al. (2007) England	To identify psychosocial, behavioural, and clinical risk factors, including variations in care for inpatient care.	Consecutive sampling of 222 cases matched on date of death with 222 living controls Purposive sampling of responsible psychiatrists.	Quantitative Case-control Questionnaires for clinical data Cases- consecutive sample of people aged 16-65 who died by suicide in hospital or on leave between 1999-2000 Controls- identified through the Nationwide Clearing Service Database, a subset of the NHS.	Most common method of suicide was hanging (42%), followed by jumping from a height or in front of a vehicle (31%). Suicide by overdose (5%) was less frequent and similar to drowning (4%). Common substance for overdose was paracetamol. 23% of suicides occurred within the first week of admission and 48% with a month. 42% of those who died in the first week were on the ward and 26% died later in the admission. Those who died within a week were more likely to be off the ward, absconded or on authorised leave. More cases of suicide were off the ward without staff agreement than controls. Those who died of suicide later in the admission were more likely to be off the ward on agreed leave.	MASTARI Case-control 9/10

<p>Hunt, et al. (2010) England & Wales</p>	<p>To describe the social and clinical characteristics of people who had absconded from an inpatient psychiatric ward prior to suicide.</p>	<p>Purposive national sample of deaths among people in contact with mental health services in the 12 months before their death receiving a verdict of suicide or open verdict.</p>	<p>Quantitative Case series Clinical survey between 1997-2006 Questionnaire for clinical data.</p>	<p>The number and proportion of in-patient suicides declined over the 10-year study period, from 221 cases in 1997 to 144 in 2006. 30% of in-patient suicides took place on the ward, 70% occurred away from the ward. Of those who died away from the ward, 38% had absconded, and 62% were either on authorized leave or off the ward with staff agreement. Over the study period, whilst the number of suicides after absconding had fallen, the proportion showed no clear pattern, fluctuating from 40% in 1997, to 31% in 2003, and 38% in 2006. Hanging and jumping from a height or in front of a moving vehicle were the main methods used. However, those who had absconded were less likely to die by hanging and self-poisoning compared to those who were on agreed leave Those who had absconded were more likely than those on agreed leave to have been under nursing observations of varying degree. There were reported problems in the observations of those who had absconded, through either ward design or other patients, and absconding was viewed as preventable.</p>	<p>MASTARI Case series 8/10</p>
<p>Hunt et al. (2012) England & Wales</p>	<p>To describe the ligature points and ligatures used in ward hangings; to identify any</p>	<p>Purposive sampling of national sample of deaths receiving a verdict of suicide</p>	<p>Quantitative National clinical survey Case control</p>	<p>448 suicides occurred on the ward. 344 (77%) of them died by hanging. On average, 38 patients died by suicide annually; this significantly declined during the study period, from 57 in 1999 to 15 in 2007.</p>	<p>MASTARI Case control 7/10</p>

	trends over time in ligature points and ligatures used and to compare these patient characteristics with other inpatient suicides.	or open verdict that occurred within 12 months of contact with mental health services.		<p>Majority of these suicides happened in bedrooms and bathrooms.</p> <p>More patients died from hanging in the first week compared to other suicide methods.</p> <p>Compared to other methods, hangings occurred more while on observations than other suicide methods.</p> <p>Common ligature points were doors, hooks or handles, windows; these 4 constituted 59% of all anchor points.</p> <p>Other commonly used anchor points were: beds, bed rails, shower, toilets, wardrobes, taps, light fixtures; and others utilised manual strangulation.</p> <p>Most ligatures were belts, sheets, towels - 61% of all ligatures. Shoelaces, clothing items, phone cord, chargers and curtains were also used.</p> <p>73% of ligatures were brought in by patients, e.g., clothing and luggage straps.</p> <p>Hanging incidents decreased over time.</p>	
Kapur et al. (2013) England	To explore trends in psychiatric inpatient suicide over time.	Purposive sampling. Individuals aged over 15 who died by suicide while under psychiatric inpatient care from 1997-2008.	Quantitative Longitudinal Prospective Questionnaires Data on inpatients aged 15 and over who died of suicide between 1997 and 2008 collected through the National	<p>Suicide was more common in males than females.</p> <p>Inpatient suicide rates fell by 47.6% during the study.</p> <p>Reduction of suicide was statistically significant for deaths that occurred on the ward than those away from the ward.</p> <p>Death by hanging fell by 30.7%, drug poisoning by 48.5%, carbon monoxide poisoning by 59.6%, drowning by 51.2% and jumping by 28.4%.</p> <p>The fall of hanging deaths was more significant for deaths occurring on the ward, where it fell by 60%.</p>	MASTARI Analytical Cross-sectional 6/8

			Confidential Inquiry and Hospital Episode Statistics.	Fall in inpatient suicide was associated with the focus on ligature point reduction and ward safety. Recommend further focus to be on the processes of granting leave and prevention of absconding to further decrease inpatient suicide.	
Manuel, et al. (2017) New Zealand	To investigate coronial recommendations to MHS in relation to suicide prevention and to examine clinical and family responses to these.	Purposive sampling Clinical leaders from 12 DHBs Local family workers (Maori mental health workers, family advisors and family support field workers).	Qualitative Analyses of coroners' reports. Interviews with clinicians and individuals working with families of consumers of MHS for their responses to the recommendations.	Coroners recommended that MHS implement suicide prevention strategies that improve communication. Risk containment, means restriction, service delivery and family involvement. Clinicians agreed with most recommendations especially ward safety and restriction of access to means. Family workers endorsed coroners' findings especially regarding family inclusion and communication.	QUARI 8/10
Mills et al. (2008); Mills et al. (2010); Mills et al. (2013); Watts et al. (2012)	To identify and abate hazards implicated in inpatient suicides in the VHA and evaluate the use of the MHEOCC.	Purposive sampling. All VHA facilities.	Quantitative Cross sectional Analysis of RCA reports submitted to the VHA between 1999 and 2011 Uncontrolled before and after analysis	Use of the MHEOCC aided the identification and abatement of environmental hazards. The most common method of inpatient suicide was hanging, followed by cutting, strangulation and over dose/self-poisoning. Doors and door hardware accounted for majority of hanging points, followed by beds, showers, wardrobe and locker doors, and fixtures. Common ligatures were bedding, belts, shoelaces, electrical codes and clothing. Razor blades were commonly used for cutting. Majority of jumping events occurred from balconies and walkways.	MASTARI Analytical Quasi-Experimental studies 8/9

USA				Majority of events occurred in patient's bedroom, bathrooms, private/secluded areas and small numbers in the general ward. The use of the Mental Health Environment of Care Checklist allows for systematic identification and abatement of environmental hazards. Reduction of environmental hazards was associated with decreased inpatient suicide.	
Kapur et al. (2016); While et al. (2012) England & Wales	Examine the uptake of key mental health service recommendations over time and to investigate the association between their implementation and suicide rates.	Purposive sampling of 91 mental health services provided by the NHS.	Quantitative Observational Before and after analysis Questionnaires Clinical survey Data obtained through the National Confidential Inquiry between 1997-2012	Implementation of all service changes was associated with a decrease in suicide risk (removal of non-collapsible ligature points, policies on responding to patients who abscond, communication and information sharing with families, other agencies, NICE guidelines. Removal of ligature points and improved ward safety were among the recommendations associated with significant decrease in inpatient suicide.	MASTARI Quasi-Experimental studies 8/9

3.3 Data analysis

3.3.1 Coding

This review's aim and objectives as stated in Chapter Two, section 2.1.2 provided the focus for thematic analysis in the data synthesis stage of this review. The included articles addressed the aim and objectives of this study in different ways. Some analysed rates of inpatient suicide before and after service changes; some studied inpatient suicide trends over the years and the factors contributing to the decrease of inpatient suicide; and others (mainly within the VHA) analysed RCA reports to identify the most common methods of suicide and hazards within the environment of care, then implemented interventions targeted at reducing/eliminating these.

Due to the diversity of the data, a six-step thematic analysis process was utilised, as outlined by Braun and Clarke (2006), to extract relevant data and develop codes and themes that are pertinent to the objectives of this study. The extracted data were continuously compared against primary articles to ensure that all relevant data were captured. As described in Chapter Two, section 2.3.5, initial codes were developed and referenced to the main findings of the primary articles. Themes and subthemes began to develop as data were grouped according to similarities. This process of theme formation was not linear and continued until potential themes and subthemes were formed. Further detail about thematic process and how that was applied to this review can be found in Chapter Two, section 2.3.5.

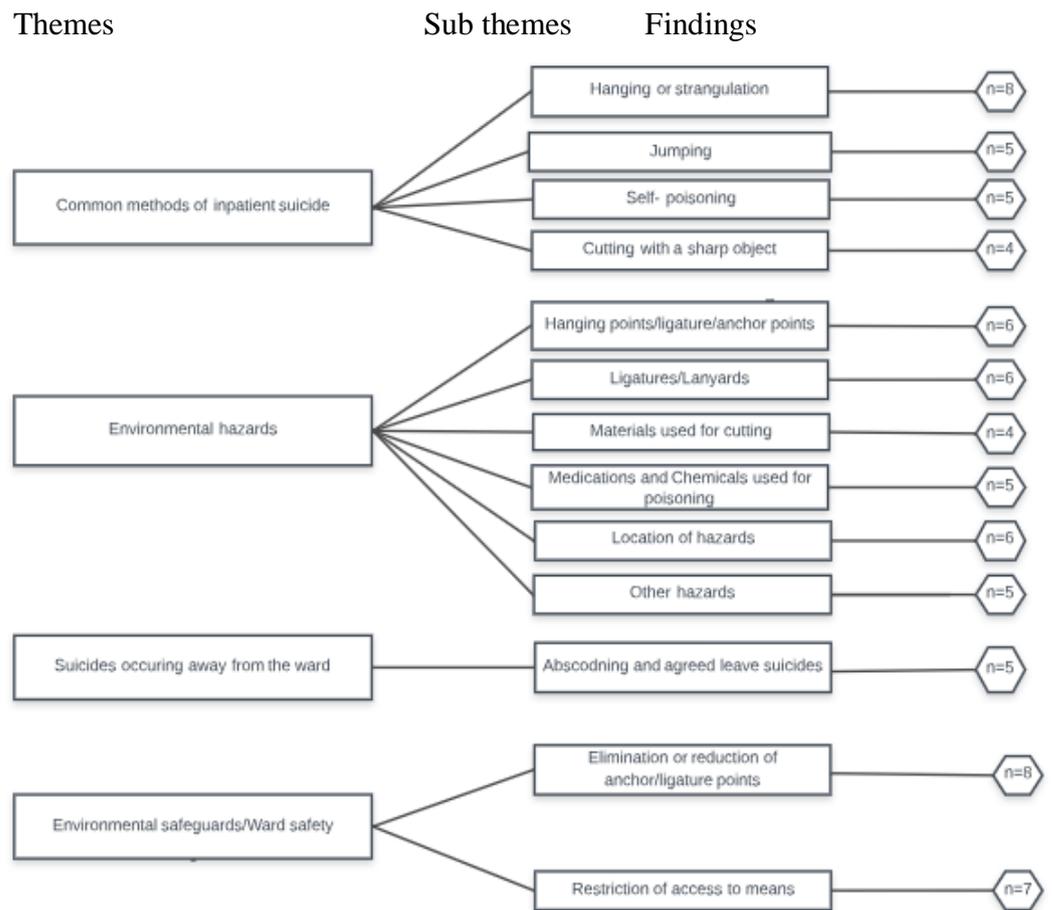
3.4 Themes and subthemes

Initially, 20 potential subthemes were generated from the coding process; these were reduced to 16 when checked for similarities and repetition. Further analysis of these subthemes produced four main themes and 12 subthemes. This process was completed in consultation with the supervisors to ensure that the final themes represented main findings from the primary articles.

