Suicide by hanging: a scoping review

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Abstract

Suicide by hanging is increasing in many countries around the world and whilst efforts are being made to influence the prevention agenda to reduce the incidence, little is known regarding the contributing factors for choosing this method. The purpose of this scoping review is to summate understandings about how the epidemiology and prevention of suicide by hanging is recognised, described, and discussed in the literature, and critically appraise the extent to which the lived-experiences of survivors of suicide attempts are included. A scoping review was conducted implementing the appropriate framework and in accord with the PRIMSA-ScR extension. Three databases (CINAHL, PubMed, and PsycINFO) were searched along with the reference lists of eligible sources in January and February 2021. Thirty-six articles with a primary focus on hanging as a method of suicide and/or its prevention are included in this review, with brief thematic analysis used to summarise the featured studies. Three distinct themes emerging from the literature include: (i) Hanging suicide deaths in the community environment or person's usual place of residence, (ii) Hanging suicide deaths in controlled environments (including police cells, prisons, and inpatient units), and (iii) Medical management of near-lethal hangings. This review highlights the necessity for improving education and policy regarding the controlled environments frequently associated with hanging suicides and the medical management of near-lethal hangings, as well as the ongoing need for policy to guide and govern the responsible media portrayal of known suicides as well as fictional hangings. Finally, this review highlights the necessity for including those with lived-experiences of a suicide attempt by hanging to advance the current prevention agenda.

KEY WORDS: suicide, hanging, lived-experience, suicide prevention

Introduction

Approximately 800,000 deaths globally are attributed to suicide each year, with an estimated suicide death every 40 seconds. In addition, two non-fatal suicide attempts are estimated to occur for every death by suicide (World Health Organization, 2020). Moreover these figures are likely underreported due to stigma and

ongoing criminalisation in some countries highlighting the need for suicide prevention as a priority public health focus globally (Dabkowski & Porter, 2021). The World Health Organisation (WHO) report that only 38 countries identify as having a national suicide prevention strategy and posit that suicide prevention has not adequately been addressed (World Health Organization, 2020). Further, the WHO outline the number of measures that may be taken at population, sub-population and individual levels in order to prevent suicide and suicide attempts including the integrated approach of research and the raising of awareness of suicide's public health significance (World Health Organization, 2014). Finally, it is suggested that it is knowledge regarding the most commonly used methods of suicide and suicide attempts that must underpin research and development of prevention strategies in order to ensure their effectiveness (World Health Organization, 2020).

Suicide by hanging is a particularly commonly used method for suicide and attempted suicide and is now a priority research area worldwide owing to its high level of mortality and lethality, and increasing rates in some countries (Arya et al., 2019; Australian Institute of Health and Welfare, 2020). Further, whilst some earlier studies have highlighted positive prognosis for hanging attempt survivors (for example, please see Penney, Stewart, and Parr (2002)), much research has documented the various complications amongst hanging attempt survivors including myocardial damage (Aslam & Maurya, 2013; Nair et al., 2009; Vander Krol & Wolfe, 1994), stroke, and hypoxic brain injury (Bradshaw & Amundson, 1994). There appears, however, to be a paucity of literature regarding the rate of enduring disability which adds to the need for further research regards completed and attempted hangings and opportunities for prevention.

Hanging is the intentional act of killing oneself via suspension from a ligature point utilising a ligature around the neck. Suspension can be whole, i.e.: freely suspended with both feet off the ground, or partial, i.e.: kneeling, sitting, lying, or with one or both feet remaining on the ground or other surface. It is important to acknowledge that hanging is distinguished from strangulation in the current review by the involvement of suspension, as consistent with earlier studies (Hunt et al., 2012).

When considering the suicide prevention space generally lethal means restriction, or the removal of or restriction to access to a particular method, is a key suicide prevention strategy and public health intervention (World Health Organization, 2014). The research in this area is extensive and has significantly influenced policy development and regulation around access to potential suicide methods such as: domestic gas; pesticides; over-the-counter medications; and firearms (Yip et al., 2012). Research has consistently shown that reducing access has a positive effect in lowering both method-specific and overall rate of suicide (Pollock, 2019). Arguably, fewer opportunities exist in the prevention space for reducing suicide by hanging as ligatures are so universally available, as are ligature points including low-hanging suspension sites (Arya et al., 2019; Biddle et al., 2010; Gunnell et al., 2005; Reisch, Hartmann, Hemmer, & Bartsch, 2019).

Early intervention is likely the most effective prevention effort, owing largely to the private nature of hanging. To intervene early though understandings of what drives the decision to choose hanging as a method of suicide will underpin effective prevention efforts. Universal (or whole of population), and selective (working with at-risk groups or communities) interventions remain at the forefront of all suicide prevention efforts. This

means that there is a time-sensitive opportunity within the prevention agenda to explore the more personal, proximal factors affecting individuals, and their decision to suicide, with a specific focus on hanging. The Life is for Everyone (LIFE) Framework (Commonwealth of Australia, 2007) is central to the national suicide prevention effort and discusses the importance of understanding both distal (further away in time from becoming suicidal) and proximal (closer in time to being suicidal) risk factors in efforts to prevent suicide. The LIFE framework highlights the importance of understanding these risk factors to address populations and communities who may be at risk, as distinct from targeting individuals. The current gap in the prevention agenda as it relates to hanging, however, suggests that efforts should also be focused on understanding the factors associated with choosing this method-specific risk.

Further efforts are focused on the responsible and ethical reporting and portrayal of suicide deaths and fictional suicides in the media. There is an expansive body of literature highlighting the potential adverse effects of media reporting. Evidence has suggested a contagion effect following prominent and explicit reporting (Pirkis, Blood, Sutherland, & Currier, 2018; Pirkis et al., 2020; Sisask & Värnik, 2012), leading to imitative suicidal acts. Whilst comparatively smaller, there exists empirical evidence suggesting that adaptive framing of suicides may encourage help-seeking (Machlin, King, Spittal, & Pirkis, 2017). Globally, this growing body of research has been used to develop international guidelines for media professionals (Pirkis et al., 2020) as well as local government and non-government guidelines. In Australia, the *Mindframe* guidelines (Everymind, 2020) are continuously refreshed and collaboratively reviewed by media professionals and Everymind (2020). Developed by the then Hunter Institute for Mental Health in 2002, the *Mindframe* guidelines were one of the first frameworks to be developed, and now constitute international best practice (Pirkis et al., 2020). Evaluation undertaken on the guidelines found that they are positively embraced by journalists, with a broad reach, and have led to a positive impact in the responsible reporting of suicide (Everymind, 2020).

