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Review article

Staff awareness of suicide and self-harm risk in healthcare settings: A mixed-methods systematic review

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ABSTRACT

Background: Suicide risk screening in healthcare settings plays a significant role in suicide prevention. Healthcare staff who are poorly informed about self-harm and suicide risk are less likely to identify and subsequently screen at-risk individuals. This mixed-method systematic review aimed to appraise and synthesise evidence from studies that explored and promoted healthcare staff's knowledge and awareness of suicide and self-harm risk in healthcare settings.

Methods: Electronic databases (CINAHL, MEDLINE, APA PsycInfo, APA PsycARTICLES, Psychology and behavioural Science Collection, ERIC, and SocINDEX), the Cochrane Library, and various grey literature databases were searched for relevant studies. The level of evidence and methodological quality of the included studies were assessed.

Results: Eighteen empirical studies were included. Levels of knowledge about suicide and self-harm risk varied significantly across the reviewed studies. Face-to-face group training and educational programmes, digital or online educational programmes, and an educational poster campaign were amongst the strategies used to promote awareness of suicide and self-harm risk, with the majority marginally succeeding in doing so.

Limitations: The reviewed studies were heterogeneous in terms of design, interventions, and outcome measures which made it difficult to make comparisons. The overall level of scientific evidence was classified as being relatively low. The lack of blinding and lack of a control group were amongst the limitations for experimental studies.

Conclusions: Long-term, routine face-to-face group training programmes should be established to educate healthcare staff about suicide risk across all professions and in specific patient groups.

Introduction

Suicide and self-harm are significant public health issues worldwide. In the United States of America (USA) (Department of Health and Human Services USA, 2012), the United Kingdom (UK) (Department of Health, 2017) and Australia (Australian Institude of Health and Welfare, 2017), government prevention initiatives have been launched to reduce national incidence rates.

Every year, approximately 800,000 people die by suicide worldwide, although with reporting difficulties that figure may be underestimated (World Health Organization, 2019). Furthermore, for each suicide, there are more than 20 suicide attempts (World Health Organization, 2019). In 2016, the overall age-standardised rate of suicide in Europe was reported by the WHO as 12.9 per 100,000 which is higher than the global average of 10.5 per 100,000 (Eurostat, 2018).

The Joint Commission (2016) released a Sentinel Event Alert advocating advisory information designed to assist healthcare organizations in identifying and responding to individuals at risk for suicide through suicide risk screening. Healthcare settings can play a significant role in preventing suicide through suicide risk screening and management. All healthcare workers, regardless of speciality area, can contribute to effective suicide prevention. Many studies have observed high levels of contact between healthcare workers and suicidal patients.

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Table 1
Review eligibility criteria.

SPIDER framework	Inclusion criteria	Exclusion criteria
Sample	Staff working in any healthcare setting and studies with mixed populations when data for healthcare staff were distinguishable	Students or non-healthcare staff and interventions delivered by healthcare staff to non-healthcare staff
Phenomenon of **I**nterest	Self-harm and/or suicide risk including self-poisoning and self-injury	Clinical risks other than self-harm or suicide risk, physician-assisted suicide, and unintentional poisoning
Design	Empirical research (qualitative, quantitative, and mixed-methods) and structured reviews (systematic, integrative, and scoping reviews)	Psychometric evaluations of scales, narrative reviews, protocols, policy documents, dissertations/theses, conference proceedings, commentaries, editorials
Evaluation and **R**esearch type	Exploring and/or enhancing healthcare staff knowledge and/or awareness of suicide and/or self-harm risk	Exploring and/or improving staff attitudes towards suicide and/or self-harm risk

A study of psychologists-in-training observed that 97% of respondents had delivered care to at least one patient with some form of suicidal behaviour throughout their training (Kleespies et al., 1993) while another study observed 87% of social workers reporting contact with a suicidal patient within the past year (Feldman, 2006). Additionally, a study of clinical social workers reported 55% had at least one patient with an attempted suicide during their professional careers (Sanders et al., 2008). A more recent study observed results which indicated that while over 75% of trainees had received education on suicide, few reported receiving clinical supervision on this topic (Mackelprang et al., 2014).

Research has shown that suicide risk screening across all healthcare settings can ensure that large numbers of at-risk individuals are reached (King et al., 2017). However, when healthcare staff are poorly informed about self-harm and suicide, they are less likely to identify at-risk individuals (Rayner et al., 2019; Wee et al., 2018). In light of this, training for healthcare staff to improve knowledge and awareness of suicide and self-harm has been widely advocated as an important component of any suicide or self-harm prevention strategy (Gask et al., 2006). In Ireland, for example, the National Clinical Programme for the Assessment and Management of Patients Presenting to Emergency Departments following Self-harm, made a series of recommendations around best practice care for this group (National Clinical Programme for Mental Health, 2016). One of the report's key performance indicators was that all mental health practitioners that assess patients who present with self-harm should receive appropriate training.