The four main themes generated were:

- Common methods of inpatient suicide
- Environmental hazards
- Suicide occurring away from the ward (Absconding and agreed leave)
- Environmental safeguards (Ward safety)

Figure 3.2.1 Theme representation and subtheme representation



These themes and subthemes are discussed below

3.4.1 Theme One: Common methods of inpatient suicide/suicide attempts

This theme was a common finding across all the articles. When not part of the main findings, the articles either included a list or a discussion section identifying the common methods that inpatients used to attempt or complete suicide. Some methods were utilised more than others, influenced by lethality, availability and other patient factors such as demographic characteristics, clinical diagnosis, and personality characteristics. From this, the four subthemes were:

- **Hanging or Strangulation** Hanging/strangulation was identified by 7 of the 9 articles as the most commonly used method of suicide among inpatients who died in hospital, accounting for 75 to 90% of all inpatient suicides. Hanging was consistently more commonly used in completed suicides than suicide attempts (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013; Watts et al., 2012). For those who died away from the ward, hanging was more common in those on agreed leave than absconds. Hanging was also common in suicides occurring earlier (the first 3 days) in admission than later (after a week) (Hunt et al., 2007; Hunt et al., 2013). Males were more likely to use hanging than females, especially in completed suicides (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013; Watts et al., 2012).
- **Jumping from a height** This was a common finding (found within 62% of the articles), however, this method was more commonly used

in suicide attempts than in completed suicides within the hospital (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2013; Mills et al., 2012). Patients who attempted suicide this way jumped from roofs and stairs (Bowers et al., 2011; Watts et al., 2012). Jumping suicides were common among inpatients who died away from the hospital especially after absconding (Hunt et al., 2007; Hunt et al., 2010, Hunt et al., 2013). Males were more likely to use jumping as a method to attempt or complete suicide compared to females (Bowers et al., 2011; Hunt et al., 2007; Watts et al., 2012).

- **Self-poisoning** Identified by 4 of the articles as commonly used in suicide attempts but not completions (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2013; Watts et al., 2012). Self-poisoning, however, was more prevalent in completed inpatient suicides occurring away from the hospital than in hospital, accounting for 9% of all suicides occurring away from the ward (Hunt et al., 2010). On leave cases were more likely to self-poison than absconding cases, accounting for 17% of all suicide cases occurring away from the ward (Hunt et al., 2010). Females were more likely to choose this method than males, more so in suicide attempts for cases occurring within the hospital (Bowers et al., 2011; Hunt et al., 2013; Hunt et al., 2007; Hunt et al., 2012; Mills et al., 2008; Mills et al., 2013; Mills et al., 2010).
- **Cutting with a sharp object** This was a finding of 4 of the primary articles, cutting was commonly used in suicide attempts, 22.6% in Watts et al. (2012), but not in completed suicides (Bowers et al., 2011;

Hunt et al., 2007; Hunt et al., 2013; Watts et al., 2012). Six cases in Hunt et al., (2013) died by cutting or stabbing. Among suicide attempts cutting was more common in women than men but vice versa in completed suicides (Bowers et al., 2011; Watts et al., 2012). Cutting was more common in events occurring on the ward than off the ward (Bowers et al., 2011; Hunt et al., 2013; Hunt et al., 2007; Hunt et al., 2012; Watts et al., 2012).

3.4.2 Theme two: Environmental hazards

This theme was represented in most of the articles to varying depths. The hospital environment was identified by 6 of the 9 articles as the root cause in most inpatient suicides. The USA studies especially focused on identification of the physical environmental hazards and implementation of preventative measures. The subthemes within this theme will be discussed below.

- **Hanging points (anchor and ligature points)** Hanging points were identified by 6 of the 9 articles as the most commonly utilised hazards among inpatients who attempted or died of suicide within the hospital, accounting for 77% of hazards in Hunt et al., (2012) and 44% in Watts et al. (2012). The most common ligature points were doors, and door hardware (handles and hooks), accounting for 59% of all anchor points in Hunt et al. (2012). Other commonly used ligature points were: beds, bed rails (10%), shower heads, wardrobes, curtain rails, clothes and towel hooks, hand rails, support bars (8%), windows and other hard mounted ward fixtures that can hold a noose (10%), including low

lying fixtures such as a wall mounted door stop (Hunt et al., 2012).

Males were more likely to use beds as hanging points than females (Hunt et al., 2012).

- **Ligatures** Three of the nine articles found that the commonly used ligatures were materials readily available to patients such as bedding and personal clothing items (Bowers et al., 2011; Hunt et al., 2012; Watts et al., 2012). Belts, sheets and towels were the most commonly used ligatures in completed suicides, accounting for 61% of incidents in Hunt et al. (2010), followed by shoelaces, clothing items and cords from electronic devices such as phones and hair dryers (Hunt et al., 2010; Watts et al., 2012). For suicide attempts, commonly used ligatures were clothing items including underwear, accounting for 40.6% of events in Bowers et al. (2011), followed by plastic bags, bed linen and electrical cables (Bowers et al., 2011). Females were more likely to use clothing items than males; males used belts more than females. The use of belts was associated with high mortality (Bowers et al., 2011, Hunt et al., 2012, Watts et al., 2012).
- **Materials used for cutting** Four of the articles reported that most of the items used were readily available on the ward, such as shaving razors, plastic and butter knives (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2013; Watts et al., 2012). Less common items were glass, sewing needles, metal pieces and stationary such as pencils and pencil sharpeners. There were no comparisons between suicide attempts and completions or gender differences with the items used for cutting

(Bowers et al., 2011; Hunt et al., 2013; Hunt et al., 2007; Watts et al., 2012).

- **Chemicals/ poisons used for self-poisoning** Five of the studies identified commonly used poisons as being cleaning products, chemicals and medications (Bowers et al., 2011; Hunt et al., 2013; Hunt et al., 2007; Hunt et al., 2010; Watts et al., 2012). Medications were commonly accessed through hoarding of administered medication or brought in by patients coming back from leave or on admission. Opiates were the most commonly used medication on and off the ward (Hunt et al., 2007; Hunt et al., 2013; Watts et al., 2012). Those on agreed leave were more likely to use carbon monoxide to self-poison than absconders (Hunt et al., 2010).
- **Other hazards** Other identified physical hazards were in relation to insecure ward exits and hindrances to adequate patient supervision because of the structural design (Hunt et al., 2007; Hunt et al., 2010; Hunt et al., 2013). Absconding was associated with insecure ward exits or malfunction of equipment such as doors, windows or outside fences making it easy for patients to leave the hospital without permission (Bowers et al., 2011; Hunt et al., 2013; Hunt et al., 2007; Hunt et al., 2010; Manuel et al., 2017; Watts et al., 2012). Structural design, where the nurses' station was isolated from the patient areas and bedrooms, was cited as a hindrance to adequate supervision of patients. Other hazards were through patients accessing isolated rooms (not suicide

proofed), unsupervised such as in interview rooms, utility and activity rooms (Bowers et al., 2011; Manuel et al., 2018; Watts et al., 2012).

- **Location of Hazards** This subtheme was identified in 5 of the 9 articles, with most of the articles identifying bedrooms and bathrooms as the most common locations for hazards within the unit, especially hanging hazards (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013; Watts et al., 2012). Other hazardous areas were secluded areas of the unit such as laundry rooms and interview rooms, especially when accessed without staff supervision. Less common locations were communal areas such as day rooms, dining rooms and corridors. Suicide attempts were more common in communal areas or non-private areas than completed suicides (Bowers et al., 2011; Watts et al., 2012). Suicide attempts in communal rooms were classified as low severity attempts by Bowers et al. (2011).

3.4.3. Theme three: Suicides occurring away from the ward (Absconding and agreed leave).

Absconding Four of the nine articles found that almost two-thirds of all inpatient suicides occur away from the ward, after patients abscond or on agreed leave (Hunt et al., 2013; Hunt et al., 2007; Hunt, et al., 2010; Watts et al., 2012). The numbers of suicides occurring away from the ward varied across the articles, 74% in Hunt et al. (2007), 54% in Hunt et al. (2013) and 70% in Hunt et al. (2010), of whom 38% had absconded and 62% were on agreed leave. Absconding suicides were more common in the first week of admission (Hunt et al., 2007; Hunt et al., 2010; Hunt et al.,

2013). Absconders who completed suicide were likely to be young (median age 39), male (66%), unemployed (58%) and homeless (7%) and living alone (42%), compared to those on agreed leave (Hunt et al., 2010).

3.4.4 Theme four: Environmental safeguards/ward safety

The use of environmental safeguards to improve ward safety and prevent suicide attempts and completions was identified by all articles in this review. Studies employed different methods to determine the effectiveness of environmental safeguards and all reported a significant decrease in suicide and suicide attempts associated with the use of environmental safeguards. The subthemes that emerged within this theme are as below.

Elimination/reduction of anchor/ligature points Having identified hanging as the most common method of suicide and suicide attempts, 6 of the 9 reviewed articles found that improving ward safety and reducing hazards by eliminating hanging points is related to a decrease of inpatient suicides and suicide attempts occurring within the hospital (Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013; Kapur et al., 2013; Kapur et al., 2016; Watts et al., 2012). The studies from the VHA found a significant decline in inpatient suicide and suicide attempts in their uncontrolled, before-and-after studies. They found that the use of the Mental Health Environment of Care Checklist (MHEOCC) , to identify and abate hazards from the environment of care between 2008 and 2011 was associated with a decrease of inpatient suicide (87% reduction in a quarter); the VHA experiencing only three completed suicides since this time frame,

compared to 22 annually before implementation of the MHEOCC (Watts et al., 2012). Similar findings were reported by studies from the UK, with Kapur et al. (2013) reporting that inpatient suicide rates fell by close to one-third especially in those that occurring on the ward. The most significant fall was observed in hanging suicides which fell by nearly 59%. Kapur et al. (2016) also reported a significant fall of hanging suicides in services that implemented the recommended service changes, especially ward safety measures relating to reducing hanging points. Limitations of the studies that might impact this finding are discussed in Chapter Four, section 4.6.

Table 3.2 Commonly recommended environmental safeguards

- Removal of structures that are potential anchor points including low laying structures
- Removal of doors or using anti- ligature doors
- Removal of closets, clothing poles, belts, hangers and privacy curtains
- Having flat ceilings
- Use of beds without bedrails and free of leverage points
- High un-openable windows with unbreakable glass
- Install breakaway shower heads, hand rails, towel rails and curtain rails unable to carry human weight
- Removal of exposed pipes, sprinkler heads, vents or ducts
- Reduces access to sharp items
- Restrict access to roofs/ high places to reduce opportunities to jump
- Conduct regular environmental checks to identify and abate environmental hazards
- Removal/reduction of ligature that can be used for hanging such as belts, shoelaces and bedding, depending on the risk (Hunt et al., 2012; Kapur et al., 2013; Kapur et al., 2016; Manuel et al., 2017; Watts et al., 2012).

Restricting access to means This was identified by 7 of the 9 articles as a way of reducing inpatient suicide and suicide attempts occurring on and off the ward. Some of the strategies used to limit access to means although not strictly related to the physical environment include: searching the patient's and family's belongings as they enter the unit to ensure no harmful objects are brought to the ward (razors, knives, long cords, chargers, spray cans, plastic bags, bottles, cans, and medications); restricting access to secluded areas or unused rooms; sharp objects, cleaning chemicals, medications; and supervising patients as they take their medications to prevent hoarding (Bowers et al., 2011; Watts et al., 2012). Locking or strict monitoring of ward exits was identified by Hunt et al., (2013); Hunt et al., (2007); Hunt et al., (2010); Manuel et al. (2017) and Watts et al. (2012) to prevent absconding suicides. The Hunt et al. (2010) study found open wards experienced more absconding suicides than secure wards. The above stated findings show that procedural and environmental risk management strategies are interwoven, therefore relying on each other to be effective.