In understanding the factors associated with the method-specific risk of hanging the research requires exploration of the experiences of those who have survived their hanging attempt. The field of suicidology has only recently begun to directly engage those with a lived-experience of suicidality (Maple, Frey, McKay, Coker, & Grey, 2019). The 2019 Royal Commission into Mental Health (State of Victoria, Royal Commission into Victoria's Mental Health System, Interim Report, Parl Paper No. 87, 2019) recommended engagement with those with a lived experience in designing and delivering suicide prevention. Engaging people who have lived-experience in design and delivery of suicide prevention can be partially addressed with the exploration of these stories of survival. Positioning these individuals as experts in their experiences and engaging them as consultants in the process by ensuring their narratives are fully integrated, suicide prevention research can be meaningfully extended. Further efforts are also needed to engage and mentor their expertise in the co-design of research and prevention efforts. The gathering and application of the research data informed by these first-person accounts must be done so respectfully. In doing so, the survivors of a suicide attempt are able to meaningfully extend the field of suicide prevention knowledge.

Aims

There is growing interest in epidemiology of those choosing hanging as a method of suicide; however, prevention efforts have largely focused on the controlled environments of prisons, police cells, and inpatient mental health units. There is a lack of research within the wider community environments. Also lacking is research involving the narratives and experiences of those who have survived a hanging attempt. This means that within community environments, where up to 90% of all hanging deaths occur (Biddle et al., 2010; Gunnell, Bennewith, Hawton, Simkin, & Kapur, 2005), little is known about what may have been helpful in preventing a hanging suicide or suicide attempt. Exploring these narratives can contextualize the circumstances, decision-making, reasoning, and impulsivity behind choosing this method. The purpose of the current scoping review is to summate understandings about how the epidemiology and prevention of suicide by hanging is recognised, described, and discussed in the literature, and critically appraise the extent to which the lived-experiences of survivors of suicide attempts are included. Understanding survivors' perspectives of hanging attempts and gaining insights into what may have been helpful in terms of suicide prevention can address key knowledge gaps to guide future research, practice, and policy. It is this first-person voice of the survivor of hanging suicide attempt that is referred to as the lived-experience voice needed throughout this study; not to detract from the importance of the collective lived-experience of the carers and family of those who have attempted suicide, or those bereaved by suicide. It is important to incorporate the narratives of suicide attempt survivors in the design of future prevention efforts as there is growing recognition that hanging suicides are increasing around the world.

Methods

A scoping review was completed to assess and summate the scope of available literature on hanging as a method of suicide and its prevention. With the broader definition outlined by Arksey and O'Malley (2005) of a scoping review, the purpose of this review is to summate understandings about how the epidemiology and prevention of suicide by hanging is recognised, described, and discussed in the literature, and critically appraise the extent to which the lived-experience of survivors of suicide attempts are included. The process of rapidly mapping main concepts supporting a research focus is key. In conducting the initial search of the literature, the opportunities for a systematic review and a scoping review were considered; firstly, that systematic reviews typically focus on well-defined topics in which specific study designs are known in advance, whereas a scoping review tends to address emergent or under-researched issues and are inclusive of diverse study designs; and secondly, that systematic reviews aim to include quality-assessment of a narrow topic. Scoping reviews, by contrast, tend not to focus on the quality of included studies (Arksey & O'Malley, 2005). Further consideration was also given to the fact that a systematic review on the epidemiology and prevention of suicide by hanging was conducted in 2005 by Gunnell and colleagues, thus the extensive systematic review of this component was not needed in the initial stages of scoping or research mapping.

Methodological Framework

The framework for conducting a scoping review as proposed by Arksey and O'Malley (2005) is underpinned by attributes of a systematic review – in that the methods utilised throughout the different

stages are done transparently, rigorously, and in a way that allows replication by other researchers. The framework suggests that the search for literature needs to be guided by the need to identify all possibly relevant studies, regardless of design (Arksey & O'Malley, 2005). The process is iterative comprising the five stages: (i) Identifying the research question (ii) Identifying potentially relevant studies (iii) Selecting studies (iv) Charting the findings as data (v) Collating, summarising, and reporting the results.

Search Strategy

Consideration was given to the need to include relevant literature accurately and comprehensively. The study included literature published between 1965 and 2020 inclusive. The start date of 1965 was chosen as this was the earliest study reported in the published systematic review by Gunnell et al. (2005). Further, studies in English only were considered owing to the cost and time involved in translation of published materials.

Discussed below are the methods of this scoping review in line with the processes outlined by Arksey and O'Malley (2005), and in accord with the PRIMSA-ScR extension (Tricco et al., 2018).

Identify the research question. 'What evidence is available regarding the epidemiology, contributing factors to, and prevention of hanging suicides amongst 18-65 year olds?'

Identify relevant studies. Consultation with a liaison librarian within the [University] was undertaken to identify the relevant keywords, and databases to search. The initial search strategy was devised, and then later refined based on early results. The initial search strategy was undertaken in PsycINFO, before being adapted to Medline and CINAHL. Whilst the systematic review conducted by Gunnell et al. (2005) served as the base for studies, additional relevant papers were identified through the hand searching of reference lists of retrieved literature. Databases searched included PsycINFO for the years 1965 – 2020, CINAHL 1982 – 2020 and Medline 1965 – 2020 using the following search strategy to identify relevant papers: Suicide* or suicidal as a mesh heading and a text word combined with the following text words: hang* or asphyxia or strangulation; prevent* or intervention*; attempt* or nonfatal or non-fatal.