The (Centers for Disease Control, 2010) state that suicide is “when people direct violence at themselves with the intent of ending their lives, and they die as a result of their action.” The World Health Organisation (WHO, 2014) defines deliberate self-harm as “an act with non-fatal outcome in which an individual deliberately initiates a non-habitual behaviour, that without intervention from others will cause self-harm, or deliberately ingests a substance in excess of the prescribed or generally recognised therapeutic dosage, and which is aimed at realising changes that the person desires via the actual or expected physical consequences.”

We conducted a mixed-methods systematic aimed to appraise and synthesise evidence from studies that explored and promoted healthcare staff's knowledge and awareness of suicide and self-harm risk in healthcare settings. Review finding will inform the development of guidelines for self-harm and suicide risk awareness, assessment and response across the health services.

Methods

Mixed-method systematic review is a relatively novel systematic review methodology that helps synthesise evidence from qualitative, quantitative, and mixed-method studies and allows for the combination of the strengths of multiple study designs (Kavanagh et al., 2012; Pluye and Hong, 2014). A review protocol has been created and published in the PROSPERO database (Registration number: Yet to be published). There is no gold standard for the reporting of mixed-method systematic reviews (Flemming et al., 2018); therefore, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist was used in the reporting of this review (Moher et al., 2009).

Eligibility criteria

Review eligibility criteria were predetermined according to the review aims using the SPIDER framework (Sample, Phenomenon of Interest, Design, Evaluation, and Research type) (Cooke et al., 2012). This framework is similar to PICO (Population, Intervention, Comparison, and Outcome), but is more suited for reviews that include multiple study designs (Richardson et al., 1995). Studies eligible for inclusion met the following criteria: (i) included staff working in any healthcare setting; (ii) focused on self-harm and/or suicide risk; (iii) empirical research of any design including structured reviews; and (iv) measured or explored staff awareness and/or knowledge of suicide and/or self-harm risk or evaluated the effect of interventions promoting suicide or self-harm risk awareness and/or knowledge. Full eligibility criteria are presented in Table 1.

Search strategy

The Cochrane Library and the following electronic databases were searched: CINAHL, MEDLINE, APA PsycInfo, APA PsycARTICLES, Psychology and behavioural Science Collection, ERIC, and SocINDEX. Subject headings were used where appropriate. The search was conducted on title or abstract and combined using Boolean operators and truncation as follows: (self-harm* OR "self harm*" OR self-poison* OR "self poison*" OR self-injur* OR "self injur*" OR self-mutilat* OR "self mutilat*" OR parasuicid* OR suicid* OR "suicid* idea*" OR DSH) AND (aware* OR know*).

A focussed grey literature search that included customised Google and targeted website searches was carried out. The search was designed to capture studies from the six countries of focus: Ireland, the UK, Australia, New Zealand, Canada, and the USA. These countries were selected since they have similar health systems and infrastructure (Hegarty et al., 2020).

Six separate Google searches were performed using the terms: “suicide,” “self-harm,” “risk,” “awareness” and “prevention” and the domains of the selected countries. The first ten pages, or 100 hits, of each search were reviewed. This process helps capture the most relevant hits (Godin et al., 2015). Targeted websites included ministries of health and national organisations involved in suicide prevention in each of the selected countries as well as electronic libraries. The full list of websites searched is included in Appendix 1 of the supplementary material.

Electronic and grey literature databases were last searched in August 2019. Searches were limited to recent records published between January 2014 and August 2019, in English.

