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Factors influencing suicide risk assessment clinical practice: protocol for a scoping review

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ABSTRACT

Introduction

Every year, suicide accounts for nearly 800,000 deaths worldwide. Appropriate risk assessment and intervention is imperative since evidence demonstrates that a large proportion of those who die by suicide visit health professionals prior to their death. Much previous research has focused on identifying patient level risk factors that can improve the risk assessment process through risk scales and algorithms. However, clinical guidelines emphasize the importance of evaluation through clinical interviews and prioritize the clinician's final judgment. The purpose of this review is to (1) understand the clinician and organizational level barriers and facilitators that influence a clinician's assessment of suicide risk, (2) identify the types of biases that exist within the risk assessment process, and (3) determine if there are evidence-based training protocols and educational initiatives to aid (or support) clinicians with this process.

Methods and analysis

This scoping review protocol uses the Arksey and O'Malley framework. Literature will be identified using a multi-database search strategy developed in consultation with a medical librarian. The proposed screening process consists of a title and abstract scan, followed by a full-text review to determine the eligibility of articles. Studies outlining any factors that affect a clinician's suicide risk assessment process, ranging from individual experience and behaviours to organizational level influences will be included. Results of the search will be screened independently by two reviewers and included studies will be abstracted and charted. A descriptive analysis of the extracted data will be identified within the results using the Situated Clinical Decision Making framework to organize the themes.

Ethics and dissemination

Ethical approval is not required for this review. The results will be translated into educational materials and presentations for dissemination to appropriate knowledge users. Knowledge outputs will also include academic presentations at relevant national and informational conferences, and a published, peer-reviewed journal article.

Keywords

Suicide, risk assessment, clinical decision making, organizational factors, cognitive bias

STRENGHTS AND LIMITATIONS OF THIS STUDY

- Findings from this review will aid in providing a catalogue of broader, non-patient related factors that affect the suicide risk assessment process.
- Strengths of this study include the importance of the topic to the suicide risk assessment process, use of an established scoping review methodology, a rigorous search strategy developed by a medical librarian, and a systematic study selection and data extraction process carried out by two health service researchers.
- Limitations include the restriction to English language studies and the potential to miss relevant studies in the grey literature.
- Consultation with content experts will be included to mitigate some of the limitations.

INTRODUCTION

Every year, close to 800,000 individuals die by suicide around the world.[1] Among these, research from the United States. has shown that around 45% of individuals have visited mental health and primary care providers in the month prior to their death.[2] Therefore, targeting healthcare providers for appropriate suicide risk assessment and intervention is imperative. Assessing and managing suicide risk is considered a core competency of mental health care. This process of risk assessment and management for suicide is best understood as structured evaluation, intervention and subsequent re-assessment of a patient's likelihood to attempt suicide.[3]

Risk assessment falls within the scope of decision making, of which there are largely two classes – clinical judgement (or clinical decision making), which refers to a clinician's expert opinion based on their data gathering, and mechanical prediction, which refers to purely statistical and algorithmic prediction. A previous meta-analysis of 136 studies of human health and behaviour demonstrated that mechanical prediction was consistently more accurate than clinical judgement.[4] With large public concern surrounding deaths by suicide, much research over the past 50 years within this field has focused on identifying patient risk factors[5] and developing risk assessment tools to better recognize patients at highest risk of committing suicide, including the Beck Hopelessness Scale[6], Columbia-Suicide Severity Rating Scale[7], Nurses' Global Assessment of Suicide Risk[8] and SAD PERSONS[9], among others. Unfortunately, there has been limited supporting evidence for the use of risk scores from these tools as the sole basis for decision making since the predictive ability of these tools are rather low, given a low overall prevalence of suicides in the general population (0.01%).[10]

Additionally, the advent of electronic health records has led to an increase in the amount and variety of patient data that can be extracted and analyzed, which in turn has more recently given rise to complex algorithms attempting to predict suicide or suicidal behaviour, including ones that have achieved sensitivities ranging from 0.33-0.45[11] to 0.70[12], 0.72[13] and even 0.95.[14] Moving such algorithms into practice has proven to be an issue, since practical challenges exist such as validating an algorithm in a different population, gaining clinician trust in the algorithm, implementation into the clinical work flow, and ensuring ongoing data quality assurance.[15] As a result, such suicide predictive algorithms have stayed within the realm of research and have not been assessed prospectively within clinical practice.