Study selection. Studies were selected through a two-step process. First, from the 399 papers identified using this strategy, those selected focused on hanging as a method of suicide or where the title and abstract review suggested that the paper would include details regarding hanging suicides and their prevention. Second, the full text articles were reviewed. Single case-report studies were excluded as per the systematic review by Gunnell and colleagues (2005). Studies were excluded if, whilst hanging was referenced, there was no specific focus on this method or if the focus was purely on pathological features of hanging suicides or near-lethal hanging attempts. Additional relevant papers were identified through mining the reference lists of retrieved literature (see Fig. 1).

Charting the data. Retained articles were then entered into a charting form using Microsoft Excel (Table 1). The following key attributes were charted: author and year; study design; setting and sample size; location (of hanging, if focused on); contributing factors (incorporating the lived-experience as voiced by

hanging attempt survivors, as well as the investigated retrospective data and psychological autopsy evidence), ligature point and ligature. Data charting was completed independently by RS, BH, CD and JO.

Collating, summarising, and reporting the results. Information was extracted from the data charting forms and then reported on following manual synthesis. This process included all co-authors in clustering, ordering and summarising paper findings. The authors used an iterative process of review and refinement, to achieve a logical flow and completeness.

Results

The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) (Liberati et al., 2009) flow diagram outlined in Figure 1 details the search strategy employed. Through the databases selected 399 abstracts were initially retrieved; PsycINFO (*n*= 106), CINAHL (*n*= 90), Medline (*n*= 203), 112 of these were duplicates and excluded at review of title. A further 240 abstracts were excluded due to being focused exclusively on youth or adolescents (<18 years), or the elderly (65 years+), autoerotic hangings/plastic bag or other suffocation/deprivation of oxygen (e.g.: helium-induced oxygen deprivation), or through abstract review indicating whilst hanging was mentioned, there was no specific focus on the method or its prevention. Forty-seven articles remained, and after an additional 10 references were retrieved after hand-searching from reference lists, 57 required full-text review. A further 21 articles were excluded; due to no access to a full online format of the article (n= 11), or after review there was insufficient focus on hanging as a suicide method or its prevention specifically (n= 9), as well as a single-case study (n= 1). Table 1 summarises the key characteristics of the included primary research studies (n= 36).

A total of 36 population-based studies were identified following the scoping review search which focused on the methods used for suicide, hanging being identified as a primary method. These included epidemiological and descriptive studies focusing on suicide prevention where hanging was discussed in terms of either epidemiology and/or prevention specifically or within a broader discussion of suicide prevention. Included were: one prospective cross-sectional study, five prospective case series, 26 retrospective case series, two combined retrospective and prospective case series, and two case-controlled psychological autopsies. Of note, five of the original population-based studies identified by Gunnell et al. (2005) in their systematic review could not be located in full text format thus were not included in this review.

Within the studies most common ligatures were reported in 15, whilst most common ligature points were discussed in only 10. The most common place of suicide was reported in 17 of the studies. Nine of the studies included near-lethal hanging suicide attempts; two of these studies (Atreya & Kanchan, 2015; Biddle et al., 2010) reported only near-lethal hangings. These two works differ, however, in that one reviewed retrospective data only Atreya and Kanchan (2015), whilst the second employed a qualitative approach to feature the narratives of near-hanging survivors Biddle et al. (2010). Whilst both aimed to identify possible circumstances and associated precipitating and perpetuating factors to suicide by hanging, the methodologies were vastly different.

The most common ligatures identified were rope, items of clothing and cord/string which is consistent with the findings of Gunnell et al. (2005). Further, the main ligature points remained roof rafters/beams. In those studies reporting place of suicide (and excluding those focusing solely on controlled environments such as inpatient units, police cells or prison), over two-thirds of all suicides occurred in the individual's usual place of residence, which is slightly less than reported in the previous systematic review (Gunnell et al., 2005).

Only five of the studies commented explicitly on contributing factors to the suicide or suicide attempt. Contributing factors were identified through interviews with hanging attempt survivors (Jawaid, Amalnath, & Subrahmanyam, 2017; Atreya & Kanchan, 2015; Biddle et al.,2010), and retrospective analysis of medical records and police reports (Ganesan et al., 2018; Reisch et al.,2014). Family conflict including marital dispute and failed love affairs were common contributing factors, as well as loss of employment or associated financial strain.

Hanging as a method of suicide has increased across much of the world including India, Japan, and Australia (Arya et al., 2019; De Leo, Dwyer, Firman, & Neulinger, 2003; De Leo, Evans, & Neulinger, 2002; Dhungel, Sugai, & Gilmour, 2019; Kanamüller, Riipinen, Riala, Paloneva, & Hakko, 2016; Kõlves, McDonough, Crompton, & de Leo, 2018). It accounts for the majority of suicides in many countries also including Finland, Australia, India, Japan, Iran and the UK (Arya et al., 2019; Biddle et al., 2010; De Leo et al., 2003; De Leo et al., 2002; Gunnell, Bennewith, Hawton, Simkin, & Kapur, 2005; Kanamüller et al., 2016; Kasmaee, Zohrevandi, Asadi, & Shakouri, 2015).

Three distinct themes of the 36 research papers included in this scoping review were identified and will be discussed in detail: (i) Hanging suicide deaths in the community environment or person's usual place of residence, (ii) Hanging suicide deaths in controlled environments (including police cells, prisons, and inpatient units), and (iii) Medical management of near-lethal hangings. As mentioned previously, this is due to the different opportunities for prevention depending on the setting.

Hanging Suicide Deaths in the Community Environment or Person's Usual Place of Residence

Two-thirds of hanging suicide deaths reported occurred in the individual's usual place of residence (with the exception of those studies focused solely on hanging suicides in controlled environments). Much of the literature has highlighted that it is in these private and familiar spaces that the most effective suicide prevention effort in restricting access to lethal means is unlikely to be successful (Biddle et al., 2010; Daigle, 2005; Gunnell et al., 2005). Therefore, there exists the need to identify potentially unique opportunities for earlier intervention or prevention.