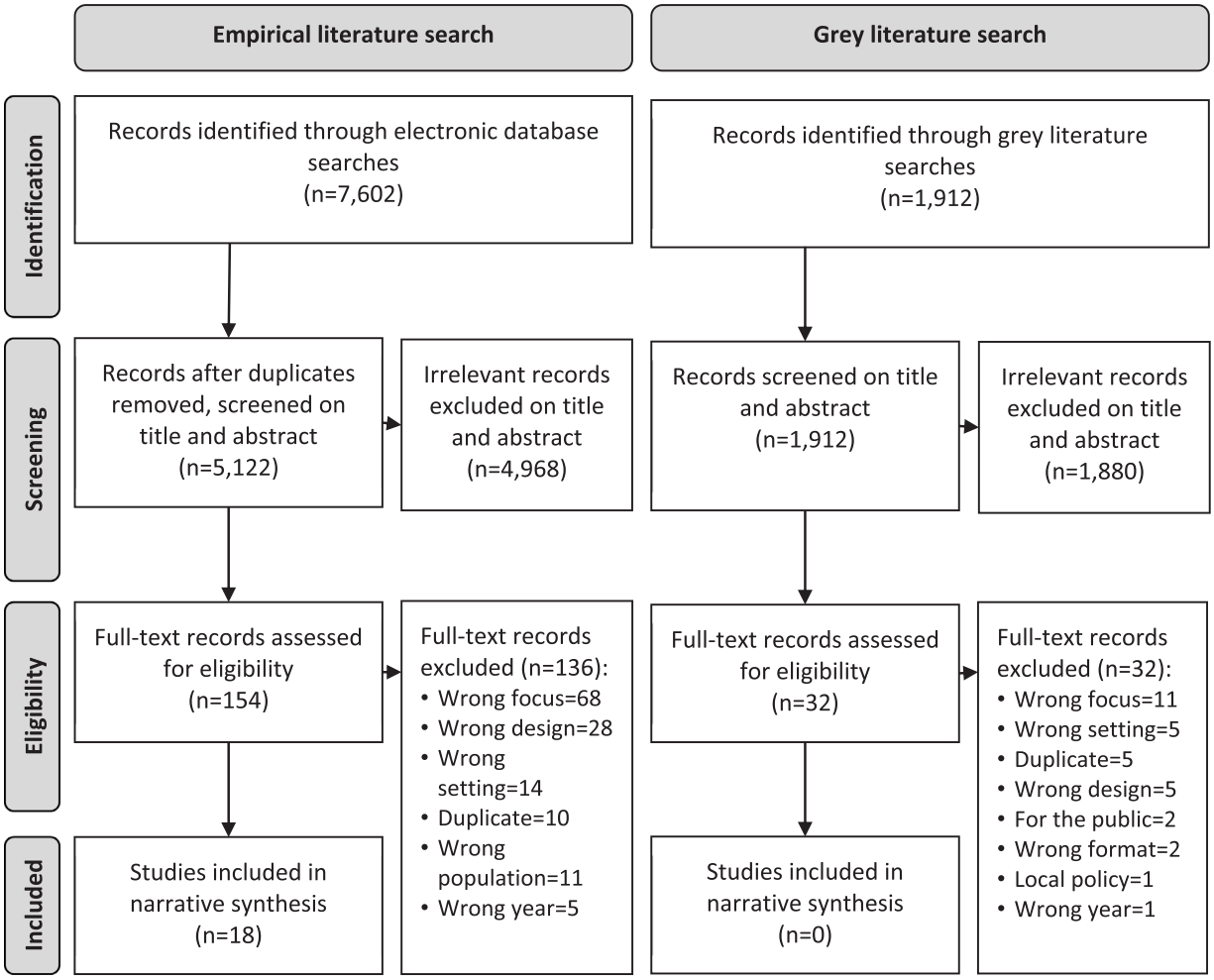

Fig. 1. PRISMA flow diagram illustrating record screening and study selection from the empirical and grey literature searches.

Study selection

All the records identified in the searches were exported to EndNote (Version 7) where duplicates were identified and removed. Records were then transferred to Covidence, an online software product recommended by Cochrane for healthcare evidence synthesis (Veritas Health Innovation). Records were initially screened on title and abstract to determine whether a full-text review was merited. Full texts of potentially eligible records were subsequently obtained and evaluated for inclusion. Reference lists were also scanned for eligible records. Title, abstract, and full-text screenings were conducted by each author. Each record was scanned by two authors independently. Screening conflicts were resolved by a third independent author.

An audit trail was kept to ensure transparency in terms of the total number of records located in each search and to enhance the replicability of the review. All database searches were saved in EBSCO, which facilitated additional searching for new papers over the course of the review. All references were managed and categorized using EndNote to facilitate documentation of the search process, streamline document management, remove duplicates, and generate reference lists.

Data extraction

Data were extracted using a standardised data extraction table. The following items were extracted from each paper that was included in this review: author(s), year and country; aim; design and theoretical underpinning; sample and setting; awareness campaign/intervention; key outcome(s); key outcome measure(s); and key findings presented according to the review aim. The full data extraction table is included in Appendix 2 of the supplementary material. Two authors (CD and EM) conducted data extraction. Each extracted paper was cross-checked by the remaining authors to ensure accuracy and minimise reporting errors.

Level of evidence and quality assessment

Studies were stratified and grouped according to study design, and appropriate quality assessment tools were selected accordingly. For mixed-method studies, the Mixed Methods Appraisal Tool was used (Hong et al., 2018). For other study types, the Critical Appraisal Tools developed by the Joanna Briggs Institute (JBI) were used (Joanna Briggs Institute, 2017). The level of evidence of the included studies was assessed using the Scottish Intercollegiate Guidelines Network (SIGN, 2015) grading system. The eight levels of evidence range between 1++, 1+, 1-, 2++, 2+, 2-,3, and 4. For instance, a score of 1++ corresponds to high quality meta-analyses, systematic reviews of randomised controlled trials, or randomised controlled trials with a very low risk of bias, whereas a score of 4 is assigned to expert opinions.

Quality and level of evidence assessment were conducted by two authors and cross-checked by a third author for accuracy. All eligible studies were included regardless of quality to minimise the risk of reporting bias (Appendix 3 of the supplementary material).

Data synthesis

Due to heterogeneity between studies attributable to clinical,

methodological, and statistical differences, a narrative data synthesis, rather than a meta-synthesis, was completed. Data synthesis in mixed-method systematic reviews is either sequential (i.e. sequential exploratory synthesis) or concurrent (i.e. convergent synthesis) (Hong et al., 2017; Pluye and Hong, 2014). Data-based convergent synthesis, results-based convergent synthesis, and parallel-results convergent synthesis are three types of convergent synthesis. In the present review, parallel-results convergent synthesis was used to integrate qualitative and quantitative findings under two themes: (i) staff awareness and knowledge of suicide and self-harm risk in healthcare settings and (ii) strategies promoting suicide and self-harm risk awareness and knowledge. Both themes were guided by the review aims. The first theme was further synthesised under two sub-themes: level of knowledge and awareness and knowledge of suicide risk factors in specific patient groups. As for the second theme, it was synthesised further according to the strategies used to promote suicide and self-harm risk awareness.