Despite all this relevant research, there is currently no universally defined pathway or algorithm for accurately integrating risk factors for suicide, leading to the use of risk tools and algorithms more as an aid to clinical decision making, to uncover pertinent information.[10] World Health Organization (WHO) guidelines suggest that suicide risk should be specifically evaluated with clinical interviews assessing psychological and social functioning of the patient. [16 17] Other clinical guidelines on suicide risk assessment similarly emphasize the importance of the clinician's final judgment[18]. Given the challenges in behaviour prediction, a state-of-the art review on the topic has prompted the need for understanding what constitutes a reasonable standard of care in suicide risk assessment.[19]

There are a multiplicity of concerns complicating the clinical management of suicide risk, and despite the increasing focus on targeting risk assessment and prevention interventions at high risk patients, little is known about the contextual, non-patient specific factors that influence a clinician's decision making process while conducting a suicide risk assessment. Clinical experience, a thorough knowledge base and the ability to think critically, are a few of the many skills required for any clinical decision making process.[20] Theories on decision making based on human thought processes have suggested a dual decision making theory wherein clinicians use both intuitive and analytical processes.[21] Intuitive decisions are fast and abbreviated, making uses of heuristics and shortcuts for familiar scenarios. Occasionally, this use of shortcuts can lead to over confidence and complacency, predisposing the clinician to biased decisions.[22] It is important to understand how clinicians' cognitive factors such as intuition and experience contribute to their risk formulation process and confidence in their decision. An important starting line for educational and training purposes is to identify the variety of clinical experiences that exist within the practice of suicide risk assessment[23], and to understand the barriers and facilitators for consistent clinical practice.

This paper outlines a protocol for a scoping review focused on shifting the spotlight onto finding clinician and organizational level characteristics that can influence the suicide risk assessment process, highlighting that mental health professionals are not free of biases, some of which can unsuspectingly affect their decisions.[24 25] The primary purpose is to understand how factors other than patient-level ones, affect the clinical decision making process, which will in turn help inform the development and adoption of best practice risk assessment and clinical decision making around suicide and suicidal behaviour.[26] The findings from this review will allow us to explore the broad topic of suicide risk assessment and increase awareness of these factors. Increased awareness of these elements can eventually lead to more efficient practice.

Methods and analysis

The scoping review is a rigorous and systematic method for mapping key concepts, research areas and gaps in knowledge, especially in an area that has not been comprehensively reviewed before[27]. One of its main strengths include presenting the results in an accessible format for knowledge users.

This review follows the seminal framework outlined by Arksey and O'Malley[28], and advanced by Levac *et al*.[29]. Arksey and O'Malley propose a six step framework for carrying out a scoping review, including: (1) identifying the research question, (2) identifying relevant literature, (3) study selection, (4) charting the data, (5) collating, summarizing and reporting the articles and (6) consulting and translating knowledge[28]. In order to ensure relevance to patient care, our study team also includes knowledge users. This protocol uses the recently developed 20 item Preferred reporting items for systematic reviews and meta-analysis extension for Scoping Reviews (PRISMA- ScR)[30] to ensure appropriate rigor.

Detailed further below are the various steps involved within the Arksey and O'Malley process, as applied to this scoping review:

1. Identifying the research question

The aim of this scoping review is to identify the personal, professional and organizational level barriers and facilitators that influence the suicide risk assessment process carried out by a clinician. To meet these aims, this review seeks to answer the following questions:

1. What non-patient specific factors affect the suicide risk assessment process?
2. What types of inherent clinician biases can exist within this process?
3. Is there evidence of training and educational initiatives that have helped clinicians improve upon these contextual factors?

2. Identifying relevant studies

The comprehensive search strategy was iteratively developed in consultation with a medical librarian (SB), and was validated through the retrieval of a key set of relevant studies. To ensure a comprehensive search of the health sciences literature, we used the following primary electronic databases: MEDLINE, PsycINFO, Embase, CINAHL, and ERIC. The search query was first developed in MEDLINE, using the Ovid interface which allows for fine-tuning using Medical Subject Headings (MeSH) indexed by the National Library of Medicine's controlled vocabulary.[31] The Ovid interface also allows for a more accurate translation of the search strategy to query other Ovid-based databases such as PyscINFO and Embase.