Another identified strategy to reduce access to means was the use of self-locking doors to prevent patients accessing prohibited areas of the unit without staff supervision. A content analysis of the coroner's recommendations identified that coroners make recommendations that target reducing access to means. Furthermore, restriction of personal belongings, such as matches, lighters, glass items, mirrors, inflammable products, wire hangers and plastic bags, was recommended by Watts et al. (2012) as a way to reduce access to means. The VHA studies also recommend regular environmental checks

utilising the MHEOCC to restrict access to means, and to identify and abate hazards from the environment of care (Watts et al., 2012).

Other identified preventative measures that were not within the scope of this review but equally important were constant observations for high risk patients, availability of well trained and skilled staff, and guiding policies. Constant observations were especially recommended to prevent absconding suicide in this review. Furthermore, ongoing suicide risk assessment was also recommended especially before granting leave to patients (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013; Kapur et al., 2016; Watts et al., 2012).

Table 3.3. **Representation of themes**

Author	Year	Theme One	Theme Two	Theme Three	Theme Four
Bowers, Dack, Gul, Thomas & James	2011	✓	✓	✗	✓
Hunt, Windfuhr, Shaw, Appleby, Kapur & National Confidential Inquiry into Suicide and Homicide	2012	✓	✓	✗	✓
Hunt, Bickley, Windfuhr, Shaw, Appleby & Kapur	2013	✓	✓	✓	✓
Hunt, Kapur, Webb, Robinson, Burns, Turnbull, Shaw & Appleby	2007	✓	✓	✓	✓
Hunt, Windfuhr, Sminson, Shaw, Appleby & Kapur	2010	✓	✓	✓	✓
Kapur, Hunt, Windfuhr, Rodway, Webb, Rahman, Shaw, & Appleby	2012	✓	✓	✗	✓
Manuel, Crowe, Inder & Heneghan	2017	✗	✓	✗	✓
Kapur, Ibrahim, While, Baird, Rodway, Hunt, Windfuhr, Moreton, Shaw & Appleby	2016	✓	✗	✓	✓
While, Bickley, Roscoe, Windfuhr, Rahman, Shaw, Appleby & Kapur	2012	✗	✗	✓	✓
Mills, DeRosier, Ballot, Shepherd & Bagian	2008	✓	✓	✓	✓
Mills, Watts, Miller, Kemp, Knox, DeRosier & Bagian	2010	✓	✓	✓	✓
Mills, King, Watts & Hemphill	2013	✓	✓	✓	✓
Watts, Young-Xu, Mills, DeRosier, Kemp, Shiner & Duncan	2012	✓	✓	✓	✓

3.5 Chapter summary

This chapter presented the findings of the search strategy, data appraisal, extraction and analysis. Study characteristics including design, location, settings and sampling methods were described. This chapter also discussed aggregation of the similar studies; processes of, and tools for quality assessment of the included articles. Table 3.1 displays a summary of the extracted data and critical appraisal outcomes. Themes and subthemes that emerged from the analysed data are also presented in this chapter, and further illustrated in Table 3.3 and Figure 3.2. The next chapter will discuss these themes and subthemes guided by the aim and objectives of this study.

Chapter Four: Discussion

4.1 Introduction

This chapter discusses the four main themes that emerged as they relate to the wider literature on the topic. The discussion will be guided by the review's aim and objectives, which were to identify the types of environmental safeguards currently utilized in psychiatric facilities to prevent patients from attempting and completing suicide, and their effectiveness. The four themes will be discussed under separate headings, beginning with a summary of findings. Lastly, the limitations and strengths of the review, implications for practice and recommendations for future research will also be discussed.

4.1.1 Summary of findings

The articles included in the review identified hanging as the most common method of inpatient suicide (accounting for 75-90% of all suicides occurring within the hospital), followed by jumping from a height, self-poisoning and cutting. Most inpatient suicides occurred away from the ward, after absconding or while on agreed leave. Common methods of suicide for off the ward suicides include jumping from a height or in front of traffic, hanging, shooting with a gun and self-poisoning. Unlike suicides occurring within the hospital, the choice of method is not influenced by availability but by perceived lethality (Hunt et al., 2010). The most common hazards within psychiatric hospitals are hanging hazards including low lying anchor points. The common locations for hazards are bedrooms, bathrooms and private areas of the ward. The use of environmental safeguards, particularly the removal of

hanging points, was associated with a decrease of inpatient suicide, especially those occurring on the ward. This finding, therefore, demonstrates that environmental safeguards can be an effective intervention in the prevention of inpatient suicide, more so when used in conjunction with other risk management strategies.

These findings will be further discussed in the sections below

4.2 Theme One: Methods used

This theme was a common finding across the reviewed articles (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013; Kapur et al., 2013; Watts et al., 2012). Some methods were utilized more than others influenced by lethality, availability and other patient factors such as demographics, clinical diagnosis, and personality characteristics.

Hanging/strangulation was identified as the most frequently used method of suicide in psychiatric hospitals, accounting for 75-90% of inpatient suicides occurring within the hospital (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013). This finding was consistent throughout the reviewed articles as well as in the wider literature, where most articles on inpatient suicide identify hanging as the most common method inpatients use to commit suicide (De Leo & Svetcic, 2010; Janofsky, 2009; Lieberman et al., 2004; Tishler & Reiss, 2009). This according to Bowers et al. (2010) is influenced by availability and lethality; hence why hanging was found to be more common compared to other methods, as it is perceived to be more lethal in comparison to other methods. In addition, Biddle et al. (2010), in their

qualitative study, found that hanging was preferred as it was perceived as clean, simple, quick and easy to complete without much preparation.

In comparison to cutting, poisoning and jumping, hanging suicides were found to occur earlier in the admission (Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013), indicating acuity, intense suicidality and perhaps an impulsive drive not to only commit suicide but to ensure success by using a more lethal method. In saying that, hanging also occurs later in admissions, at times among patients identified as low risk and granted leave in to the community (Hunt et al., 2012; Hunt et al., 2013).

Additionally, despite being chosen for lethality hanging was not only common among completed suicide but also in suicide attempts, accounting for 82.4 percent of all incidences (Bowers et al., 2011). This might indicate that hanging is not only chosen for lethality but other factors such as availability of means, or patient behavioral characteristics such as impulsiveness.

Moreover, similarly to suicide in the general population, in this study males were more likely to use hanging than other methods (Hunt et al., 2012; Watts et al., 2012). When compared to other inpatient suicides, those who died by hanging were younger, had a history of self-harm, alcohol and drug misuse, and violence and were less likely to be living alone (Hunt et al., 2012).

The second most common method of completed suicide among inpatients as found by Hunt et al., (2007) and Hunt et al., (2013) was jumping from a high place or in front of traffic. However, most of the studies identified jumping as more common among suicide attempts, especially for events occurring on the

ward (Bowers et al., 2011; Watts et al., 2012). This is likely due to psychiatric hospitals being specifically designed to prevent this risk.

Three of the included articles, (Hunt et al., 2007; Hunt et al., 2010; Kapur et al., 2013) found that jumping was more common among inpatients who died away from the ward, especially after absconding. This is further supported by Hunt et al., (2010), who found that 49% of absconders and 30% of agreed leave inpatients used jumping to commit suicide. This is not a surprising finding given the general demographic characteristics of inpatients likely to abscond and commit suicide; that is, acutely suicidal, impulsive, young, male and non-adherent to treatment (Hunt et al., 2010).

Jumping was more common among males than females for both completed and attempted suicides. According to Bowers et al. (2011), this is because males are more likely to use violent methods than females. This is further illustrated by the studies from the VHA which recorded high suicide attempts through jumping, where the majority of the population are male veterans (Mills et al., 2008; Mills et al., 2010; Mills et al., 2013).

Similarly, to jumping, self-poisoning and cutting were found to be more common among suicide attempts occurring on the ward than completed suicides (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2012; Watts et al., 2013). For self-poisoning, the rates of completed suicide on the ward ranged between 6 and 9% across the reviewed articles (Mills et al., 2013; Hunt et al., 2007; Hunt et al., 2013). However, higher rates were recorded in inpatients committing suicide away from the hospital, with 9% self-poisoning after absconding and 17% while on leave (Hunt et al., 2010). This finding is

supported by Hunt et al. (2009) who in their study of suicide in recently discharged patients, identified self-poisoning as the second cause of death in this population. For this study, this might indicate that self-poisoning is more common later in admission considering that leave is usually granted to patients regarded as low risk and as a preparation for discharge (Bowers et al., 2010; De Leo & Svetcic, 2010; Tishler & Reiss, 2009). For inpatients who attempt or complete suicide this way within the hospital, this is influenced by availability, more so in comparison to those dying away from hospital, who have ample access to chemicals and poisons and tend to use a variety of chemicals (Bowers et al., 2010; Tishler & Reiss, 2009), whereas those on the wards are limited to what they can access within the hospital environment (Hunt et al., 2007; Hunt et al., 2013). Self-poisoning was more common among females than males, even in the male dominated population within the VHA (Mills et al., 2008; Mills et al., 2013). This perhaps is reflective of the notion that females attempt suicide more than males as self-poisoning was more prevalent among suicide attempters.

For cutting events, Mills et al. (2013) recorded the highest rate of suicide attempts, (22.6%) but a zero rate for completed suicides, while Hunt et al. (2013) found that 6% of inpatients died from cutting or stabbing. These findings highlight that the choice of method may indicate the intended outcome (Lieberman et al., 2004). This is further supported by De Jong, Overholser and Stockmeier (2010) who found that suicide attempters were likely to use less lethal methods, such as cutting, compared to suicide completers. Moreover, Runeson, Tidemalm, Dahlin, Lichtenstein and

Långström (2010) in their study on method of attempted suicide as a predictor of subsequent successful suicide found that cutting was associated with low mortality in comparison to self-poisoning. They add that cutting usually indicates poor emotional regulation; and patients who choose cutting usually do not intend to die but rather communicate emotional pain (Runeson et al., 2010). Interestingly, however, those who cut are more likely to be hospitalized and are perceived as high risk of suicide. This might be because this kind of violence towards one's self goes against usual human responses to pain or harm.

Cutting was found to be more common among females than males (Bowers et al., 2011; Mills et al., 2008). This is supported by Bergen et al. (2012) who state that those who choose cutting are more likely to be female, suffer from mood disorders and be under the age of 35. In this study, cutting was more prevalent in suicide attempts on the ward than off the ward (Hunt et al., 2007; Hunt et al., 2013). Similar to hanging, cutting events commonly occurred in private areas of the unit, even though patients who cut were likely to seek staff for assistance (Bowers et al., 2011; Mills et al., 2008; Mills et al., 2013).

4.2.1 Theme summary

Hanging/self-strangulation was the most common method of inpatient suicide compared to other methods, especially among patients who die in the hospital. Cutting, self-poisoning and jumping were more common in suicide attempts than completed suicides, for events occurring within the hospital. However, higher rates of completed suicides using these methods were recorded for patients dying away from the ward. The method used, especially for events

occurring on the ward, is highly influenced by availability of means and lethality. Males tend to use more violent methods than females and females attempt suicide more frequently than males.

4.3 Theme Two- Environmental hazards

Environmental hazards in this study are defined as any structural features or equipment within the environment that a patient can use to attempt or complete suicide. These include ligature points, ligature material and sharp items (Cardell et al., 2009). The hospital environment was cited by 6 of the 9 articles as the most common source of means for inpatient suicide (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013; Kapur et al., 2016; Watts et al., 2012). The VHA studies especially focused on the identification of the physical environmental hazards and implementation of preventative measures.