Results

The initial search of emphirical and grey literature reviews identified 7602 and 1912 articles respectively. After title and abstract screening, 154 empirical and 32 grey literature articles were identified for full-text review (Fig. 1). Eighteen empirical studies met eligibility criteria. None of the records identified in the grey literature were deemed relevant for inclusion. The main reasons for exclusion of both empirical and grey literature studies at eligibility stage included inappropriate study population (n = 11), study setting (n = 14), study design (n = 28), and focus of the study (n = 68).

Study characteristics

There were six cross-sectional studies, three uncontrolled before-and-after studies, two mixed methods studies, two controlled before-and-after studies, two qualitative studies, two randomised controlled trials (RCTs) and one systematic review. Participants included healthcare professionals from all disciplines, including medical, nursing and allied health staff, working in community- and hospital- based settings. The sample sizes ranged from 28 (Michail and Tait, 2016) to 1171 (van Landschoot et al., 2017) participants. Most of the included studies were conducted in the USA (n = 4), the UK (n = 5), and Australia (n = 3). Full study characteristics with findings from individual studies are presented in Table 2.

Level of evidence and quality assessment

Most of the included studies were observational in design (n = 11) and did not account for confounding factors. Included studies that were interventional in design scored poorly due to being un-blinded and lacking control groups. There were no studies that met the SIGN criteria for level 1++ or level 1+ studies. Of the eighteen included studies, three were categorised as level 1- (meta-analyses, systematic reviews or RCTs with a high risk of bias), one was categorised as level 2++ (systematic reviews of case control or cohort studies' or 'high quality case control or cohort studies with a very low risk of confounding or bias), six were categorised as level 2- (case control or cohort studies with a high risk of confounding or bias) and eight were categorised as level 3 (non-analytic studies) (SIGN, 2015).

Awareness and knowledge of suicide and self-harm risk

Of the eighteen included studies, sixteen reported outcomes related to staff awareness or knowledge of suicide and self-harm risk in healthcare settings. Eleven used author-designed questionnaires that were based on previous research and professional expertise to measure participants' knowledge and awareness of suicide and self-harm risk Other outcome measures that were used included the Intervention Knowledge Test (Boukouvalas et al., 2019; Shah et al., 2016), the Question Persuade Refer (QPR) questionnaires (van Landschoot et al., 2017), and the Scale of Public Attitudes about Suicide (Jiao et al., 2014).

Level of knowledge and awareness in and across healthcare professionals

In general, levels of knowledge about suicide and self-harm risk factors varied significantly across studies. Adrian et al. (2018) examined self-rated knowledge of suicide risk factors and reported a mean pre-test score of 1.63 (Standard Deviation (*SD*) - 0.84) out of a maximum of 5.0. McFaul et al. (2014) reported a pre-test mean knowledge score of 0.65 (*SD* - 0.18) in a study of primary care providers in rural settings. A needs assessment of primary healthcare professionals reported overall knowledge about suicide and suicide risk factors to be low or medium (Shah et al., 2016).

Van Landschoot et al. (2017) observed high mean baseline scores on knowledge of suicide (23.8; *SD* - 3.8; total score ranging from 7 to 35), suicide risk factors (2.2; *SD* - 0.7) and warning signs (4.0; *SD* - 0.9) in health professionals from emergency and psychiatric departments. In a study of paediatric nurses in the UK, the mean number of correct responses to the knowledge of self-harm items pre-training to be 6.7 out of 12.0 (56%) (Manning et al., 2017). In a study of US pharmacists working across various settings, there was a higher proportion of baseline correct responses to ten true-or-false questions about suicide, with the mean score being 8.0 out of 10.0 (80%) (Painter et al., 2018).

Briggs et al. (2018) examined levels of knowledge and awareness of eight potential risk factors for suicide. The study found that while all respondents identified various risks, only two identified all of them, with the least known risk factor for suicide being 'family history of suicide' (Briggs, 2018). In a study of psychiatrists, many participants indicated incorrect responses to items relating to basic knowledge of suicide (Jiao et al., 2014). This study found that 37% of the psychiatrists correctly agreed that talking about suicide-related issues with an individual would not precipitate suicidal behaviour and only 41% correctly agreed that those who state that they intend to kill themselves may actually do so (Jiao et al., 2014). One Australian study compared next-of-kin and healthcare professionals awareness of suicide risk in a person that had died by suicide. It found that healthcare professionals had poorer knowledge of their patients' suicide-related warning signs in the month prior to deaths compared to the person's next-of-kin (Draper et al., 2018). In addition, a review by Boukouvalas et al. (2019) observed a consistent reporting that increased levels of knowledge led to increased levels of understanding and willingness to help suicidal patients.

Two studies observed differences in knowledge of suicide risk factors across healthcare professionals. Shah et al. (2016) found that knowledge about suicide and asking about suicidal behaviour was significantly better in primary health care workers compared to physicians (Shah et al., 2016). Van Landschoot et al. (2017) reported significant differences in self-perceived knowledge level between staff of psychiatric and emergency departments, with mental health professionals reporting higher baseline knowledge scores than ED providers (mental health professionals = 25.2 vs. ED providers = 21.6; $t(507) = -12.42$, p -value < 0.001, respectively).