Such opportunity may exist in the recognition of certain personal characteristics. It has been suggested that those who choose hanging as a method of suicide differ from those who choose other methods; for example, De Leo, Evans and Neulinger (2002) in their comparative study report that men who chose hanging as the method of suicide were more likely to suffer from psychiatric illness, and less likely to suffer from a somatic disease when comparing them to their male counterparts who chose suicide by firearm. There are, however, few such comparative studies. Psychological autopsy aims to retrospectively construct a framework of the deceased's mental state, and any concerns in the period leading to their death. It involves the compiling of official records such as medical history and any notes, with the interviews of key persons such as family and friends, healthcare professionals etc., (Rivlin et al., 2013). Bastia and Kar (2009) prospectively implemented this strategy identifying factors and stressful life events associated with hanging with the view to explore preventability. Stressors were found specific to gender, with the authors suggesting that gender-specific early interventions might identify those at risk of suicide by hanging. Most specifically, it was suggested that close observation at home may prove particularly important regarding women identified at risk, owing to the large proportion (90%) of females dying by suicide within their usual place of residence.

Further efforts have been made to explore opportunity for earlier intervention within the community environment. Biddle and scholars aimed to understand the factors influencing the decision to use hanging as a method of suicide, via a narrative interview study of eight people (Biddle et al., 2010). Their positioning of the

lived-experience voice as authoritative and expert privileged the narratives of survivors to guide prevention agendas. Their findings highlighted two key reasons for either adopting or contemplating hanging as a method of suicide: the anticipated nature of the death, and accessibility. Consistent with much of the prior research, the findings further strengthened the need for prevention efforts to focus on the common perceptions of hanging as a "rapid, accessible, and 'tidy' method of securing escape from difficulties and distress" (Biddle et al., 2010, pp. 324). Interestingly, the study also showed that impulsiveness and access to means have the potential to override individual's original preference of method of suicide, suggesting the importance of focus of prevention within controlled environments.

Hanging Suicide Deaths in Controlled Environments

Contrasting death by suicide in the community environment or person's usual place of residence, suicides within controlled environments are regarded by many national governments as avoidable deaths (Hunt et al., 2012). Whilst the prevention agenda broadly champions improvement in overall suicide prevention and the popularity of hanging within the general population (Biddle et al., 2010; Gunnell et al., 2005; Pirkis et al., 2020), much of the focused literature aims to address the prevention of suicide within controlled environments including psychiatric hospitals, police custody cells and prison environments, as well as dormitories where individuals are closely observed by others (Hunt et al., 2012). Limiting access to lethal means within controlled environments when considering hanging specifically has been a predominant focus of much of the suicide prevention literature.

Prison suicide has reached epidemic levels in some parts of the Western world (Grassi et al., 2018) and is now a major public health concern. The literature regarding suicides in custody have aimed to identify prison-specific risk factors for, or 'predictors of' suicide, to best address the prevention agenda; single cell accommodations (Austin et al., 2014; Grassi et al., 2018), sudden isolation and new (recent) prison environment are particularly noteworthy; Grassi et al. (2018) identifying that "most" suicides occur within the first year of detention, and primarily within the first week, findings similarly reported by Austin et al. (2014) who delineated that 39% of suicides occurred within the first month and 26% within the first week. Further, there have been significant differences identified between pre-trial and sentenced prisoners wherein sentenced prisoners have increased suicide risk (Daigle et al., 2007; Grassi et al., 2018; Konrad et al., 2007). Globally, hanging has been shown to be the preferred method of suicide for those incarcerated, with fatality rates exceeding 70% (Grassi et al., 2018; Gunnell et al., 2005).

In Australia in 2018-2019 there were 89 deaths whilst in prison custody, 15 of these were due to suicide, all of these were by hanging and associated complications. In 53% of these cases the bed sheets were used as ligature, whilst the most common hanging point (60%) was a cell fitting other than cell bars (Doherty & Bricknell, 2020). Consistent with the 2017-2018 period, there were no hanging suicides whilst in police cells or in police custody during the 2018-2019 period. Over this two-year period, the hanging suicides whilst in custody constituted 0.39% (15/3,817) of national suicides by hanging (Doherty & Bricknell, 2020). Policy documents now recommend minimising or eliminating completely hanging points in cells, for example the

World Health Organisation's *Preventing Suicide in Jails and Prisons* (World Health Organization, 2007). In Australia, there exists a duty of care to intervene and prevent suicides within the custody setting.

Psychological autopsies of the deceased in custody pose limitations for prevention or risk identification, for example: the unmodifiable risk factors or 'predictors' available for inclusion i.e.: age, gender, and ethnicity; incomplete records; cross-sectional rather than longitudinal data; and an overcrowded prison system making in-depth knowledge unlikely (Rivlin, Fazel, Marzano, & Hawton, 2013). In an attempt to address some of these limitations, Rivlin et al. (2013) interviewed suicide attempt survivors. Their aim was to identify possible processes or psychological issues leading up to the act in an attempt to identify an opportunity for prevention or intervention. This research did not look at hanging prevention specifically; however, the authors noted that over two-thirds of near-lethal attempts included in the study (67%) were hangings and made comment regarding some prisoner's perceptions that it would be less painful than other methods, and that they had preconceived ideals regarding the ease of the method and subsequent death. Further, they identified that "most" prisoners who had attempted hanging had used their bed linen, as consistent with many studies focussed on suicide in prisons and made suggestions to review materials from which the bed coverings are made (Rivlin et al., 2013). Employing similar methods Marzano et al. (2011) investigated the psychological processes involved in near-lethal self-harm acts through mixed methods. Again, hanging specifically was not differentiated in the analysis of triggers or reasons for suicide. 72% of their study population had attempted suicide by hanging, however. Further, the authors noted that n= 13 of these women identified that their decision making process regarding choice of method was due to it being the "only one available to them at the time of the near-lethal act, at times adding that this was not necessarily their 'preferred' method or the one they would have used outside of prison" (Marzano et al., 2013, pp. 877). Whilst not solely focused on hanging, both studies show the potential for interviewing the survivors of near-lethal suicide attempts – not just in prison settings, but the general population.