The search strategy consisted of subject headings, keywords and related terms for the concepts of suicide risk assessment and experiences of health personnel relating to this behaviour. Terms for the concept of suicide risk assessment included "risk assessment" combined with "suicide", "suicidal ideation" or "suicide attempt". The primary search terms for the concept of clinician's experiences included "attitude of health personnel", "knowledge, attitudes and practice" and "physician-patient relations". A detailed search strategy can be found in Table 1.

Our search is limited to the English journal articles, without date or study type restrictions. All bibliographic results from the search were stored using the citation management program EndNote [http://endnote.com/]. The citations were also downloaded into a spreadsheet for screening and charting purposes.

Table 1: Search Strategy for OVID Medline

1	Risk Assessment/ or "Healthcare Failure Mode and Effect Analysis"/ or (risk* adj4 assess*).ti,ab,kf.
2	Suicide/ or Suicidal Ideation/ or Suicide, Attempted/ or suicid*.ti,ab,kf.
3	"Attitude of Health Personnel"/ or Practice Patterns, Physicians'/ or Bias/ or Observer Variation/ or exp Prejudice/ or Culturally Competent Care/ or Alert Fatigue, Health Personnel/ or Physician-Patient Relations/ or Professional-Patient Relations/ or Nurse-Patient Relations/ or Nonverbal Communication/ or Health Knowledge, Attitudes, Practice/ or Clinical Competence/ or Clinical Decision-Making/ or Clinical Protocols/ or Duty to Warn/ or Clinical Decision-Making/ or Ethics, Medical/ or Professional Role/ or Nurse's Role/ or Physician's Role/

4	Inservice Training/ or Simulation Training/ or Staff Development/ or Education, Continuing/ or Education, Nursing, Continuing/ or Education, Medical, Continuing/ or "Internship and Residency"/ or Teaching Rounds/
5	exp Health Occupations/ or exp Health Personnel/ or (clinician* or "health care professional*" or "healthcare professional*").ti,ab,kf.
6	or/3-5
7	and/1-2,6
8	limit 7 to english language

Table 1 Legend

Code	Description
/	indicates that a term is a subject heading
adj4	searches within 4 words of each other (4 words before and 4 words after) in either direction
*	truncation technique to broaden search to include words with different endings and spellings
ti	searches field that contains the English language version of a title
ab	searches author-written abstracts
kf	retrives every keyword heading that includes the particular word
exp	indicates that a subject heading is "exploded" to include all of the narrower subject headings beneath it in the hierarchy

3. Study Selection

After a combined pilot with both reviewers, to ensure common understanding of the inclusion criteria, all articles will be independently screened in two stages. Study eligibility will be determined beginning with a title and abstract scan, followed by a full-text review stage.

In order to be eligible, studies must involve the following criteria: (i) study the risk screening or assessment process around suicide (ii) include clinicians' thinking, attitudes, or experiences, and (iii) apply to patients being assessed within primary care, EDs, or mental health and addiction outpatient or inpatient settings. We will include published literature reporting on previous literature reviews, quantitative, qualitative, mixed or multi-methods research. Exclusions will include articles primarily detailing the assessment of risk of Deliberate Self Harm (DSH) or Non-Suicidal Self Injury (NSSI). This is because DSH and NSSI differs from suicidal behaviours in intent, level of lethality, level of psychological pain and cognitive constriction. In general, DSH and NSSI are behavior undertaken to feel better or cope, whereas suicide-related behaviors are undertaken to end the capacity to feel at all by ending one's life.[32]

Ratings will be documented on the spreadsheet as 'include', 'exclude' or 'uncertain', and at the end of each round, ratings will be compared and resolved by the pair through discussion and consensus, with a third reviewer in case of no further resolution. All reviewers will use a pilot-tested screening form developed for this review, including the 3 main criteria listed above. The

inter-rater reliability will be calculated, with a Cohen's Kappa threshold of greater than or equal to 0.70, indicating substantial agreement.[33]

4. Charting the data

Charting data involves organising and interpreting data by sifting and sorting through material according to key issues and themes[28]. Included studies will be reviewed and charted independently by the two reviewers, using a standardized charting form consisting of the following data, where available:

Table 2: Charting details

General Details

- Author(s)
- Year of publication
- Study location/ Country of publication

Study Characteristics

- Clinician's discipline (i.e. family physician, psychiatrist, mental health nurse, ED nurse)
- Patient population (e.g. diagnosis, age)
- Healthcare setting (i.e. primary care, ED, inpatient, outpatient)
- Study Methodology (i.e. qualitative, quantitiative, mixed methods)

Non-patient specific factors affecting suicide risk assessment (RQ1)

- Factor(s) reported on as affecting suicide risk assessment (e.g. clinician's age, clinician's experience level, time, patient's legal status)
- Overall effect of factors on suicide risk assessment process (i.e. barrier, facilitator)

Biases (RQ2)

- Types of biases listed within study (as previously classified by Crosskerry 2003[22])

Training and educational initiatives (RQ3)

- Descriptions of training and educational initiatives that have aided clinicians with suicide risk assessment

Any additional details that pertain to the research questions will be detailed. This step will include an interative process in which the two data extracters will revise the data-charting form as required.

5. Collating, summarising and reporting the articles

To effectively present an overview of the information retrieved, and to establish the extent and nature of the literature on this topic, the results of the review will be presented using: (1) a PRISMA flow chart to identify the number of articles present at every major stage (2) a simple quantitative analysis using simple descriptive statistics including: the distribution of studies geographically; distribution of studies by different clinician and patient populations; the research methods adopted; and the range of contextual factors included in the review; and (3) a qualitative narrative synthesis of the content of included articles.

The qualitative narrative synthesis will include a focus on three overarching topics, as identified by the three research questions. The first will include a breakdown of the non-patient specific factors affecting the suicide risk assessment process, while the second will report on results of the types of cognitive biases that emerge within the suicide risk assessment process. In order to organize the results within these two research questions, the Situated Clinical Decision Making (SCDM) framework[34] will be employed. The SCDM framework was initially developed by Gillespie and Peterson (2005) as a means to help novice nurses reflect on the decisions they made within clinical practice, and as an aid in developing specific expertise. The framework balances depth with complexity, and incorporates components from *context*, *foundational knowledge* and *clinical decision-making processes*. For the purposes of the first research question, we will use the three contextual factors components, as follows:[35] (1) Micro level – this level is inclusive of the clinician and patient. Examples can include the importance of therapeutic alliance, moral or ethical issues present, the clinician's experience level relative to their patient assignment, the clinician's personal capacity for communication, the clinician's confidence, and the patient complexity; (2) Meso level – this level is inclusive of organizational factors that may affect a clinician's decision making, such as unit culture, workload and staffing patterns, availability of resources, and communication with the rest of the team; and (3) Macro level – this final level includes broader societal, governmental and professional related concepts that may affect the process. Results for the second research question will fall within the Clinical Decision Making Processes construct, which focuses on cues, biases, and intuitive processes that may impact a clinician's decision making ability. Finally, results for the third research question will be collated and reported through a narrative approach, summarizing education strategies and types of training initiatives found to help improve a clinician's decision making around suicide risk assessment.

ETHICS AND DISSEMINATION

6. Consulting and translating knowledge

This protocol presents a scoping review that will contribute to the advancement of the topic of suicide risk assessment, focusing in on an often understudied aspect of clinical decision making and the risk assessment process. This review will identify gaps in knowledge and research, while also helping to inform best practice. Approval from the Research Ethics Board is not required for this review. This review will guide the direction of future research on this topic, and aid in improving training and education around this practice.

An integrated knowledge translation approach will be used by engaging knowledge users over the course of the study. Our team includes multiple knowledge users - two psychiatrists, a mental health nurse, and a decision maker in medical education. The team will review results and emerging themes to ensure validity and credibility, and will also collectively help ensure that study findings meet the needs of healthcare professionals and educators. Results will be published in a peer-reviewed decision-making journal such as BMC Medical Informatics and Decision Making or a topical journal such as Suicide and Life-Threatening Behaviour or Archives of Suicide Research, as well as be presented at academic conferences such as Canadian Association for Health Services and Policy Research (CAHSPR) or E-Mental Health Conference. Finally, educational materials will be created to disseminate study findings to appropriate mental health professionals.

AUTHOR CONTRIBUTIONS

The design and development of this study was led by LS, who also drafted the protocol. JS, DW, GS and VD provided guidance to the study conceptualization and protocol development and have revised all drafts of this manuscript. SB, an experienced medical librarian, developed the search strategy, conducted the search and edited the manuscript. All authors give approval to the publishing of this protocol manuscript.