As stated in section 4.2, hanging was identified as the most common method of suicide among patients who attempted or died of suicide while in hospital making anchor/ ligature points the most frequently identified hazards within psychiatric units (Hunt et al., 2012; Mills et al., 2010). Mills and colleagues in their studies reviewed root cause reports of all suicides and suicide attempts occurring within the VHA between 1999 and 2011. They identified ligature points as the most commonly available hazard (Mills et al., 2008; Mills et al., 2010; Mills et al., 2013; Watts et al., 2012). This finding is supported by the wider literature on inpatient suicide prevention which consistently points to the physical environment of care as the most frequently cited root cause in

hospital suicides, especially structural features within the unit that can facilitate hanging (Cardell et al., 2009; De Santis et al., 2015; Lieberman et al., 2004; Sakinofsky, 2014; Thomas, 2017).

The most commonly identified hanging hazards were any sturdy structural features that can support human weight, including low lying structures (Hunt et al., 2012; Mills et al., 2010; Mills et al., 2013). Among the frequently identified anchor points were beds, doors and door hardware, accounting for 59% of all anchor points; rails including shower rails, hand rails and curtain rails (8%); windows, support bars and bathroom ware such as exposed plumbing pipes, tapes and towel hooks (16%) (Hunt et al., 2012; Mills et al., 2010; Mills et al., 2013). Furthermore, Mills et al. (2010) assigned risk levels to the identified hazards determined by lethality and location of hazards. They found that hanging points had a high-risk classification compared to suffocation and poison risk (Mills et al., 2010). In support of this, Lieberman et al., (2004), states that anchor points in private areas such as bedrooms and bathrooms pose a high risk as patients are less likely to be found in time. In addition, low lying anchor points were found to be as hazardous as high anchor points (Hunt et al., 2012; Mills et al., 2010), however, these may be overlooked and perhaps only brought to the staff's attention after an incident occurs (Gunnell, Bennewith, Hawton, Simkin, & Kapur, 2005; Yeager et al., 2005).

The researcher observed that some of the primary articles do not discuss manual strangulation separate from hanging which may be misconstrued as indicating that it is less common. This is not the case as Hunt et al., (2012)

found that nine suicides occurred from manual strangulation without the need for an anchor point. This finding highlighted the varied ways and items that inpatients attempt and complete suicide, so all possible hazards should be taken seriously despite the improbability of death occurring (Mills et al., 2013). Lieberman et al. (2004) in agreement states that even when suicide is not the outcome, the risk remains high as it only takes a few minutes of adequate pressure around the neck for a patient to lose consciousness. When compared to males, females were more likely to self-strangle while males preferred to attach a ligature to a fixed point such doors and beds (Bowers et al., 2011; Hunt et al., 2010).

Similarly, to anchor points, commonly used ligatures were items readily available on the ward such as linen and personal clothing items (Hunt et al., 2012; Mills et al., 2010; Mills et al., 2013). Belts, sheets, towels and clothing items were the most commonly used ligatures in completed suicides, accounting for 61% of incidents in Hunt et al., (2012), followed by shoelaces and cords from electronic devices such as phones and hair dryers. Most of these items belong to patients and most of them essential for daily functioning, which perhaps explains their availability and accessibility to patients. The wider literature on inpatient suicide comes to the same conclusion about the most commonly used ligature (Bowers et al., 2010; De Leo & Svetlicic, 2010; Lieberman et al., 2004; Sakinofsky, 2014; Thomas, 2017; Tishler & Reiss, 2009)

Furthermore, according to Mills et al. (2013), belts were associated with high mortality rates, despite only being used in 10% of hanging events they

accounted for 31.8% of completed suicides. This may be because belts are strong, readily available as found by Bowers et al., (2011) and easy to turn into a ligature, whereas sheets or towels require some work and effort to turn in to a ligature. Moreover, intimate and private items such as brassieres were among the commonly identified ligatures (Bowers et al., 2011; Hunt et al., 2012; Mills et al., 2013). This may be due to the ethical, cultural and moral dilemmas that may hinder removal of such potential ligature material from patients. It is difficult to balance risk management with other equally relevant patient needs such as culturally appropriate care, respect, autonomy, informed choice and consent to care (Saigle & Racine, 2018).

So far, this study has established that availability of means has an influence on methods chosen, as do items used and the location where events occur within the ward and perhaps outside the ward (Hunt et al., 2012; Manuel et al., 2017; Mills et al., 2008; Mills et al., 2010; Mills et al., 2013). For cutting incidents, razors were the most common hazard, accounting for 23.1%, of events followed by plastic and butter knives, accounting for 7.3% of events (Mills et al., 2013). There were no comparisons made by the reviewed articles between suicide attempts versus completions or gender differences with the items used for cutting.

Although cutting was associated more with suicide attempts than completions, the Mills et al. (2010) and Mills et al. (2013) studies state that the use of sharp items such as razors can over time cause lasting physical harm. Furthermore, despite this subtheme being predominantly represented by studies completed within the VHA, the findings are congruent with the author's experience,

where patients commonly use razors, plastic knives and broken glass.

Moreover, the author has worked with long term patients who cut themselves now suffering from comorbid conditions such as nerve pain, which supports Mills et al. (2010) and Mills et al. (2013) in their view above.

For self-poisoning events, commonly used poisons were cleaning products and medications (Hunt et al., 2007; Hunt et al., 2013; Mills et al., 2008; Mills et al., 2013). This, again, indicates availability of means with most self-poisoning events occurring on the unit mainly involving administered medications and cleaning chemicals accessed from unattended cleaning carts. Furthermore, although medications were commonly accessed through hoarding of administered medication, some were brought in by patients returning from leave, on admission or by visitors unaware of the risk (Mills et al., 2013). Opiates were the most commonly used medication on the ward (Hunt et al., 2007; Hunt et al., 2013), which is surprising for the reviewer who anticipated that commonly utilized psychotropic medications, such as antipsychotics or benzodiazepines, would be widely used considering the population being studied.

Other identified physical hazards were in relation to insecure ward exits and hindrances to adequate patient supervision because of the ward design (Hunt et al., 2007; Hunt et al., 2010; Hunt et al., 2013; Kapur et al., 2013; Manuel et al., 2017; Mills et al., 2013). According to Hunt and colleagues, insecure ward exits, or malfunctioning doors, windows or outside fences make it easy for patients to abscond (Hunt et al., 2013; Hunt et al., 2007; Hunt et al., 2010).

Although not specifically related to the physical environment, poor

supervision and monitoring of patients, loud, disruptive and non-therapeutic environments are all aspects of the hospital environment which can have an impact on inpatient suicide risk (Bowers et al., 2011; Hunt et al., 2013; Kapur et al., 2013; Manuel et al., 2017). This is supported by Thomas (2017) who states that a unit structural design, where the nurses' station is isolated from the patient areas and bedrooms, can hinder adequate supervision and monitoring of patients.

The location in which environmental hazards are was also identified as significant. According to Mills et al. (2010) hazards located in bedrooms and bathrooms were associated with the highest risk, indicating that the location of the hazard is also important when thinking about suicide risk management strategies. Private areas such as bedrooms, bathrooms and secluded areas were consistently identified as the locations where many suicides and suicide attempts occur (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013; Manuel et al., 2017; Mills et al., 2008; Mills et al., 2010; Mills et al., 2013). Mills et al. (2010) adds that hazards in these private areas, especially hanging hazards, pose a higher risk than those in communal areas as patients are less likely to use these hazards. If they do, they may be interrupted by staff or other patients. Moreover, suicide attempts occurring in communal areas were classified as low severity attempts by Bowers et al. (2011) which, one might argue, is because communal areas are full of activity making it difficult to complete suicide, rather than there being fewer hazards in the communal areas. This finding is supported by the wider literature, which consistently identifies private areas as more hazardous (Bowers et al., 2010;

De Leo & Sveticic, 2010; Lieberman et al., 2004; Sakinofsky, 2014). Other areas within the hospital environment identified as hazardous were laundry, interview and utility rooms, especially when accessed without staff supervision (Mills et al., 2013). These areas are especially hazardous as they are not normally suicide proofed (Lieberman et al., 2004; Thomas, 2017; Tishler & Reiss, 2009).

4.3.1 Theme summary

The most commonly identified environmental hazards were ligature/anchor points, including low lying physical structures that can hold a ligature. Doors, beds, windows, handles, curtain rods, shower rails, support bars were among the most commonly identified anchor points. Most commonly available ligatures were everyday items such as linen and personal clothing, which complicates the elimination of these items from the unit to minimise the hazards. This is because it may be ethically and culturally insensitive for patients to go without necessities such as sheets or brassieres. Belts, although not commonly used were associated with a high mortality rate. This may be because belts are less likely to break and are possibly not considered hazardous unless a patient is known to be high risk or has previously attempted suicide that way. Other hazards were razors, medications and cleaning chemicals. Highlighted in this theme is also the possibility that anything can be turned in to a hazard by creative and determined patients, as well as the difficulty of inpatient suicide prevention. Most suicides and suicide attempts occur in private locations such as bathrooms and bedrooms. Although

rare, these incidents also occur in communal areas such as lounges, dining rooms and courtyards.

4.4 Theme Three: Off the ward suicides (absconds and agreed leave)

A significant and perhaps unexpected finding of this study was that most inpatient suicides occur away from the ward, after absconding or while on agreed leave from the hospital (Hunt et al., 2007; Hunt et al., 2010; Hunt et al., 2013; Kapur et al., 2013). Hunt et al. (2010) completed a comprehensive study on suicide among psychiatric inpatients who abscond. They found that 70% percent of inpatient suicides between 1997 and 2006 occurred away from the hospital. Among these, 38% percent died by suicide after absconding and 62% while on agreed leave. The primary articles present varying rates, with some studies recording higher numbers than others. However, the consensus is that there are more inpatient suicides occurring off the ward than on the ward itself (Hunt et al., 2007; Hunt et al., 2013; Hunt et al., 2010; Kapur et al., 2013; Kapur et al., 2016; Watts et al., 2012). This finding is supported by the wider literature on inpatient suicide (Bowers et al., 2010; Lieberman et al., 2004; Muir-Cochrane, Mosel, Gerace, Esterman, & Bowers, 2011; Muir-Cochrane & Mosel, 2008). However, this section of the review will mainly discuss absconding suicides as this is more related to the physical environment of care and to the scope of this study.

As stated above, most inpatient suicides occur after absconding and absconding was identified as a significant risk factor for inpatient suicide (Hunt et al., 2007; Hunt et al., 2010; Hunt et al., 2013). In addition, Lieberman et al. (2004) identify absconding as the second most common way inpatients

commit suicide or access suicidal means. Although this may be, Bowers et al. (2010) state that a definitive causal relationship between absconding and suicide has not yet been established. This is further illustrated in this study as this finding is derived from observational case control studies which are less adept at showing causal relationship (Boyko, 2013). Despite the lack of causality, it is concerning that as many as 38% of inpatient suicides occur after absconding from the hospital where all measures should be in place to ensure this does not occur. On the other hand, this highlights that inpatient suicide prevention is difficult and complex.

Moreover, despite a reported decrease of on the ward inpatient suicide (Kapur et al., 2013; Watts et al., 2012), the rate of absconding suicides has remained relatively stable with no significant change over the years (Hunt et al., 2010). This is supported by Kapur et al. (2013) whose study reported a decrease of suicides occurring on the ward but also noted a significant increase of inpatient suicide occurring away from the hospital. They hypothesized that this could be a result of increased hospital safety through environmental safeguarding and restriction of access to means; or may indicate a transfer of risk from inside the hospital to outside (Kapur et al., 2013).