Little data exists in Australia regarding the total number of suicide deaths within Australian psychiatric units. In the UK however, it is reported that suicide by hanging equates to over 75% of all deaths on psychiatric units (Hunt et al., 2012). Similar to deaths in custody, suicides on inpatient units are regarded as avoidable deaths, and various guidelines exist to govern practice within inpatient settings (for example please see: Department of Health, 2010)

Medical Management of Near-Lethal Hangings

Case fatality of hanging attempts is high. Of particular note is the swiftness of which lethal cerebral anoxia can occur in hanging/ligature strangulation (Austin et al., 2014). Loss of consciousness may occur within seconds of compression of the neck, with death occurring in mere minutes (Atreya & Kanchan, 2015; Gilbert, Jensen, & Byard, 2008). Although the majority of those who attempt hanging do not survive, those who reach hospital alive have relatively positive outcomes (Gunnell et al., 2005; Penney, Stewart, & Parr, 2002). These survival outcomes are independent of low initial Glasgow Coma Scale (GCS) with early medical intervention and aggressive resuscitation the main influencing factors (Ganesan et al., 2018).

Complications in hanging-attempt survivors include stroke, acute transection or contusion of the spinal cord (Boots et al., 2006), cervical spine injury and retrograde amnesia (Jawaid et al., 2017), obstruction of the neck vessels, hypoxic brain injury, pulmonary oedema, myocardial damage (Ganesan et al., 2018) or massive subarachnoid haemorrhage due to artery tears (Boots et al., 2006). In an Australian case series (n= 44) an 88% survival rate was reported for those who reached hospital alive post-hanging attempt, with a low incidence of severe or persistent neurological damage (5%) (Penney et al., 2002). Further, of the nine patients admitted (64%) with a GCS of 3/15 at the scene were discharged alive; seven of these patients had been reported to have fixed dilated pupils at the scene yet were discharged with no neurological sequelae (Penney et al., 2002). In a clinico-epidemiological study of near-hanging cases in Nepal, the mortality rate was even lower, with a decline to 2.3% providing the individual survived the transport to hospital (Atreya & Kanchan, 2015). Whilst all ten patients included in the study had been found unconscious when first discovered, only one individual required intubation due to a GCS of 5/15. All were directly transferred to the ICU from the ED (Atreya & Kanchan, 2015).

The most frequently reported causes of death following a near-hanging (and in which the individual is brought to the hospital alive) are bronchopneumonia, pulmonary oedema and adult respiratory distress syndrome (Ganesan et al., 2018; Gunnell et al., 2005). In spite of the apparent misconception, fractures of the neck and associated transection of the spinal cord, as well as decapitation, are relatively rare in non-judicial hangings as the drop beforehand and the tension on the noose are both usually insufficient (Boots et al., 2006; Byard & Gilbert, 2018; Davidson, 2003; Jawaid et al., 2017; Morild, 1996; Simonsen, 1988). With this in mind, there is identified benefit in conveying the place of ligature to emergency medical management providers, as the height of the drop can be influential in recognising need for cervical spine imaging (Davidson, 2003; Jawaid et al., 2017). Further, there have been identified markers outside of GCS that may indicate a poorer prognosis which include: pre-hospital cardiopulmonary arrest, requirement of intubation, and lowered respiratory rate (<4) (Aufderheide et al., 1994).

Near hanging is associated with favourable outcomes, providing the individual receives aggressive resuscitation or early medical intervention, even if found at the scene with a GCS of 3/15 (Atreya & Kanchan, 2015; Boots et al., 2006; Penney et al., 2002); with the literature currently suggesting that 80% survive or even greater (Penney et al., 2002; Atreya et al., 2015) for those found alive following a near-hanging.

Discussion

The purpose of the current scoping review is to summate understandings about how the epidemiology and prevention of suicide by hanging is recognised, described, and discussed in the literature, and critically appraise the extent to which the lived-experiences of survivors of suicide attempts are included. Suicide by hanging has increased during the last 30 years across countries including Australia, England and Wales. It poses a high-lethality rate and approximately 70% of those who hang themselves die. The general population studies and those within controlled environments show a paucity of detail regarding the contributing factors for, or preventative factors against suicide by hanging; however, opportunities are raised to reduce the incidence (particularly in controlled environments). There exist a range of factors impacting the

decision making behind a particular method of suicide, with research highlighting socio-cultural acceptability a particularly important one (Cantor & Baume, 1998); however further research is required in order to address the rising trend in method-specific cases – hanging in particular.

The controlled environments of prisons, police cells, dormitories where persons are routinely monitored, and mental health inpatient units offer opportunities for the reduction in incidence of hanging suicides. With research highlighting hanging as a substitution of preferred method within controlled environments (e.g.: Marzano et al. 2010), and the possibility of death without complete suspension there is the need for recognition of potential ligature points in institutional settings. Australia and the UK, as well as other countries around the globe are recognising the need for reform within institutional settings and are introducing relevant policy and protocol to address this method-specific risk.

The World Health Organisation has issued guidelines around the prevention of suicide within custody settings (World Health Organization, 2000; World Health Organisation, 2007) which focus on the commonly used ligature and ligature points, as well as advice for prison officers in reducing potential hanging suicides. Grant and Jewkes (2015) champion the Australian-driven key design of safe cell technology. Occurring after a coronial inquiry (Coroners Court of Victoria, 1999) into deaths in custody following a series of preventable suicides, the 'safe cell' projects saw the development of guidelines around numerous safety components including evacuation procedures in case of fire, as well as removal of obvious ligature points in mainstream cells. The inquiry and subsequent guideline development saw the corrections agencies of other states also examining the incidence of suicide in their prisons and adopted similar standards (Grant & Jewkes, 2015). Expanding on this, has been the recognition of important cultural differences between detainees of Aboriginal and non-Aboriginal heritage. The primary focus of the paradigm of using architecture to improve the livelihood of Indigenous persons in custody was risk reduction, highlighting that the primary method of suicide in prison environments remains hanging (Grant, 2013).