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COMPETING INTERESTS STATEMENT

None to declare.

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PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist

Section	PRISMA-ScR Checklist Item - Explanation
Title	Identified the report as a scoping review
Abstract	
Structured summary	Provided a structured summary including: introduction, methods & analysis, ethics and dissemination
Introduction	
Rationale	Rationale for the review has been described
Objectives	Research objectives and questions have been stated
Methods	
Protocol and registration	This is a protocol
Eligibility Criteria	Detailed study selection section is present
Information sources	All databases that the scoping review will be conducted in has been detailed
Search	Search strategy for MEDLINE is presented
Selection of sources of evidence	Detailed study selection section is present
Data charting process	Data charting section is present
Data items	Items/ information that will be extracted has been listed
Critical appraisal of individual sources of evidence	Not applicable in the protocol
Summary measures	Not applicable for scoping reviews
Synthesis of results	Detailed how the data will be summarized.
Risk of bias across studies	Not applicable for scoping reviews
Additional analyses	Not applicable for scoping reviews
Results	
Selection of sources of evidence	PRISMA Flow Diagram will be present in scoping review
Characteristics of sources of evidence	Not applicable in protocol: Will be detailed in the scoping review
Critical appraisal within sources of	Not applicable

evidence	
Results of individual sources of evidence	Not applicable in protocol: Will be detailed in the scoping review
Synthesis of results	Not applicable in protocol: Will be detailed in the scoping review
Risk of bias across studies	Not applicable for scoping reviews
Additional analyses	Not applicable for scoping reviews
Discussion	
Summary of evidence	Not applicable in protocol: Will be detailed in the scoping review
Limitations	Limitations mentioned in the "Strengths and limitations section. Detailed limitations of the scoping review process will be detailed in the scoping review
Conclusions	Not applicable in protocol: Will be detailed in the scoping review
Funding	Funding section is present

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ABSTRACT

Introduction

Every year, suicide accounts for nearly 800,000 deaths worldwide. Appropriate risk assessment and intervention is imperative since evidence demonstrates that a large proportion of those who die by suicide visit health professionals prior to their death. Much previous research has focused on identifying patient level risk factors that can improve the risk assessment process through scales and algorithms. However, best practice guidelines emphasize the importance of clinical interviews and prioritize the clinician's final judgment. The purpose of this review is to (1) understand the clinician and organizational level barriers and facilitators that influence a clinician's assessment of suicide risk, (2) identify the types of biases that exist within this process, and (3) list any evidence-based training protocols and educational initiatives to aid (or support) clinicians with this process.

Methods and analysis

This scoping review protocol uses the Arksey and O'Malley framework, and PRISMA reporting guidelines for scoping reviews. Literature will be identified using a multi-database search strategy developed in consultation with a medical librarian. The proposed screening process consists of a title and abstract scan, followed by a full-text review by two reviewers to determine the eligibility of articles. Studies outlining any factors that affect a clinician's suicide risk assessment process, ranging from individual experience and behaviours to organizational level influences will be included. A tabular synthesis of the general study details will be provided, as well as a narrative synthesis of the extracted data, organized into themes using the Situated Clinical Decision-Making framework.

Ethics and dissemination

Ethical approval is not required for this review. Results will be translated into educational materials and presentations for dissemination to appropriate knowledge users. Knowledge outputs will also include academic presentations at relevant conferences, and a published, peer-reviewed journal article.

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STRENGHTS AND LIMITATIONS OF THIS STUDY

- Findings from this review will aid in providing a catalogue of broader, non-patient related factors that affect the suicide risk assessment process.
- Strengths of this study include the importance of the topic to the suicide risk assessment process, use of an established scoping review methodology, a rigorous search strategy developed by a medical librarian, and a systematic study selection and data extraction process carried out by two health service researchers.
- Limitations include the restriction to English language studies and the potential to miss relevant studies in the grey literature.
- Consultation with content experts will be included to mitigate some of the limitations, however it should be noted that this process can also introduce a risk of bias to the final findings.