Another significant finding of this study was that methods utilized by inpatients who die off the ward are different to those used by inpatients who die on the ward (Hunt et al., 2007; Hunt et al., 2010). Absconding suicides do not seem to be hugely influenced by availability of means, instead they choose more lethal and violent methods such as shooting with a gun, jumping in front of cars, trains or off buildings (Hunt et al., 2007; Hunt et al., 2010).

Furthermore, inpatients committing suicide after absconding were likely to be young, unemployed, homeless, to have schizophrenia and to be admitted involuntarily (Hunt et al., 2010). These demographic characteristics perhaps reflect the hopelessness that a patient having these social and health issues might be experiencing, making suicide a desirable solution one might pursue despite the preventative measures in place. This is further evidenced by the finding that most absconding suicides occur in the first week of admission, where patients are acutely suicidal, impulsive and driven by their illness to commit suicide (Hunt et al., 2007; Hunt et al., 2010; Hunt et al., 2013). However, while this might be the case, it important to note that absconding suicides are also common in prolonged or delayed discharges according to Muir-Cochrane and Mosel (2008).

4.4.1 Theme summary

Approximately 70% of all inpatient suicides occur away from the ward, almost half of them after absconding (Hunt et al. 2010). This suggests that perhaps inpatient suicide rates have not changed, what has changed instead is the location where inpatient suicide is occurring. Although the rates of absconding suicides vary among the reviewed literature, the consensus is that more inpatient suicide deaths occur away from the ward itself. The articles reviewed for this study being observational cannot establish a definitive causal relationship between absconding and inpatient suicide. Absconders were likely to be young, male, unemployed, homeless, involuntary and diagnosed with schizophrenia. Absconding suicides were found to be more prevalent earlier in admission.

4.5 Theme Four: Environmental safeguards/ward safety

Environmental safeguards are any modifications to the structural/physical environment of a psychiatric unit to remove or eliminate hazards that can be used to attempt or complete suicide. Environmental safeguarding can also be through means restriction or limiting access to means with which patients can attempt or complete suicide (Cardell et al., 2009).

The use of environmental safeguards to prevent inpatient suicide attempts and completions was identified by all the primary articles as one of the potentially effective risk management strategies that is used in psychiatric hospitals (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2010; Hunt et al., 2012; Hunt et al., 2013; Kapur et al., 2013; Kapur et al., 2016; Manuel et al., 2017; Watts et al., 2012). Elimination/reduction of structural hazards and restriction of access to means were the two umbrella terms used to describe the environmental safeguards identified as effective in preventing inpatient suicide. These will be discussed further in the sections below.

4.5.1 Elimination/reduction of hazards (anchor/ligature points)

Removal/reduction of physical hazards within the environment of care was associated with a substantial decrease in inpatient suicide (Kapur et al., 2013; Kapur et al., 2016; Mills et al., 2008; Mills et al., 2010; Mills et al., 2013). This finding was consistent across all studies with an emphasis on elimination or reduction of hanging points as they were identified as the most commonly used hazards in completed and attempted suicides occurring within the hospital (Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013). Mills and

colleagues studied inpatient suicide prevention within the VHA over six years and their findings indicate that inpatient suicide can be significantly reduced through systematic identification and abatement of environmental hazards from the environment of care (Mills et al., 2008; Mills et al., 2010; Mills et al., 2013; Watts et al., 2012). Their findings are not only supported by the UK based articles reviewed for this study but are also verified by the wider literature on inpatient suicide prevention, with many studies identifying environmental safeguarding as the most logical preventative measure given that the physical environment of the hospital is cited as the most common root cause for inpatient suicide (Bowers et al., 2010; Cardell et al., 2009; De Santis et al., 2015; Lieberman et al., 2004; Sakinofsky, 2014; Tishler & Reiss, 2009). Although the studies from the VHA are considered low quality, the VHA are well regarded for their contribution to inpatient suicide prevention which was apparent to the reviewer during the course of this review. In addition to inventing the Mental Health Environment of Care Checklist (MHEOCC) widely used by psychiatric facilities in the USA, the VHA are leading in the designing and testing of anti-ligature equipment, having made their own anti-ligature doors and beds. Moreover, through environmental safeguarding, routine assessments of the environment of care and removal of hazards, they have only experienced three successful suicides since 2008, compared to 22 before that (Watts et al., 2012).

According to Mills et al. (2013, pp. 531) “the greatest importance must be placed on methods and related environmental hazards which may have resulted in the greatest number of deaths and serious injuries”. So, based on

the finding that hanging is the most common method of suicide, it is logical that elimination of environmental hazards should mainly focus on ligature points, especially in bathrooms and bedrooms (Hunt et al., 2012; Mills et al., 2013; Mills et al., 2010). The identified environmental safeguards included designing out the anchor/hanging points or replacing equipment such as beds and doors with non-ligature holding ones such as single hinge slanted doors (Hunt et al., 2012; Mills et al., 2010; Mills et al., 2013). Another identified environmental safeguard was replacing sturdy wall fixtures such as curtain rods, towel rails and support bars with magnetic ones that disengage if weight is placed on them (Kapur et al., 2013; Kapur et al., 2016; Mills et al., 2010; Mills et al., 2013).

In the UK, a decrease in inpatient suicide was observed among services that implemented the recommended service changes, in which ward safety and reduction of ligature points were two of the main recommendations (Kapur et al., 2013; Kapur et al., 2016). However, although environmental safeguards were associated with decreased inpatient suicide rates, it is possible that other factors, such as improved service delivery, contributed to this decrease, especially given that uncontrolled before-and-after studies are typically a weak form of evidence (Boyko, 2013).

Furthermore, although the findings of this study demonstrate that environmental safeguards can be effective in the prevention of inpatient suicide (Kapur et al., 2013; Kapur et al., 2016; Mills et al., 2008; Mills et al., 2010; Mills et al., 2013; Watts et al., 2012), the ethical implications of these environmental safeguards such as consent issues, autonomy and patient

voice/advocacy have not been discussed in most of the articles. Mills et al. (2010), however, recruited appropriately skilled personnel to form an 18-member multidisciplinary team tasked with developing the MHEOCC. They, however, did not include patients or family representatives, although the changes to the environment would impact patients more. Manuel et al. (2017) was the only article that reported some form of patient and family consultation and involvement in regard to their responses to the coroners recommendations for mental health services.

Involving patients or patient representatives in environmental safeguarding was modelled by Benesohn and Resnik (1973) as cited in Cardell et al.'s study (2009) which included patients in the process of environmental safeguarding. As a result, they found that patients were more knowledgeable about hazards within the environment than staff (Cardell et al., 2009). This suggests that involving patients when implementing environmental safeguards is not only favorable ethically but can enhance the process and, in a way, provide inside information that can only be known through someone experiencing the problem. Additionally, excluding patients when implementing environmental safeguards contradicts organizational values such as nonrestrictive care, informed consent, preservation of patients' rights and dignity, and collaborating with family and patients. Alternatively, Tishler and Reiss (2009) suggest having a suicide proofed area within the unit dedicated for those at high risk of suicide instead of placing restrictive measures on all patients despite level of risk. However, this is not fully supported in the literature with a majority recommending that all patient areas be free of hazards that can be

used to commit or attempt suicide (Cardell et al., 2009; De Santis et al., 2015; Lieberman et al., 2004; Sakinofsky, 2014; Tishler & Reiss, 2009).

It is impossible to prevent all suicides (Lieberman et al., 2004). Desantis et al. (2015) agree adding that it is difficult to remove all hazards from the environment of care as determined patients will find other ways to attempt or complete suicide. In addition, Mills et al. (2013) found that, when hanging events decreased due to the focus on the removal of hanging points, other methods such as cutting increased. This shows that environmental safeguarding is expensive, can be difficult and is ongoing.

Furthermore, Mills and colleagues, (2013) agree that environmental safeguarding is ongoing, stating that it is essential to carry out regular assessments of the environment to identify and abate hazards that may be introduced through day to day movements (Mills et al., 2010; Mills et al., 2013). This is supported by Cardell et al. (2009) who add that it is important to keep a list of physical hazards or ligature points unable to be eliminated and ensure that this is clearly communicated to all staff to increase awareness. Moreover, Yeager et al. (2005) state that this is especially important for old psychiatric buildings that might be too expensive to redesign or eliminate hazards from. The expense of remodeling does not only come from the physical aspects of the process but also the effort it takes to ensure collaboration with relevant personnel, patients and patient representatives as well as the time spend planning and researching (Shepley et al., 2013). One might argue that procedural interventions, such as adequate monitoring and supervision of at-risk patients, might be relatively cheaper and perhaps less

restrictive for other patients on the ward. However, as established earlier, these interventions are all interconnected and yield better results when utilized together.

4.5.2 Restricting access to means

Another strategy utilized in environmental safeguarding is restricting access to means. Some of the material discussed here interconnects with the above section, which further highlights that all these risk management strategies are interlinked and connected. Restriction of access to means was found as one of the most utilized interventions in the prevention of inpatient suicide. This was especially emphasized in the studies within the VHA, more so when implemented in conjunction with removal of structural hazards such as hanging points (Mills et al, 2008; Mills et al., 2010; Mills et al., 2013; Watts et al., 2012). The UK studies also found a significant decline in inpatient suicides within organizations that implemented the recommended service changes, in which restriction of access to means was one of the recommendations (Kapur et al., 2013; Kapur et al., 2016). In addition, Manuel et al. (2017) identified means restriction as one of the main recommendations made by the coroner to mental health services. Furthermore, means restriction as a suicide prevention strategy is well recognized in literature on both inpatient and general population suicide prevention (Tishler & Reiss, 2009).

As stated earlier, this study established that availability of means highly influences the rates of inpatient suicide and suicide attempts (Hunt et al., 2012; Mills et al., 2013; Mills et al., 2010). This is why restriction of means was

identified as an essential aspect of suicide risk management. This is supported by Thomas (2017) who states that an ideal hospital environment is one without means that patients can use to harm themselves. In addition, Stevenson and Cutcliffe (2006) state that restricting access to means is especially effective in acute suicidality where patients are more impulsive and driven. Examples of means restriction strategies identified in this study include controlling what patients have access to, by locking secluded areas, unused rooms, clinics and cleaning cupboards and removing patient belongings that may be used, such as clothing with long cords, phone chargers and razors (Mills et al., 2013). Furthermore, Mills and colleagues emphasize that providing a hazard free environment is not only limited to the actual physical environment but also what is brought to the environment by patients and visitors, and how that affects environmental safety (Mills et al., 2010; Mills et al., 2013). Moreover, personal belongings and clothing were among the most commonly available and utilized hazards (Bowers et al., 2011; Hunt et al., 2012; Mills et al., 2013). Therefore, removal of any items that can be used to attempt or complete suicide from at risk patients is critical. Lieberman et al. (2004) highlights the substitution hypothesis, stating that removal of one suicide method or means does not stop patients finding other means or ways to commit or attempt suicide. However, as suicidal crises are normally short-lived so means restriction in the acute stage may stop/hinder an attempt until the period of high risk has passed (Manuel et al., 2017). Moreover, if access to highly lethal methods of suicide is reduced, even when

substitution occurs, this may increase the number of patients who survive suicide attempts (Manuel et al., 2017).

As discussed in section 4.4, a significant amount of inpatient suicide occurs outside the hospital. A majority of the studies in the literature identified strict monitoring and locking of hospital exits as a strategy to limit access to means especially for absconding suicides (Hunt et al., 2007; Hunt et al., 2010; Hunt et al., 2013; Manuel et al., 2017; Mills et al., 2013). However, although this practice remains a big part of today's psychiatry, it is surrounded by controversy and is discouraged in the wider literature as it contradicts least restrictive care efforts (Bowers et al., 2015; Huber et al., 2016; Muir-Cochrane et al., 2011; Muir-Cochrane & Mosel, 2008). This is congruent with the researcher's work place, where doors can be locked to prevent a patient from absconding, but this is strictly regulated by policies. Locking of doors is considered a form of restraint and is only used as a last resort.