Knowledge of suicide risk factors in specific patient groups

In the study of risk factors amongst patients with spinal cord injuries, surgical physicians had less awareness and knowledge than non-surgical physicians (Lee et al., 2019). In addition, the study observed that a majority of clinicians (87% of all clinicians) who participated in the study responded that the probability of a patient with a severe condition committing suicide was higher than normal (Lee et al., 2019).

In a study of risk amongst older people, many emergency nurses reported a strong understanding of the risk of suicide in this group. Respondents most frequently selected low mood, social isolation,

Table 2
Study characteristics, key findings, and level of evidence (n = 18).

Reference & Country	Design	Sample & Setting	Intervention	Outcome(s)	Instrument(s)	Findings*	Level of evidence**
Adrian et al. (2018), USA	Controlled before-and-after	83 practitioners in children's hospital	6-hour suicide prevention training	Knowledge of suicide risk factors	5-item suicide risk knowledge test	1. Pre-training mean = 1.63/5 (low-to-moderate) 2. No significant changes in knowledge post-training (post training mean = 1.55)	1-
Boukouvalas et al. (2019), Australia	Systematic review	46 publications	NA	Knowledge of suicide	Intervention Knowledge Test	1. Increased knowledge led to more positive attitudes towards suicide 2. Training led to improvements in knowledge	2++
Briggs (2018), England	Cross-sectional	38 nurses in emergency departments	NA	Knowledge of suicide risk factors	Scale measuring knowledge of 8 risk factors	1. 44.7% (n = 17) were unsure of at least one risk factor e.g. family history of suicide 2. NR	3
de Beurs et al. (2015), Netherlands	Cluster RCT	303 nurses, psychologists, and psychiatrists	One day face-to-face training and e-learning module	Knowledge about suicidal behaviour	7 of the 14-item Question-Persuade-Refer-questionnaire	1. NR 2. Improved knowledge in intervention vs. control group (p < 0.001). Large effect size (1.0) at post-test	1-
Draper et al. (2018), Australia	Cross-sectional	74 professionals who had previous contact with the deceased	NA	Knowledge of suicide warning signs in the deceased	Researcher-designed questionnaire	1. Next-of-kin had better knowledge about their deceased's suicide warning signs in the month before death than healthcare professionals (p < 0.05) 2. NR	3
Fry et al. (2019), Australia	Cross-sectional	136 nurses in emergency departments	NA	Knowledge of caring for older suicidal persons	28-item survey	1. 91% (n = 124) frequently managed suicidal behaviour, 51% (n = 69) recognised suicide as common in older people 2. NR	2-
Granek et al. (2018), Israel	Qualitative grounded theory	61 oncology healthcare professionals	NA	Knowledge of suicide risk	Semi-structured qualitative interviews	1. Lack of training, knowledge, awareness of suicide risk in oncology. Learning by experience and not through systematic training. 2. NR	3
Jiao et al. (2014), China	Cross-sectional	179 psychiatrists	NA	Knowledge of suicide risk factors	Scale of Public Attitudes about Suicide	1. Correct responses: 91% (n = 163) for "persons who have attempted suicide may have subsequent suicidal behaviour," 37% (n = 66): "talking about suicide-related issues with an individual would not precipitate suicidal behaviour," 41% (n = 73): "those who state that they intend to kill themselves may actually do it" 2. NR	3
Lee et al. (2019), South Korea	Cross-sectional	29 physicians	NA	Suicide risk awareness/ knowledge in spinal cord injury	Researcher-designed questionnaire	1. Non-surgical physicians had more awareness/knowledge of suicide risk compared to surgeons 2. NR	3
Manning et al. (2017), England	Mixed-methods	98 nurses in children's hospital	Digital educational programme	Knowledge of self-harm in young people	12-item true/false questionnaire	1. Mean knowledge score of 6.7/12 pre-training vs. 8.7/12 post-training (p-value = 0.000). 2. Statistically significant knowledge increase in nurses who completed training	3
McFaul et al. (2014), USA	Uncontrolled before-and-after	454 primary care providers in rural settings	Suicide Prevention for Primary Care Practices toolkit	Screening preparedness and knowledge of suicidal behaviour	Researcher-designed questionnaire	1. Pre-training mean preparedness score 4.15/7 and mean knowledge score 0.65 (total score NR) 2. Significant increase in knowledge and preparedness to screen (P-value = 0.00). Greatest impacts of the toolkit were seen on increased awareness.	2-
Michail and Tait (2016), England	Qualitative focus groups	28 general practitioners	NA	Development of education on youth suicide prevention	Qualitative questions	1. Ill-equipped/uncertain re assessing, recognizing, managing, and referring young	3

(*continued on next page*)

Table 2 (*continued*)