INTRODUCTION

Every year, close to 800,000 individuals die by suicide around the world.[1] Among these, research from the United States has shown that around 45% of individuals have visited mental health and primary care providers in the month prior to their death.[2] Therefore, targeting healthcare providers for appropriate suicide risk assessment and intervention is imperative. Assessing and managing suicide risk is considered a core competency of mental health care. This process of risk assessment and management for suicide is best understood as structured evaluation, intervention and subsequent re-assessment of a patient's likelihood to attempt suicide.[3] Clinicians from different disciplines carry out risk assessment across a variety of care settings, often with distinct goals and scopes of practice. Within primary care, the key goal is to determine whether an individual must be referred to a more specialized care environment, whereas within emergency rooms, the goal is often to decide whether a patient can be discharged from the hospital or requires a more restrictive level of care. Finally, within inpatient mental health settings, ongoing screening is usually required to determine what the best plan of action is for patients that are admitted due to being at high risk of suicide.[4]

Risk assessment falls within the scope of decision making, of which there are largely two classes – clinical judgement (or clinical decision making), which refers to a clinician's expert opinion based on their data gathering, and mechanical prediction, which refers to purely statistical and algorithmic prediction. A previous meta-analysis of 136 studies of human health and behaviour demonstrated that mechanical prediction was consistently more accurate than clinical judgement.[5] With large public concern surrounding deaths by suicide, much research over the past 50 years within this field has focused on identifying patient risk factors[6] and developing risk assessment tools to better recognize patients at highest risk of committing suicide, including the Beck Hopelessness Scale[7], Columbia-Suicide Severity Rating Scale[8], Nurses' Global Assessment of Suicide Risk[9] and SAD PERSONS[10], among others. Unfortunately, there has been limited supporting evidence for the use of risk scores from these tools as the sole basis for decision making since the predictive ability of these tools are rather low, given a low overall prevalence of suicides in the general population (0.01%).[4]

Due to the large evidence base showing the lack of predictability and lack of effectiveness of the many developed suicide risk assessment tools, such tools have been presented as more of an aid for clinical decision making to uncover pertinent information,[4] rather than guide clinical judgement. World Health Organization (WHO) guidelines suggest that suicide risk should be specifically evaluated with clinical interviews assessing psychological and social functioning of the patient. [11] [12] The NICE guidelines on suicide risk assessment similarly emphasize the importance of the clinician's final judgment, and recommend to "not use risk assessment tools and scales to predict future suicide"[13]. Given the challenges in behaviour prediction, a state-of-the art review on the topic has prompted the need for understanding what constitutes a reasonable standard of care in suicide risk assessment.[14]

There are a multiplicity of concerns complicating the clinical management of suicide risk, and despite the increasing focus on targeting risk assessment and prevention interventions at high risk patients, little is known about the contextual, non-patient specific factors that influence a clinician's decision-making process while conducting a suicide risk assessment. Clinical experience, a thorough knowledge base and the ability to think critically, are a few of the many skills required for any clinical decision-making process.[15] Theories on decision making based on human thought processes have suggested a dual decision-making theory wherein clinicians use both intuitive and analytical processes.[16] Intuitive decisions are fast and abbreviated, making use of heuristics and shortcuts for familiar scenarios. Occasionally, this use of shortcuts can lead to overconfidence and complacency, predisposing the clinician to biased decisions.[17] It is important to understand how clinicians' cognitive factors such as intuition and experience contribute to their risk formulation process and confidence in their decision. An important starting line for educational and training purposes is to identify the variety of clinical experiences that exist within the practice of suicide risk assessment[18], and to understand the barriers and facilitators for consistent clinical practice.

This paper outlines a protocol for a scoping review, with the primary purpose being to understand how clinician and organizational level characteristics - factors other than patient-level ones - can influence the suicide risk assessment process, highlighting that mental health professionals are not free of biases, some of which can unsuspectingly affect their decisions.[19 20 21] The findings from this review will allow us to explore the broad topic of suicide risk assessment and increase awareness of these factors. Increased awareness of these elements can eventually lead to more efficient practice.

Methods and analysis

The scoping review is a rigorous and systematic method for mapping key concepts, research areas and gaps in knowledge, especially in an area that has not been comprehensively reviewed before.[22] One of its main strengths include presenting the results in an accessible format for knowledge users.