Although staff, patients and visitors view locked doors as effective in the reduction of absconding and other adverse events, staff find that it increases their workload by having to let people in and out (Muir-Cochrane et al., 2011). However, the same can be said about open wards as great effort, time and expense goes in to preventing patients from absconding (Muir-Cochrane & Mousel, 2008). Clearly, psychiatric facilities should strive to achieve a balance between use of restrictive measures, freedom and autonomy while managing absconding and suicide (Huber et al., 2016). This means that for patients deemed a high suicide risk, high levels of surveillance and restrictions are

warranted, while those that are demonstrably low risk should not be hampered by unnecessary restrictions (Huber et al., 2016).

Furthermore, Bowers et al. (2008) in their study found no evidence that locked wards decrease absconding and consequently inpatient suicide. Instead, they suggest that nursing interventions implemented in partnership with patients may be more effective compared to locked doors. In addition, Lang et al. (2010) found that open wards reduce the risk of absconding as patients feel respected, trusted and less stigmatized. This practice also coincides with conservation of patients' rights. Hunt et al. (2016) add that an overly restrictive and controlling ward atmosphere can be counterproductive as may cause patients to become dependent on staff for their recovery and may further reinforce hopelessness. Moreover, research shows no difference in suicide rates between locked and unlocked wards (Bowers et al., 2015; Lang et al., 2010; Muir-Cochrane & Mosel, 2008).

Other preventative measures identified during the process of this research, which were not within the scope of this review but equally important, were constant observations, availability of well trained and skilled staff, and guiding policies. Constant observations were especially recommended to prevent absconding and suicide in this review, particularly in the acute stage.

Furthermore, ongoing risk assessment was also recommended, especially before granting leave to the community (Bowers et al., 2011; Hunt et al., 2007; Hunt et al., 2012; Hunt et al., 2013; Kapur et al., 2016; Watts et al., 2012).

4.5.3 Theme summary

The use of environmental safeguards to prevent suicide attempts and completions was identified by all articles in this review as an effective intervention in the prevention of inpatient suicide. However, some the strategies are contradictory to other equally important aspects of health care provision such as privacy, autonomy, partnership and collaboration with patients. Removal of potential hazards such as personal clothing can be viewed as culturally and ethically insensitive, demoralizing and stigmatizing for an already vulnerable population. Environmental safeguarding and structural redesigning are time consuming and expensive as well as not inclusive of patients' voice, as found in this study. However, when a balance cannot be established, patient safety and protection from preventable adverse events should override the need for privacy which means, for units that care for suicidal patients, all necessary measures should be taken to prevent suicide.

While environmental safeguards have been shown to decrease inpatient suicide, the literature suggests that that they are more effective when used in conjunction with other interventions such as therapeutic rapport and effective treatment of the underlying illness.

The following sections will discuss the limitations and strengths of this study, its implications for health care and future research.

4.6 Limitations

The first limitation of this study perhaps lies within the integrative review methodology itself. Although renowned for its broad and comprehensive

approach to literature review, (Whittemore & Knafl, 2005), inclusion of diverse primary research for this study proved troublesome in terms of identifying the appropriate critical appraisal tools for mixed method articles. Also, the heterogeneity made it impossible to undertake a quantitative analysis of the gathered data. In addition, this study only included articles published within the past ten years (2007-2017), which means the researcher may have missed some significant relevant studies completed before or after these dates. A preliminary search of the literature had revealed some significant studies published decades ago, but the majority were inaccessible through the university's library and therefore excluded. The exclusion of non-English literature is another limitation of this study as it might have missed some significant articles. Furthermore, only one of the articles was published in NZ meaning that the generalizability of the review's findings to the NZ setting might be limited. However, despite this, findings can still be applied here as there are commonalities in practice with the UK and the USA.

The lack of experimental studies is another limitation of this study as the articles utilized were observational case-controls, uncontrolled before-and-after analysis, analytical cross-sectional, case series and qualitative, which are considered low grade evidence compared to experimental studies. Also, it was difficult to locate quality articles that specifically measured the decrease of inpatient suicide in relation to implemented environmental safeguards. Ideally, literature only concerning inpatients deaths occurring within the hospital would have been prioritised as that would have enabled the reviewer to specifically focus on the physical structure of the hospital and what

environmental safeguards were found useful in preventing those suicides. Perhaps the most significant limitation of this study is the use of articles originating from the same data set. Although they all studied slightly different outcomes, this meant that the findings overlapped.

4.7 Strengths

A major strength of this study is the use of the integrative review as it is broad and allows for inclusion of diverse primary research, therefore capturing all available data on the studied topic. Despite the scarcity of literature on this topic, this review managed to locate and use recent and robust studies as far as observational studies are concerned. The author employed three different search strategies as well as seeking assistance from a university's librarian to ensure that the search strategy was exhaustive and captured all relevant articles on the topic. Although most of the articles used originated from the UK and the USA, the findings of this review are relevant to New Zealand as similarities in psychiatric practice and care provision were evident through the reviewed literature. In addition, the findings of this review closely correlate with current practice in New Zealand regarding inpatient suicide prevention. Another strength of this study is the use of the JBI suite tools for quality appraisal and data extraction. The JBI are widely used and recognized for their contribution to literature reviews and nursing research. Furthermore, the use of thematic analysis for data synthesis enhanced the rigor of this study as it facilitated the systematic analysis of data from diverse primary research into unified findings.

4.8 Implications for practice

The findings of this study show that the most hazardous features of the physical environment of care are any structures, high or low that patients can use to hang themselves, this is not limited to anchor points but also includes any material that can be turned into a ligature. Therefore, the physical environment of care, no doubt, plays a big role, evidenced by the bulk of the literature pointing to it as the most cited root cause of inpatient suicide. This finding suggests that inpatient suicide prevention should focus on the physical environment of care. As shown in this study, the use of environmental safeguards, such as designing out and removing ligature points or replacing equipment with anti-ligature ones, such as collapsible rails, is associated with decreased rates of inpatient suicide. However, organizations implementing these interventions should ensure that appropriately qualified personnel are involved in the process; that is, engineers, architects, unit managers and frontline staff. It is very important that patients are included in the process, as appropriate, to ensure “patient voice” and representation in the running of the unit. It is also important to undertake routine audits of the physical environment of care to identify and remove any hazards that patients may use to attempt or complete suicide.

To prevent absconding suicides, the main intervention identified by this study and other literature reviews on this topic was strict monitoring, securing and locking of unit doors. Although, this is widely used, the literature presents conflicting views on the practice, with some questioning its effectiveness, legal and ethical standing. Restrictive measures tend to exclude the patient’s

voice, may be inconsiderate of human rights, demeaning and stigmatizing.

Therefore, organizations implementing such interventions need to be aware of these risks and endeavor to find a balance between risk management and preservation of basic human rights. This could be ensured through guiding policies, appropriate and adequate training for staff, and collaborating with patients in care planning and treatment. In addition, organizational leaders and policy makers should provide procedures to guide staff on how to respond when a suicidal patient absconds, for instance searching nearby areas, contacting family and alerting the police.

Furthermore, the findings of this research are applicable to the “Zero Suicide” initiative currently being implemented by the CDHB as well as country wide efforts to decrease inpatient suicide.

4.8.1 Other preventative measures as they relate to environmental safeguards

As discussed in Chapter One, section 1.4., various suicide risk management strategies are utilized to prevent suicide and suicide attempts. In most cases these strategies are interlinked and are more effective when utilized together. This includes staff training, which, according to Cardell et al. (2009), should not only focus on environmental safeguards but also include, risk assessment, proper documentation, review of related policies, and establishing and maintaining therapeutic rapport with patients. All these factors are important to inpatient suicide prevention especially in conjunction with environmental safeguards. In addition, policies guiding staff on restricting access to means such as searching patients’ belongings on admission and regularly through the

admission, as well as educating visitors about what is appropriate to bring to a psychiatric hospital are also crucial.

4.9 Implications for future research

There were no experimental studies identified for inclusion in this review. Ethical restrictions make it difficult to conduct experimental studies in this area. Perhaps cluster randomized controlled trials of units within a hospital could be completed to measure the direct impact of environmental safeguards. However, this might also be ethically inappropriate as it may be considered as endangering human life by withholding implementing environmental safeguards or not fully implementing all necessary precautions to prevent death from occurring. Furthermore, this type of study requires a large sample, take a long time to complete and is costly making it less appealing to researchers (O'Gorman et al., 2013). However, well designed qualitative research focusing on individuals who survived serious suicide attempts might also contribute towards understanding more about what influences the choice of method, what is helpful in terms of prevention interventions, how psychiatric hospitals can improve their approach on inpatient suicide prevention and perhaps assist in developing or advancing currently used environmental audit checklists (Taylor, Bogdan, & DeVault, 2015). Furthermore, although observational studies are not the gold standard of research evidence, they play an important role in research especially when experimental studies cannot be undertaken. Improvements could be made to these studies by collecting larger samples, comprehensive information using standardized approaches and better-defined variables (Von Elm et al., 2007).

Moreover, more studies could be completed that solely focus on absconding and suicide to determine what interventions work as this group representing the majority of completed inpatient suicide was a significant finding of this study.

4.9.1 Conclusion

Suicide is the leading cause of death in mental health institutions and most of these deaths are linked to the environment of care. This study found that the most common method of inpatient suicide is hanging, with the majority of these hangings occurring in private areas of the unit such as bedrooms and bathrooms. Most commonly identified hazards were ligature points and ligatures, hence why hanging is by far the most common method utilized by patients who die on the ward. Other common ways that inpatients commit or attempt suicide are jumping from a high place, self-poisoning and cutting. Hanging was the only method commonly used for both completed suicides and attempted suicides. Availability of means and perceived lethality influence the choice of method. The other three methods were more common among suicide attempts occurring on the ward.

The most common ligature points were doors, beds, rails, windows including low lying features such as door stops. Ligatures used were items commonly available on the unit such as sheets, towels and clothing. Opiates and cleaning chemicals were the most common products used for self-poisoning, while razors and plastic knives were most common among implements used for cutting.

The majority of inpatient suicides occur away from the ward after absconding or while on leave. Absconding suicides were found to be impulsive and likely to occur early in admission as opposed to later. The method of suicide in this population tends to be influenced by lethality rather than availability, violent methods were more common than non-violent for both suicide attempts and completions.

The use of environmental safeguards, especially the elimination of hanging hazards from the environment of care and restriction of access to means that patients can use to attempt or complete suicide, was associated with decreased inpatient suicide. Although the enforcement of environmental safeguards was associated with decreased suicide rates, it is not an infallible solution and cannot be separated from other risk management strategies such as adequate risk assessment and treatment of underlying conditions, supervision and monitoring of patients, therapeutic rapport and constant observations.