There exists the need to improve the emergency medical care provided to near-hanging survivors in order to improve on the post intervention fatality rate. Two single-case studies not included in this review focused on filmed suicidal hangings and reported death in as little as two minutes (Sauvageau & Racette, 2007), and two minutes, 43 seconds (Yamasaki, Kobayashi, & Nishi, 2007), highlighting the importance of timely, appropriate care if possible. Lack of randomised trials regarding acute management of near-lethal hanging attempts poses limitations in the development of best-practice guidelines for medical management; however, it is reasonable to suggest that those responding to such incidents be trained in the immediate after-care of people who have attempted hanging. As the research suggests, favourable outcomes are associated with those who are found and treated with aggressive resuscitation (Boots et al., 2006; Ganesan et al., 2018), with timely conveyance to appropriate tertiary health providers (Boots et al., 2006). Finally, appropriate psychological follow-up is suggested to ensure adequate assessment of risk and mental state, and to support individuals and their families in an aim to prevent further attempts (Atreya & Kanchan, 2015).

Whilst studies focusing on the contributing factors to, and perceptions regarding hanging as a preferred method of suicide were limited, the common perception of those who had chosen hanging suggested a certain, quick and straight-forward method. This combination of factors as discussed by Biddle et al. (2010), Marzano et al. (2010), and Rivlin et al. (2013), suggests that there is still required effort in general public health initiatives to reduce popularity; achieving this is suggested through the reduction in portrayal of fictional hanging suicides and responsible reporting in the media of hanging suicide deaths. The *Mindframe* guidelines and the work of Everymind in Australia are not to be interpreted as a call to censor the media; research acknowledges, however, that the media have an important role to play in the responsible raising of awareness of suicide as a public health issue and can positively impact suicide rates (Everymind, 2020; Niederkrotenthaler et al., 2012; Pirkis et al., 2018).

Hanging suicides have recently been explored with media representation in mind. Pirkis and colleagues reviewed the extent to which hanging suicides were associated with the local reporting of celebrity Robin Williams' death (Pirkis et al., 2020) and referenced the Everymind (2020) guidelines as influential in their relatively positive analysis. Their research found that most articles reported by Australian newsprint outlets were not given undue prominence and did not describe in detail the suicide method Williams used (Pirkis et al., 2020). Similar studies overseas (Fink, Santaella-Tenorio, & Keyes, 2018; Whitley, Fink, Santaella-Tenorio, & Keyes, 2019) reviewed the rates of hanging suicides following Williams' death with far less favourable results in terms of responsible media coverage. The suggestion is that further dissemination of the *Mindframe* guidelines to international journalists is required (due to the large international coverage of suicide deaths of celebrities), as well as the reinforcement of specific recommendations within them (such as the publication of help services and provision of expert opinion) (Pirkis et al., 2020) to further address the potential negative impact of the media on suicide rates.

The message for prevention is consistent: ongoing review of the environment for reducing hanging deaths in controlled settings (Hunt et al., 2012; Mills et al., 2012; Molloy, Brady, Beckett, & Pertile, 2014; Reisch et al., 2019), responsible reporting of the media regarding suicides (Pirkis et al., 2020), limiting fictional portrayals of hanging (Arya et al., 2019), awareness-raising and primary-preventive efforts (Kanamüller et al., 2016) and other population-based initiatives to reduce the popularity of the method (Gunnell et al., 2005).

Due to the limited literature focusing on the lived-experiences of those who have attempted suicide, hanging in particular, the evidence related to possible contributing factors to, triggers for, or antecedent events prior to suicide are difficult to ascertain. In initial search strategy development 'lived-experience or lived experience' was included, however yielded no literature, thus was removed from the final search strategy. Further, meaningful opportunities for early intervention or prevention are assumed, or at population-based level (Gunnell et al., 2005). Whilst thorough psychological autopsy offers a detailed opportunity to review cases of death by suicide, the limitation lies in the source of the absent voices of the deceased. The rich data elicited in those studies interviewing the survivors of hanging attempts (e.g., Biddle et al. 2010; Marzano et al. 2010; Rivlin et al. 2013) highlights the potential opportunity for meaningful engagement and recognition

of possible earlier intervention strategies – not just in controlled environments, but elsewhere. This inclusion of first-person accounts and experience of suicide attempt is considered imperative in guiding the direction of future research.

Limitations

The studies included in this review were limited to English-only papers and whilst this limitation was imposed for practicality reasons it is possible that other relevant studies may have been excluded inadvertently. Future systematic reviews are warranted to appraise the empirical weight, conceptual designs and methods of the available literature as a means of asserting the most logical progression of future research.

Conclusion

The current scoping review has identified that whilst the literature regarding hanging suicides and prevention is expanding, the rates of near-lethal hangings and suicide death by hanging continue to rise in much of the world (Ganesan et al., 2018; Reisch et al., 2019; World Health Organization, 2019). As Biddle et al. (2010) suggested more than a decade ago, there exists a need for research to uncover the current perceptions of hanging, as well as the knowledge individuals draw upon and/or are influenced by when planning suicide. The obvious gap (and opportunity), however, appears to be research championing the voices of those with lived-experience. Can those who have survived a hanging attempt inform protective efforts to quell hanging attempts? The short answer is yes. Indeed, the call for lived-experience informed, designed, and focused research is clearer and louder now than ever before and through these narratives the high and rising rates of suicide by hanging might be addressed with meaningful expansion of prevention agendas.

Relevance to Clinical Practice

The review highlights the need for further research into suicide and suicide attempts by hanging, with a focus on the lived-experience survivor as the expert, to enhance the current prevention agenda. Suicide prevention and intervention strategies should be meaningful and focus on hanging as a specific method owing to its increased incedence in many countries. This should encompass development of guidelines for the therapeutoic response to those presenting in crisis who may or may not have disclosed suicidal ideation with this method-specific risk.

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Figure 1

PRISMA Flow diagram describing the systematic literature search for studies examining hanging as a method of suicide and its prevention.