Reference & Country	Design	Sample & Setting	Intervention	Outcome(s)	Instrument(s)	Findings*	Level of evidence**
						people with suicide risk 2. NR	
Michail et al. (2017), England	Cross-sectional	70 general practitioners	NA	Knowledge of suicide prevention guidelines, risk factors, and warning signs in young people	Researcher-designed questionnaire	1. 60% (n = 42) unaware of published guidelines. Participants correctly identified 71% of item responses for suicide risk factors and 51% for warning signs of suicide in young people 2. NR	3
Painter et al. (2018), USA	Uncontrolled before-and-after	77 pharmacists	Question Persuade and Refer Gatekeeper Training Program	Perception and self-efficacy around identifying and responding to suicide symptoms	Researcher-designed QRP questionnaire	1. Mean score for correct responses was 80% (of 10 questions), with 34% (n = 26) answering at least 90% of questions correctly 2. No statistically significant difference in general perceptions pre- and post- training.	2-
Prabhakar et al. (2014), USA	Uncontrolled before-and-after	240 psychiatry residents	90-minute training (videos, discussions, and patient-based learning)	Awareness of issues related to patient suicide	Researcher-designed questionnaire	1. NR 2. Self-perceived knowledge significantly improved from 44% at pre-rest to 69% at post-test (p-value = 0.000).	2-
Shah et al. (2016), India	Mixed- methods	144 primary health care professionals	1-day suicide prevention training	Suicide facts, risk factors, behaviour, risk assessment, and referral	Modified Intervention Knowledge Test	1. Knowledge about suicide, risk factors, asking about suicidal behaviour, and helping a suicidal patient rated as low or medium 2. NR	2-
Siau et al. (2018), Malaysia	Controlled before-and-after	159 doctors, nurses, assistant medical officers, hospital attendants	4-hour training using Question Persuade Refer booklet	Self-perceived knowledge of suicide and its prevention	9-item Question Persuade Refer questionnaire	1. NR 2. Significant improvement in perceived knowledge post-test in intervention group. Improvements in declarative knowledge not maintained three months post-test (p-value < 0.001).	2-
Van Landschoot et al. (2017), Belgium	Cluster RCT	1171 staff in emergency and psychiatric departments	Poster campaign "Is Your Patient Suicidal?"	Self-evaluation and objective knowledge of suicide warning signs and risk factors	14-item Question Persuade Refer survey and Suicide Information Test	1. At pre-test, mean score for self-evaluation of knowledge 24.1/35. 43.8% (n = 241) rated general understanding as 'high' or 'very high.' 2. Intervention did not influence knowledge	1-

Abbreviations: NA = not applicable; NR = not reported; RCT = Randomised Controlled Trial.

* Findings presented based on the review questions:

1. What is staff's awareness and/or knowledge of suicide and self-harm risk in healthcare settings?
2. What is the effect of strategies used to promote suicide and self-harm risk awareness and/or knowledge amongst staff in healthcare settings?.

** Level of evidence assessed using the Scottish Intercollegiate Guidelines Network (SIGN) grading system.

hopelessness and poor self-care as signs and symptoms of suicidal behaviour in older people risk (Fry et al., 2019). However, while 93% (n = 127) agreed that depression was a warning sign for suicide in the general population, only 73% (n = 100) believe it was a more common warning sign in older people. Furthermore, half of respondents correctly identified substance misuse as a risk factor for this population (Fry et al., 2019).

Michail and Tait (2016) reported that while General Practitioners (GPs) demonstrated high levels of knowledge of suicide risk factors amongst young people, many reported finding it challenging to accurately recognise the signs that might indicate heightened risk in the near future. A further study by Michail et al. (2017) reported that experienced GPs demonstrated high levels of knowledge of suicide risk factors in young people but low levels of knowledge of warning signs that might indicate heightened risk (Michail et al., 2017). In support of these findings, two qualitative studies explored healthcare professionals' views and experiences related to suicide and self-harm risk (Granek et al., 2018; Michail and Tait, 2016). In both studies, participants reported feeling ill equipped to identify suicide risk in their respective patient populations which was in part attributed to a lack of targeted, systematic topic training. More specifically for Michail et al. (2016), results reported an 'uncertainty about specific youth suicide predictors as well as a weighting approach to accurately identify risk' review.

Qualitative research by Granek et al. (2018) reported that healthcare professionals frequently noted they had a lack of awareness about the need to identify suicidality in cancer patients and that overall, they were unaware that cancer patients were at an increased risk of suicide when compared to the general population (Granek et al., 2018). In addition, the study reported that healthcare professionals felt they lacked the knowledge about how to identify suicide risk in their cancer patients (Granek et al., 2018).

Strategies promoting suicide and self-harm risk awareness and knowledge

Strategies used to promote awareness of suicide and self-harm risk amongst staff included face-to-face group training and educational programmes, digital and online educational programmes, and an educational poster campaign.

Face-to-face group training and educational programmes

All the studies that evaluated the effects of face-to-face group training programmes reported improvements in at least some of the outcomes measured, including improvements in suicide assessment knowledge and attitudes for engaging in suicide risk assessments, knowledge about suicidal behaviour and detection of suicide signs and appropriate practice for patients at risk of suicide.