Furthermore, for restrictive strategies, such as locked doors, more research is required as the findings of current studies are not convincingly for or against the use of these strategies in the prevention of inpatient suicide. Moreover, ethical and legal implications need to be considered when implementing these strategies

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Appendix A

Data Extraction and Critical Appraisal Table

Data extraction and Critical appraisal table

Author	Year	Country	Article type	Key findings	Strengths	Weaknesses	JBIC tool used and score
Kapur, Ibrahim, While, Baird, Rodway, Hunt, Windfuhr, Moreton, Shaw & Appleby	2016	England	Quantitative Observational Before-and-after analysis Questionnaires Clinical survey	Implementation of all service changes was associated with a decrease in suicide risk (removal of non-collapsible ligature points, policies on responding to patients who abscond, communication and information sharing with families, other agencies, NICE guidelines. Themes identified: <ul style="list-style-type: none"> • Methods • Physical environmental hazards • Environmental safeguards 	Generalizable Longitudinal Robust findings on aspects of service delivery and impact on suicide rates	Research design Data collection methods Follow-up study from While et al. 2012 Absence of sample demographic characteristics	MASTAR Quasi-experimental (non-randomized experimental studies)-8/9
While, Bickley, Roscoe, Windfuhr, Rahman, Shaw, Appleby & Kapur	2012	England and Wales	Quantitative Descriptive Cross-sectional Longitudinal	Services that implemented more than 7 out of the 9 recommendations had significantly lower suicide rates. Recommendations associated with a significant fall were: Services collaboration; 24-hour crisis team and community teams; multi-disciplinary reviews; removal of ligature points; and 7 day follow-up.	Generalizable Robust findings on service delivery and rates of suicide	Methods used Unmeasured confounding factors Possible bias	MASTAR Quasi-experimental (non-randomized)

			Before-and-after analysis	Themes identified: <ul style="list-style-type: none"> • Physical environmental hazards • Environmental safeguards 			experimental studies)
Mills, DeRosier, Ballot, Shepherd & Begian	2008	United States of America	Quantitative Cross sectional Analysis of RCAs	<p>42 completed suicides and 143 suicide attempts, 52% of these occurred within the unit. Hanging accounted for 71% of events, followed by cutting with a sharp object, overdose, strangulation and jumping. 41% of anchor points used in hanging were doors and wardrobe cabinets. Common materials used for nooses were bedding, belts, shoelaces and clothing. Razor blades were commonly used for cutting (37%). 57% of jumping events occurred from balconies and walkways.</p> <p>Recommended:</p> <ul style="list-style-type: none"> • Eliminating doors when not required. • Remove doors on wardrobes and replace rods and hangers with shelves. • Eliminate belts, shoelaces, razors or observe patients while shaving. 	Generalizable to populations outside of the VHA Comprehensive list of environmental hazards and ways of elimination. Makes recommendations for practice and further research	Methods used Data collection Lack of control group for demographic characteristics. Lack of control for facility characteristics.	MASTAR I Quasi-experimental (non-randomized experimental studies

Mills, King, Watts, & Hemphill	2013	United States of America	Quantitative Cross sectional Analysis of RCAs	<ul style="list-style-type: none"> • Ensure there is protocol to eliminate/restrict access to drugs/chemicals that could be used for overdosing. • Conduct environmental rounds, active observations and use a comprehensive checklist to identify and abate hazards. <p>Themes identified:</p> <ul style="list-style-type: none"> • Methods commonly used • Physical environmental hazards • Environmental safeguards <p>406 suicide attempts, 65 completed suicides Most common methods: hanging (43.6%), cutting (22.6%), (15.6%) strangulation, (7%) - overdose. Others: drowning, jumping, electrocution (<10%). 79% of the inpatient deaths were by hanging. Doors and door hardware accounted for 40.6% of hanging points, beds for 13.2%, showers for 12.3 % and wardrobe or locker doors and fixtures accounted for 6.6%. For those who died from hanging, doors and, door handles,</p>	Comprehensive list of environmental hazards and ways of elimination. Makes recommendations for practice and further research.	Methods used Data collection Lack of control group for demographic characteristics. Lack of control for	MASTAR RI Quasi-experimental (non-randomized experimental studies)
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			<p>wardrobes and locker door fixtures accounted for 52.2% of anchor points used.</p> <p>Common lanyards used were sheets/bedding- (58.5%) followed by clothing (17.0%), belts (9.4%), and shoelaces (4.7%). Belts accounted for 31.8% of completed suicides despite only being used for less than 10% of attempts.</p> <p>Razors were mostly used for cutting events (23.1%) and plastic knives (17.3%); no reported deaths due to cutting.</p> <p>Locations where events occurred: patient's bedroom (42.1%), (28.1%) in bathrooms, and (8.7%) in general ward.</p> <p>What this study adds to the previous study is that removal of hanging points leads to a decrease in hanging suicides; however, cutting and strangulation have increased. Overdoses also fell due to strict control of contraband on the unit.</p> <p>Themes identified:</p> <ul style="list-style-type: none"> • Methods commonly used • Physical environmental hazards • Environmental safeguards 	Adds to previous study	facility characteristics.	
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Mills, Watts, Miller, Kemp, Knox, DeRosier & Bagian	2010	United States of America	Quantitative Cross-sectional analysis of RCAs	<p>Checklist was used by all 113 VA facilities, identified 7,642 hazards, and abated 5,834.</p> <p>Use of the checklist led to greater identification and abatement of hazards.</p> <p>Hazards commonly found in bathrooms, and bedrooms and these areas were associated with greater risk.</p> <p>Common hazards were anchor points</p> <p>Security issues were also apparent, making it difficult to contain patients.</p> <p>Anchor points had a greater association with high risk outcomes followed by suffocation and poisoning.</p> <p>Common suffocation item was a plastic bag and poisoning substances were cleaning chemicals.</p> <p>Recommended:</p> <ul style="list-style-type: none"> • Critical review of the unit's environment for hazards. • Protocol to guide staff on what items are not allowed on the unit such as chemicals and to be vigilant with everyday items than can be used to self-harm. • Ensure that all unused/secluded areas are locked, and patients are not left there 	<p>Generalizable</p> <p>Provides a comprehensive list of environmental hazards and how they can be abated.</p> <p>Adds to previous study.</p>	<p>Checklist not proven to have a direct link with decreased suicide rates yet.</p> <p>No training provided for staff using it</p>	<p>MASTAR</p> <p>RI</p> <p>Quasi-experimental (non-randomized) experimental studies</p>
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Watts, Young-Xu, Mills, DeRosier, Kemp, Shiner & Duncan	2012	United States of America	Quantitative Cross-sectional Analysis of RCAs	<p>alone unattended. Also, self-closing and locking door are recommended</p> <ul style="list-style-type: none"> • Ongoing staff training on identifying hazards <p>Themes identified:</p> <ul style="list-style-type: none"> • Methods commonly used • Physical environmental hazards • Environmental safeguards <p>25 suicides occurred between 1999-2011. Only 3 occurred after the implementation of the Mental Health Environment of Care Checklist [MHEOCC]; that is, between 2008 and 2011. Implementation of the MHEOCC was associated with an 87% reduction of the likelihood of a suicide occurring in a quarter. Most commonly identified hazards were anchor points mainly in bedrooms, bathroom or closets. In bathrooms common anchor points were the door, shower head, towel hook or bar. Suggested abatements were shower heads that one cannot tie a ligature on and breakaway towel hooks. In closets common anchor points were doors and clothing rods.</p>	Adds to existing literature Identifies a strong association between the use of the MHEOCC and reduction of inpatient suicide Generalizable	Possible bias due to underreporting of suicide Lack of control, therefore difficult to attribute the results to the use of the MHEOCC.	MASTAR RI Quasi-experimental (non-randomized) experimental studies-8/9
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				<p>Open closets and breakaway clothing hooks were recommended.</p> <p>Themes identified:</p> <ul style="list-style-type: none"> • Methods commonly used • Physical environmental hazards • Environmental safeguards 			
Kapur, Hunt, Windfuhr, Rodway, Webb, Rahman, Shaw & Appleby	2013	England	Quantitative Longitudinal Prospective Questionnaires	<p>Inpatient suicide rates fell by 47.6% during the study.</p> <p>Reduction of suicide was statistically significant for deaths that occurred on the ward compared to those that occurred away from the ward.</p> <p>Death by hanging fell by 30.7%. Drug poisoning by 48.5%, carbon monoxide poisoning by 59.6%, drowning by 51.2% and jumping by 28.4%.</p> <p>Immediate post discharge suicides rose by almost 2%.</p> <p>Number of deaths occurring under outpatient care (crisis care, outreach teams) increased.</p> <p>Awareness of the problem of inpatient suicide through policy initiatives and guidance may have contributed to falling rates.</p> <p>Recommends:</p>	Generalizable Makes recommendations for practice	Data collection methods	MASTAR Case series 6/8

				<ul style="list-style-type: none"> • Better processes for granting leave or preventing absconding to prevent suicides that occur away from the ward • Proper discharge planning to avoid transfer of risk from inpatient to outpatient. • Appropriate follow up after discharge • Physical environment safety <p>Themes identified:</p> <ul style="list-style-type: none"> • Methods commonly used • Physical environmental hazards • Environmental safeguards 			
Bowers, Dack, Gul, Thomas & James	2011	England	Quantitative Cross-sectional Analysis	<p>Most common method was strangulation (82.4%), followed by suffocation (9.4%) and self-poisoning (2.9%).</p> <p>Jumping, exsanguination and car accidents were less common.</p> <p>56.2% of self-strangulation cases tied the ligature around their neck while 40.5% used some kind of ligature point.</p>	Methodological rigour Adds to what is already known about topic Makes recommendations for care of	Inconsistent reporting of incidence might have affected the accuracy of analysed data.	MASTAR Case series- 5/10

				<p>Commonly used ligature points were windows, doors, beds, and bathroom rails.</p> <p>Most common used objects were things readily available to patients such as clothing, plastic bags, bed linen, electrical cables, phone chargers and medications.</p> <p>Common locations were bedrooms, bathrooms, showers with only a few happening in ward common areas.</p> <p>Most suicide attempts were prevented by staff.</p> <p>Recommends:</p> <ul style="list-style-type: none"> • Availability of staff in patient areas decreases opportunities for suicide attempts-staff supervision • Staff vigilance and monitoring of patients and patient environment-caringly vigilant. • Environmental safeguarding such as collapsible curtain rails or window alarms. • Effective observations as interrupted or terminated observation of patients was associated with high rates of suicide attempts 	suicidal patients	Missing data in the sample. Might not be generalizable outside of England.	
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				Themes identified: <ul style="list-style-type: none"> • Methods commonly used • Physical environmental hazards • Environmental safeguards 			
Hunt, Windfuhr, Shaw, Appleby, Kapur & the National Confidential Enquiry into Suicide and Homicide.	2012	England and Wales	Quantitative National clinical survey Case control	<p>448 suicides occurred on the ward. 344 (77%) of them died by hanging. On average, 38 patients died by suicide annually; this significantly declined during the study period, from 57 in 1999 to 15 in 2007. Majority of these suicides happened in bedrooms and bathrooms.</p> <p>More patients died from hanging in the first week compared to other suicide methods. Compared to other methods, hangings occurred more while on observations than other suicide methods.</p> <p>Observations were interrupted, disturbed due to ward design or other unsettled patients on the ward.</p>	<p>-First study of its nature.</p> <p>-Makes recommendations for practice and informative for service planning.</p>	<p>Possible bias through clinicians already knowing the outcome when completing the questionnaires.</p> <p>Lack of comparison sample</p>	MASTAR RI Case control- 7/10