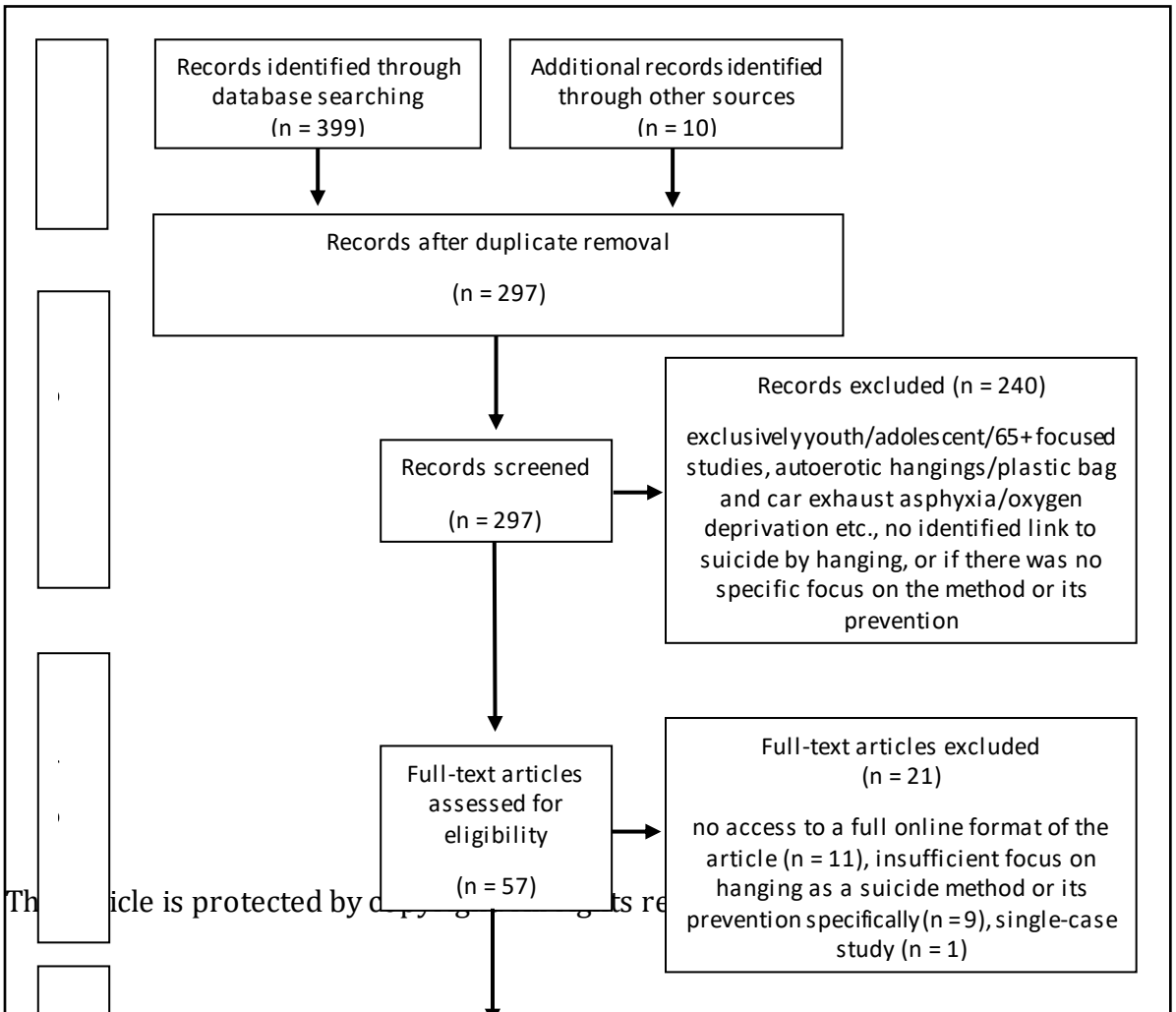

Table 1

Population-based Studies of Suicide by Hanging

Author	Setting and sample size	Location	Contributing Factor	Ligature Point	Ligature
Arya et al. (2019)	India (2001-2014); *n*= 569,632; 68% male				
Atreya and Kanchan (2015)	Nepal (2012-2014), *n*= 10 (series reports only on near-lethal hangings); 50% male; mean age 28	100% usual place of residence; 8x inside the home, 1x backyard, 1x adjoining shed	5x family conflict, 1x post-partum psychosis, 1x alcohol-related and failed love affair, 3x unreported	1x tree, 1x wooden beam, other unspecified	70% rope, 30% other including saree, bedsheet and shawl
Austin et al. (2014)	South Australia, Australia (1996-2010); *n*= 23	100% in custody - prison cells		Cell shelves, air vents, doors or projections inside shower cubicles	Bedding, belts, or shoelaces
Baker et al. (2013)	United States (2000-2010)				
Bastia and Kar (2009)	Cuttack, India (1998-1999); *n*= 104; 41% male; mean age 32 male, 25 female	70% usual place of residence	27% dowry dispute, 16% unemployment, 10% illicit relationship of spouse, 10% prolonged illness, 8% academic failure, 7% family problems, 4% financial strain, 4% illegitimate pregnancy, 4% mental illness 3% failed		50% articles of clothing, 47% ropes, 3% others

			love affairs 3% lack of children 2% cancelled marriage		
Bennewith et al. (2005)	England (2001); *n*= 162; 85% male	65% usual place of residence, 16% public place, 19% not specified		36% roof or ceiling (beams etc.), 15% tree, 49% not specified	49% rope or cord, 13% belt, 12% electrical cable, 6% dog lead, 10% item of clothing

Table 1

Population-based Studies of Suicide by Hanging (Continued)

Author	Setting and sample size	Location	Contributing Factor	Ligature Point	Ligature
Biddle et al. (2010)	United Kingdom (2006-2009); *n*= 8 (series reports only on near-lethal hangings); 50% male				
Boots et al. (2006)	Queensland, Australia (1991-*2000); n*= 149 (series includes 135 non-suicides); 82% male; mean age 30	66% 'inside building', 34% 'outside building'			42% rope or cord, 23% clothing or bed linen, 9% electrical wire, 7% belt, 13% other
Bowen (1982)	Northwest London, UK	"almost always at home"		bannisters, doorknobs,	