More specifically, Adrian et al. (2018) aimed to examine whether the enhanced Train-the-Trainer education improved practitioner knowledge, attitudes, and behaviours compared with the usual Train-the-Trainer education at post-training follow-up (Adrian et al., 2018). The enhanced education included the addition of an email reminder with the core content over a 1-month period. The study reported no significant changes in knowledge in those who did and did not receive an email reminder nor were any changes observed between pre and post education (Adrian et al., 2018). McFaul et al. (2014) examined the effectiveness of suicide prevention toolkit for rural primary care using paired t-test analysis and reported significant improvements in knowledge (t (455) = −8.04, p < 0.001) (McFaul et al., 2014). Similarly, Painter et al. (2018) reported that participants were more likely to update knowledge of suicide risk after training, the proportion of respondents who rated their overall likelihood to update their knowledge as moderately, very or extremely likely increased from 32% to 98%; p < 0.0001). Prabhakar et al., (2014) reported a patient suicide educational program increased awareness of issues related to patient suicide, residents' self-perceived knowledge of 'issues related to suicide' significantly improved from 44% rating themselves as 'knowledgeable or very knowledgeable' before the workshop to 69% after training (p < 0.001). Siau et al. (2018) reported significant improvements amongst intervention participants in terms of perceived knowledge of suicide risk immediately post-training and when compared to the control participants three months later. However, (awareness and understanding of information) were not maintained at the three-month follow-up. More specifically, for self-perceived knowledge, the repeated measures ANOVA revealed that the intervention participants demonstrated significant changes, F = (2, 96) 40.343, p < 0.001; effect size η^2 = 0.457). Pairwise comparisons further indicated that participants were significantly more knowledgeable at time points 2 (p < 0.001) and 3 (p < 0.001) compared to time point 1 (Siau et al., 2018).

Digital and online educational programmes

All three studies that assessed the effectiveness of educational programmes reported improvements to knowledge of suicide risk. Manning et al. (2017) reported statistically significant knowledge increase in nurses after completing training (mean difference 1.97; 95%CI 0.95–2.99; p < 0.001) (Manning et al., 2017). De Beurs et al. (2015) observed significant improvements in self-perceived knowledge scores (range 7–35) in providers of care that received e-learning supported training compared to those who only completed the traditional level of training (intervention mean group score 26.6 (*SD* - 3.1) vs. control mean group score 24.1 (*SD* - 2.3); effect size 1.0; p < 0.0001). Finally, Van Landschoot et al. (2017) examined the effectiveness of educational posters in enhancing knowledge of suicide prevention in healthcare professionals. Results showed no significant effect of pre-test by poster campaign for both staff of emergency and psychiatric departments (F = (1, 44) = 1.463, p = 0.23; F = (1, 28) = 0.164, p = 0.69, respectively). Boukouvalas et al. (2019) reviewed literature examining the effects of suicide prevention training on knowledge of healthcare professions in caring for people with suicide risk. With the exception of one study, all studies (n = 18) found that training led to improvements in attitudes towards suicide and greater confidence in caring for people at risk of suicidal behaviour suicide.

Educational poster campaign

The study examining the effectiveness of an educational poster campaign reported no significant findings. The study found that the poster and accompanying evaluation and triage guide did not have an effect on knowledge about suicide (van Landschoot et al., 2017).

Discussion

This mixed-methods systematic review explored levels of staff awareness and knowledge of suicide and self-harm risk in healthcare settings, as well as the effects of strategies to promote suicide or self-harm risk awareness amongst staff in healthcare settings. Overall, levels of knowledge about suicide and self-harm risk varied across the reviewed studies, and gaps in knowledge about suicide and self-harm risk in specific patient groups and between healthcare professionals were identified. In addition, it was observed that awareness and knowledge varied across healthcare staff; research studies included participants from various healthcare backgrounds, including ED staff, psychiatrists, and pharmacists.

The findings of this review suggest that knowledge of suicide and self-harm risk amongst staff working in healthcare settings is sub-optimal and are consistent with previous findings. A systematic review by Saunders et al. (2012) found that overall, suicide risk in self-harm patients is often underestimated. Differences in levels of knowledge and awareness between professional groups have also been reported in previous literature, indicating that little has changed over time. For example, a study found doctors to be more aware of suicide risk than nursing staff (Crawford et al., 2003), while another study reported that over 20% of nurses claimed that their workplace either had no practice

guidelines for deliberate self-harm or they did not know of their existence, and one-third who knew of them had not read them (McCann et al., 2007). Moreover, research by Friedman et al. (2006) found that A&E staff believed that self-laceration was a considerable problem but they felt unskilled in managing patients. In staff without previous training, a longer period working in the emergency department was correlated with higher levels of anger towards patients and an inclination not to view patients as mentally ill (Friedman et al., 2006).