			<p>Common ligature points were doors, hooks or handles, windows, (59%) of all anchor points. Other commonly used anchor points were beds, bed rails, shower, toilets, wardrobes, taps, light fixtures, and others utilised manual strangulation.</p> <p>Most ligatures were belts, sheets, towels (61%) of all ligatures. Shoelaces, clothing items, phone cords, chargers and curtains were also used. 73% of ligatures were brought in by patients, e.g., clothing and luggage straps.</p> <p>Hanging incidents decreased over time.</p> <p>Recommends:</p> <ul style="list-style-type: none"> • Better planned, constant and uninterrupted observations for suicidal patients. • Staff training and staff availability on the ward. • Better ward design to enhance monitoring and supervision of patients. • Suicide proofing by removal of hanging points. <p>Themes identified:</p> <ul style="list-style-type: none"> • Methods used 			
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				<ul style="list-style-type: none"> • Physical environmental hazards • Off the ward suicides • Environmental safeguards 			
Hunt, Kapur, Webb, Robinson, Burns, Turnbull, Shaw & Appleby	2007	England	Quantitative Case-control Questionnaires	<p>Most common method of suicide was hanging (42%), followed by jumping from a height or in front of a vehicle (31%).</p> <p>Suicide by overdose (5%) was less frequent and similar to drowning (4%).</p> <p>The common substance used for overdose was paracetamol.</p> <p>23% of suicides occurred within the first week of admission and 48% with a month.</p> <p>42% of those who died in the first week were on the ward and 26% died later in the admission.</p> <p>Those who died within a week were more likely to be off the ward, having absconded or on authorised leave.</p> <p>More cases of suicide were off the ward, without staff agreement, than controls.</p>	National case control study-ability to quantify risk on a large sample. Random sampling of controls from the at-risk population. Assessment of a wide range of potential risk factors.	Limited generalizability. Data collection period not long enough. Bias in data provided by clinicians as they were not blinded to cases and controls.	MASTAR Case-control 9/10

				<p>Later off the ward suicides occurred in those on agreed leave.</p> <p>Recommends:</p> <ul style="list-style-type: none"> • Tighter observation of patients and wards exits and continuing assessment of risk through the admission. • Ward safety through removal of hazards and adequate monitoring known to be associated with a decrease in suicide. <p>Themes identified:</p> <ul style="list-style-type: none"> • Methods commonly used • Physical environmental hazards • Off the ward suicides 			
Hunt, Bickley, Windfuhr, Shaw, Appleby & Kapur	2013	England	Quantitative Retrospective National population-	Hanging most common method of suicide (47%) followed by jumping from heights or in front of moving vehicle (29%), drowning (8%), poisoning (7%). Common substances for poisoning were opiates.	National case control study -ability to quantify risk on a large sample.	Retrospective collection of data from clinicians. Clinicians were not	MASTAR Case-control 10/10

			<p>based Case control Questionnaires</p>	<p>11% died on admission date and 40% died within 3 days of admission. 46% died on the ward and majority died by hanging, 20% were on agreed leave and 34% had absconded from the ward. More cases than controls died off the ward after absconding. No difference in level of observations, legal status or ward environment issues between cases and controls. Recommends:</p> <ul style="list-style-type: none"> • Thorough assessment of patients prior to granting leave as it might reduce the rates of inpatients who suicide while on leave. • Effective prevention of absconding and prompt and timely response when a suicidal patient absconds. • Psychiatric hospital admission itself might increase risk of suicide due to stigma, anxiety and increase in depressive symptoms so staff to use their skills to minimise this and instil hope. 	<p>Random sampling of controls from the at-risk population. Assessment of a wide range of potential risk factors.</p>	<p>blinded to case/control status introducing possible bias. Possible limitations to generalizability of some of the findings</p>	
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				<ul style="list-style-type: none"> • Therapeutic relationships vital to inpatient suicide especially in the first week of admission. • Staff knowledge of patient's precipitating factors is useful in preventing suicide in the first week of admission. <p>Identified themes:</p> <ul style="list-style-type: none"> • Methods commonly used • Physical environmental hazards • Off the ward suicides 			
Manuel, Crowe, Inder & Heneghan	2017	New Zealand	Qualitative Analysis of coroners' reports. Interviews with clinicians and individuals working	Coroners recommended that MHS implement suicide prevention strategies that improve communication, risk containment, service delivery and family involvement. Clinicians agreed with most recommendations. Family workers endorsed coroners' findings especially regarding family inclusion. Recommends:	Findings are supported by current literature. Adds to literature and makes recommendations for practice.	Might not be generalizable outside of NZ. Although based on coronial recommendations, coroners	QUARI-8/10

			<p>with families of consumers of MHS for their responses to the recommendations.</p>	<ul style="list-style-type: none"> • Interagency and internal information sharing (mental health services, NGOs, primary care). • Review of policy and procedures, effective nursing observation, reduced access to means, ward security and staff education were some of the coroners' recommendations for inpatient suicide prevention. <p>Themes identified:</p> <ul style="list-style-type: none"> • Physical environmental hazards • Off the ward suicides • Environmental safeguards/means restriction 	<p>Contributes to policy change.</p>	<p>were not given the opportunity to discuss responses to their recommendations. Recruitment of family members from one region might limit perceptions to that area only. Poor data collection methods.</p>	
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<p>Hunt, Windfuhr, Swinson, Shaw, Appleby, & Kapur,</p>	<p>2010</p>	<p>England and Wales</p>	<p>Quantitative Case series Clinical survey Questionnaire</p>	<p>The number and proportion of in-patient suicides has significantly declined over the 10-year study period, from 221 (17%) cases in 1997 to 144 (12%) in 2006. 30% of in-patient suicides took place on the ward itself; 70% occurred away from the ward. Of those who died away from the ward, 38% had absconded, and 62% were either on authorized leave or off the ward with staff agreement when the suicide occurred. Over the study period, whilst the number of suicides after absconding had fallen, the proportion showed no clear pattern, fluctuating from 40% in 1997, to 31% in 2003, and 38% in 2006. Hanging and jumping from a height or in front of a moving vehicle were the main methods used for the sample. However, those who had absconded were less likely to die by hanging and self-poisoning compared to those who were on agreed leave, but more often died by jumping and drowning. Those who had absconded were more likely than those on agreed leave to have been under a</p>	<p>Generalizable Makes recommendations for practice and policy making.</p>	<p>Possible bias. Poor data collection methods</p>	<p>MASTAR RI Case series 8/10</p>
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				<p>medium (checked every 5 to 25 minutes) or high (one-to-one) level of observation.</p> <p>There were reported problems in the observations of those who had absconded, through either ward design or other patients. Absconding was viewed as preventable.</p> <p>Recommends:</p> <ul style="list-style-type: none"> • Closer patient supervision • Better treatment compliance enforcement. • Increased staff numbers. • Improved staff communication. <p>Themes identified:</p> <ul style="list-style-type: none"> • Methods commonly used • Physical environment hazards • Off the ward suicides 			
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Appendix B

JBI critical assessment tools

- JBI Critical Appraisal Checklist for Case Control Studies
- JBI Critical Appraisal Checklist for Case Series
- JBI Critical Appraisal Checklist for Quasi-experimental Studies
- JBI Critical Appraisal Checklist for Analytical Cross-Sectional Studies
- JBI Critical Appraisal Checklist for Qualitative Studies

(JBI, 2017)

JBI Critical Appraisal Checklist for Case Control Studies

Reviewer_____Date_____

Author_____Year_____Record
Number_____

	Yes	No	Unclear	Not applicable
1. Were the groups comparable other than the presence of disease in cases or the absence of disease in controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were cases and controls matched appropriately?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were the same criteria used for identification of cases and controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Was exposure measured in a standard, valid and reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Was exposure measured in the same way for cases and controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Were confounding factors identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were strategies to deal with confounding factors stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes assessed in a standard, valid and reliable way for cases and controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was the exposure period of interest long enough to be meaningful?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. Was appropriate statistical analysis used?

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

JBI Critical Appraisal Checklist for Case Series

Reviewer _____ Date _____

Author _____ Year _____ Record
 Number _____

	Yes	No	Unclear	Not applicable
1. Were there clear criteria for inclusion in the case series?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Was the condition measured in a standard, reliable way for all participants included in the case series?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were valid methods used for identification of the condition for all participants included in the case series?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Did the case series have consecutive inclusion of participants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Did the case series have complete inclusion of participants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was there clear reporting of the demographics of the participants in the study?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Was there clear reporting of clinical information of the participants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were the outcomes or follow up results of cases clearly reported?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was there clear reporting of the presenting site(s)/clinic(s) demographic information?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Was statistical analysis appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall appraisal: Include <input type="checkbox"/> Exclude <input type="checkbox"/> Seek further info <input type="checkbox"/>				
Comments (Including reason for exclusion)				

JBI Critical Appraisal Checklist for Quasi-Experimental Studies (non-randomized experimental studies)

Reviewer _____ Date _____

Author _____ Year _____
----- Record Number -----

	Yes	No	Unclear	Not applicable
1. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were the participants included in any comparisons similar?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Was there a control group?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes of participants included in any comparisons measured in the same way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes measured in a reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall appraisal:	Include <input type="checkbox"/>	Exclude <input type="checkbox"/>	Seek further info <input type="checkbox"/>	

Comments (Including reason for exclusion)

JBI Critical Appraisal Checklist for Analytical Cross-Sectional Studies

Reviewer _____ Date _____

Author _____ Year _____ Record
 Number _____

	Yes	No	Unclear	Not applicable
1. Were the criteria for inclusion in the sample clearly defined?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were the study subjects and the setting described in detail?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Was the exposure measured in a valid and reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1. Were objective, standard criteria used for measurement of the condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were confounding factors identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Were strategies to deal with confounding factors stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were the outcomes measured in a valid and reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall appraisal: Include <input type="checkbox"/> Exclude <input type="checkbox"/> Seek further info <input type="checkbox"/>				
Comments (Including reason for exclusion)				

JBI Critical Appraisal Checklist for Qualitative studies

Reviewer_____Date_____

Author_____Year_____Record
Number -----

	Yes	No	Unclear	Not applicable
1. Is there congruity between the stated philosophical perspective and the research methodology?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Is there congruity between the research methodology and the research question or objectives?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Is there congruity between the research methodology and the methods used to collect data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Is there congruity between the research methodology and the representation and analysis of data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Is there congruity between the research methodology and the interpretation of results?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Is there a statement locating the researcher culturally or theoretically?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Is the influence of the researcher on the research, and vice-versa, addressed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Are participants, and their voices, adequately represented?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

Appendix C

Table of excluded articles

Author	Year	Title	Reason for exclusion
Huang, De-Ying, Yan-Hong, Cai-Hong & Yi- Lan	2014	Five high risk factors for inpatient suicide	-Study too small -Did not meet review aim -Poor study design
Jayaram Geetha	2014	Inpatient suicide prevention. Promoting a culture of safety over 30 years	-Could not be accessed -Abstract indicated it is a review article
Ikeshita, Shimoda, Norimoto, Arita, Shimamoto, Murata, Makinodan & Kishimoto	2014	Profiling psychiatric inpatient suicide attempts in Japan	-Poor study design/methods -Small sample -Poor quality
Sakinofsky Isaac	2014	Preventing inpatient suicide among inpatients	-Review article
Sullivan, Barron, Bezmen, Rivera & Zapata- Vega	2005	The safe treatment of the suicidal patient in an adult inpatient setting: A proactive preventative approach.	-Did not meet the review's aim -Literature review -Poor methods used
Tishler & Reiss	2009	Inpatient suicide: Preventing a common sentinel event	-Literature review
Mills, Watts, Shiner & Hemphill	2018	Adverse events occurring on mental health units	-Did not meet review aims
Berg, Rortveit & Aase	2017	Suicidal patients' experiences regarding their safety during psychiatric inpatient care. A systematic review of qualitative studies	-Systematic review
Large, Smith, Sharma, Nielson & Singh	2011	Systematic review and metaanalysis of the clinical factors associated with the suicide of psychiatric inpatients	-Systematic review

Bowers, Banda & Nijman	2010	Suicide inside. A systematic review of inpatient suicides	-Systematic review
Maclay Tammy	2012	How to save a life. A suicide prevention protocol for critical care	-Poor study design -Did not meet review aims -Wrong setting- general medical care