	(1956-1980); *n*= 201 (series includes 5% non-lethal attempts)			clothes hooks on doors	
Byard and Gilbert (2018)	South Australia, Australia (2002-2017), *n*= 1,446; 83% male; mean age 42				
Cooke et al. (1995)	Perth, Australia (1988-1992); *n*= 280 (series includes 19 non-suicides); 88% male	71% usual place of residence, 6% medical setting, 4% in custody (prison and police cells)		47% roof rafter, ceiling or veranda, 16% tree, 9% door/door frame, 4% cell bar, 4% shower rail/rose, 2% stair rail, 1% curtain rail, 1% ceiling hook, 1% manhole	
Davidson (2003)	Northern Territory, Australia (1995-2000); *n*= 72 (series includes 94% non-suicides); 68% male				

Table 1

Population-based Studies of Suicide by Hanging (Continued)

Author	Setting and sample size	Location	Contributing Factor	Ligature Point	Ligature
Davison and Marshall (1986)	Northern Ireland, UK (1979-1983); *n*= 105	71% usual place of residence, 10% public		44% rafter/beam, 13% nails, hooks, and brackets,	51% rope, 8% electric flex, 8% belts, 8% bailing twine,

		place, 7% medical setting		9% banister, 9% trees	6% clothesline
De Leo et al. (2003)	Australia (1971-1998); *n*= 100% male (series included male only population)				
De Leo (2002)	Queensland, Australia (1994-1996); *n*= 401; 100% male; mean age 36 (series included male only population)	73% usual place of residence			
Demirci et al. (2009)	Konya, Turkey (2002-2006); *n*= 72; ratio male: female 11:6; mean age 42 years				
Dhungel et al. (2019)	Japan (1979-2016)				
Elfawal and Awad (1994)	Eastern Province, Saudi Arabia (1988-1992); *n*= 61 (series includes 2 non-suicides); 80% male	95% usual place of residence, 5% place of work			67% clothesline, 33% 'other' - 14x cotton cloth, 3x electrical cable, 1x leather strap, 1x silk cloth, 1x rubber hose
Ganesan et al. (2018)	South India (2014-2016); *n*= 77 (series reports 75 non-suicides); 57% male;		Of the 33.4% of patient files indicating a reason - 14.3% martial dispute,		30% dupatta, 29% saree, 22% rope, 17% not specified

	mean age 31		6.5% failed love affairs, loss of employment and financial strain		
Grassi et al. (2017)	Italy; *n*= 2; 50% male	100% prison cell		100% cell window bars	100% underwear

Table 1

Population-based Studies of Suicide by Hanging (Continued)

Author	Setting and sample size	Location	Contributing Factor	Ligature Point	Ligature
Guarner and Hanzlick (1987)	Georgia, USA (1979-1984); *n*= 56, 90% male, ages 12-88	43% usual place of residence, 27% in custody, 9% wooded areas, 5% medical setting, 5% 'other', 4% place of work			50% ropes and belts, 50% sheets, electric cords, shirts, towels, linen, clothes hanger
Hunt et al. (2012)	England and Wales, UK (1997-2007), *n*= 344; 63% male; median age 37	100% psychiatric ward		23% door, 20% hook or window handle, 16% window, 10% bed, 8% railing, 6% pipe, 3% bed curtain rail, 13% other fixtures	61% belts, sheets or towels, 12% shoelaces, 12% clothing, 15% other including telephone cords, ropes
James and Silcocks (1992)	Cardiff, UK *n*= 84, 92% male				rope, wire, chain, electric flex, belts, various soft ligatures
Jawaid et al. (2017)	India (2014-2016); *n*= 101;		31% alcohol intoxication,		71% saree, 28% rope

	71% male		18% domestic dispute, 9% chronic illness, 7% exam failure, 31% no reason identified		
Kanamuller et al. (2016)	Oulu, Northern Finland (1988-2013), *n*= 851; 85% male; mean age 46	25% males in garden or yard, 65% females usual place of residence			
Kasmaee et al. (2015)	Guilan Province, Iran (2011-2013), *n*= 59 (series reports 39 non-suicides); 83% male; mean age 31				
Kosky and Dundas (2000)	Queensland, Australia (1995-1996); *n*= 137; 87% male; ages <25	57% usual place of residence, 34% public place, 3% in custody, 1% hospital, 1% police cells			

Table 1

Population-based Studies of Suicide by Hanging (Continued)

Author	Setting and sample size	Location	Contributing Factor	Ligature Point	Ligature
Marzano et al. (2011)	England and Wales, UK; *n*= 60; 100% female (series included female only population, series reports on near-lethal	100% in custody - prison cells			

	suicide attempts)				
Mills et al. (2012)	United States (1999-2009); *n*= 12	100% hospital ED		41% door, door handle, 16% medical equipment, 16% handrails, grab bars, 8% clothing hook, 8% call bell, 8% fire sprinkler	30% clothing, 30% bedding, 30% belts, 10% hospital fixtures
Morild (1996)	Bergen, Norway (1988-1993); *n*= 80; 73% male; mean age 38.7				
Pirkis et al. (2020)	Australia (2001-2016); *n*= 20,171				
Reisch et al. (2019)	Switzerland (2000-2010); *n*= 1,282; 78.6% male; mean age 49	66% usual place of residence, 8% public place, 7% nature, 6% psychiatric facility, 4% workplace, 1% residential home, 6% in custody (prison and police cells), 1% other	Partner/marital problems, financial strain	34% beam, bar, tube, 5% hook, 9% furniture, 2% heater, 7% window, 9% door, doorknob, 4% sanitary facility, 12% tree, 2% ladder, 7% stairs, railing, 6% other	19% clothing, 8% 'household', 17% cable, 51% robe, 42% other
Rivlin et al. (2013)	England and Wales, UK; *n*= 120; 100% male (series included male only population, series reports on near-lethal suicide	100% in custody - prison cells			

attempts)

Table 1

Population-based Studies of Suicide by Hanging (Continued)

Author	Setting and sample size	Location	Contributing Factor	Ligature Point	Ligature
Simonsen (1988)	Odense, Denmark *n*= 82 (series includes 5 non-suicides); 59% male, mean ages 53(males) and 52(females)				58% packing twine or electric cord, 25% rope, 6% linen, 6% belt, 5% 'other'
Starkuviene et al. (2006)	Lithuania (1993-2002); *n*= 14,314; 84% male				
Tewksbury et al. (2010)	Kentucky, United States (2003-2008); *n*= 99; 100% male				