The findings presented here provide support for the need for further training for all health care professionals. Four studies reported improvements in knowledge post-training however no similarities were present across training modes; on-day face-to-face training and e-learning module, Suicide Prevention for Primary Care Practices toolkit using videos, case- vignettes, and role-plays to maximize adult learning, 90-minute training using videos, discussions, and patient-based learning, 4-hour training using Question Persuade Refer booklet. There are a number of international reports and guidance documents that provide recommendations on self-harm and suicide risk reduction initiatives within healthcare. An Australian national guidance document, designed to provide information about suicide risk reduction outlines a number of education strategies for healthcare staff (Australian Healthcare Associates, 2014). It asserts that both a knowledge and an attitudinal component are imperative for any strategy to be successful. For GPs, it is suggested that education should be skill-based, and the focus should be placed on role-play instead of didactic learning. For other frontline staff, it is suggested this training should be subsidised, and staff should be encouraged to take refresher courses every three years (Ridani et al., 2016). Additionally, a Welsh suicide and self-harm prevention strategy and associated action plan outlined six key strategic objectives. The first objective involves improving awareness, knowledge and understanding of suicide and self-harm amongst health care professionals, particularly those who frequently come in to contact with people at risk of suicide and self-harm, as well as the general public (Welsh Government, 2015). Similarly, the suicide prevention strategy and associated action plan developed for the Australian state of Tasmania contains two actions that are specific to increasing capacity amongst health and other workforces that are most likely to interact with people experiencing a suicidal crisis and/or those at risk of suicide (Tasmanian Government Department of Health and Human Services, 2016). Both the Welsh and Tasmanian strategies and action plans place a focus on healthcare providers who are often the first point of contact for someone with suicidal behaviours (e.g. ED workers, GPs and primary care staff, ambulance staff and community pharmacists) and highlight that these healthcare providers need education to have the necessary knowledge and appropriate attitudes to suitably engage in suicide behaviour risk assessment and management. However, despite the expectation that, amongst healthcare professionals, mental health staff would have the best knowledge of suicide risk factors and screening methods, this review found contradicting evidence. For instance, Van Landschoot (2017) reported that staff in psychiatric departments were more competent than staff of EDs, whereas Jiao et al. (2014) report limited knowledge amongst psychiatrists. Thus, these findings may be relevant in fostering improvement in training also addressed to mental health professionals. Furthermore, the Tasmanian strategy specifies that training should be tailored to an individual's role and workplace (Tasmanian Government Department of Health and Human Services, 2016; Welsh Government, 2015).

In Ireland, education and training have been identified as key components of work to achieve the vision of the suicide prevention strategy, “Connecting for Life” (Health Service Executive National Office for Suicide Prevention, 2019). Similar to other international strategies, it recommends that training and education in suicide and self-harm should be available and accessible for all healthcare staff and should be targeted to a person's role, with more advanced training made compulsory for frontline staff, including GPs, ED staff, and mental health professionals (Health Service Executive National Office for Suicide Prevention, 2019). (Dutheil et al., 2019). Based on the findings of this review as well as the best policy guidelines discussed above, it is clear that training interventions need to be tailored for specific professionals and patient groups. For example, within the ED front line workers such as nurses and doctors need tailored training to deal with both the psychical and psychosocial issues that present in patients following SSH. Training for those in primary care, such as GP's, social workers and public health nurses require a different approach and should focus more on knowledge, awareness, attitudes and referral pathways for specific interventions. Those working with children may require a different type of training, and given the findings of Lanzillo et al. (2019) that 7% of 10–12 year olds screened positive for suicidal ideation in the ED, this is an area where further research is needed with specific interventions for health care professionals in this field warranted (Lanzillo et al., 2019).

This review has several strengths. To the best of our knowledge, this is the first recent review to screen, appraise and synthesise international research which explores staff's awareness or knowledge of suicide and self-harm risk in healthcare settings and to explore the effect of strategies promoting suicide or self-harm risk awareness amongst healthcare staff. The quality assessment of included studies, the double-blinded review and data extraction procedure, and the grading of evidence according to SIGN (2015) criteria are all strengths of this review. This paper investigates staff knowledge and awareness in healthcare settings with no restrictions on type of healthcare worker or specific departments, this wider focus is an added value of this review.

Our review has limitations that are worth noting. Firstly, we restricted our searches to articles published in the English language thus we may have ommitted important studies published in other languages. While a rigorous search strategy and screening process took place, we cannot conlcude that all relevant studies were included. Exposure measurement, outcome ascertainment and analysis methodologies varied across all studies, thus making findings difficult to compare. Various modes and areas of training were involved in studies examining the effects of strategies to promote suicide and self-harm risk awareness amongst staff in healthcare settings; these variations, along with low study sample numbers, make the comparison of study findings challenging. Furthermore, most of the included studies were observational in design and did not account for confounding factors. Finally, included studies that were interventional in design scored poorly due to being un-blinded and lacking control groups, preventing strong study conclusions.

The main findings of this review suggest that levels of knowledge and awareness of suicide and self-harm risk amongst staff working in healthcare settings vary largely. In addition, gaps in suicide risk knowledge in specific patient categories and between healthcare professionals are evident. Long-term, routine face-to-face group training programmes should be established to educate healthcare staff on suicide risk across all professions.

Author statement contributors

CD, MMS, EM, AH, JH, SH, SG, CK, JG, MM, SOC, IR completed title, abstracts and full-text searches. CD and EM extracted and quality appraised included papers. AH and MMS generated and completed search of databases. DC and UT reviewed the final manuscript. CD, MMS, EM and AH wrote the manuscript.

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Declaration of Competing Interest

None

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2020.07.113.

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