This review follows the seminal framework outlined by Arksey and O'Malley[23], and advanced by Levac *et al*..[24] Arksey and O'Malley propose a six step framework for carrying out a scoping review, including: (1) identifying the research question, (2) identifying relevant literature, (3) study selection, (4) charting the data, (5) collating, summarizing and reporting the articles and (6) consulting and translating knowledge.[23] In order to ensure relevance to patient care, our study team also includes knowledge users. This protocol uses the recently developed 20 item Preferred reporting items for systematic reviews and meta-analysis extension for Scoping Reviews (PRISMA- ScR)[25] to ensure appropriate rigor. The scoping review searches will be completed in the Fall of 2018, and subsequent analysis of the literature search findings will be completed in early 2019.

Detailed further below are the various steps involved within the Arksey and O'Malley process, as applied to this scoping review:

1. Identifying the research question

The aim of this scoping review is to identify the personal, professional and organizational level barriers and facilitators that influence the suicide risk assessment process carried out by a clinician. To meet these aims, this review seeks to answer the following questions:

1. What non-patient specific factors influence the suicide risk assessment process (i.e. how a clinician conducts a suicide risk assessment, and how they arrive at their final clinical judgement, given their scope of practice)?
2. What types of inherent clinician biases can exist within this process?
3. Is there evidence of training and educational initiatives that have helped clinicians improve upon these contextual factors?

2. Identifying relevant studies

The comprehensive search strategy was iteratively developed in consultation with a medical librarian (SB), and was validated through the retrieval of a key set of relevant studies. To ensure a comprehensive search of the health sciences literature, we used the following primary electronic databases: MEDLINE, PsycINFO, Embase, CINAHL, and ERIC. The search query was first developed in MEDLINE, using the Ovid interface which allows for fine-tuning using Medical Subject Headings (MeSH) indexed by the National Library of Medicine's controlled vocabulary.[26] Preliminary results from searching within MEDLINE has identified 860 total articles, as of November 2019. The Ovid interface also allows for a more accurate translation of the search strategy to query other Ovid-based databases such as PyscINFO and Embase.

The search strategy consisted of subject headings, keywords and related terms for the concepts of suicide risk assessment and experiences of health personnel relating to this behaviour. Terms for the concept of suicide risk assessment included "risk assessment" combined with "suicide", "suicidal ideation" or "suicide attempt". The primary search terms for the concept of clinicians' experiences included "attitude of health personnel", "knowledge, attitudes and practice" and "physician-patient relations". A detailed search strategy can be found in Table 1.

Our search is limited to the English journal articles, without date or study type restrictions. All bibliographic results from the search were stored using the citation management program EndNote [http://endnote.com/]. The citations will also be downloaded into Covidence, a literature review software for screening, charting and tabulation purposes.

Table 1: Search Strategy for OVID Medline

1	Risk Assessment/ or "Healthcare Failure Mode and Effect Analysis"/ or (risk* adj4 assess*).ti,ab,kf.
2	Suicide/ or Suicidal Ideation/ or Suicide, Attempted/ or suicid*.ti,ab,kf.
3	"Attitude of Health Personnel"/ or Practice Patterns, Physicians'/ or Bias/ or Observer Variation/ or exp Prejudice/ or Culturally Competent Care/ or Alert Fatigue, Health

	Personnel/ or Physician-Patient Relations/ or Professional-Patient Relations/ or Nurse-Patient Relations/ or Nonverbal Communication/ or Health Knowledge, Attitudes, Practice/ or Clinical Competence/ or Clinical Decision-Making/ or Clinical Protocols/ or Duty to Warn/ or Clinical Decision-Making/ or Ethics, Medical/ or Professional Role/ or Nurse's Role/ or Physician's Role/
4	Inservice Training/ or Simulation Training/ or Staff Development/ or Education, Continuing/ or Education, Nursing, Continuing/ or Education, Medical, Continuing/ or "Internship and Residency"/ or Teaching Rounds/
5	exp Health Occupations/ or exp Health Personnel/ or (clinician* or "health care professional*" or "healthcare professional*").ti,ab,kf.
6	or/3-5
7	and/1-2,6
8	limit 7 to English language

Table 1 Legend

Code	Description
/	indicates that a term is a subject heading
adj4	searches within 4 words of each other (4 words before and 4 words after) in either direction
*	truncation technique to broaden search to include words with different endings and spellings
ti	searches field that contains the English language version of a title
ab	searches author-written abstracts
kf	retrieves every keyword heading that includes the particular word
exp	indicates that a subject heading is "exploded" to include all of the narrower subject headings beneath it in the hierarchy

3. Study Selection

After a combined pilot with both reviewers, to ensure common understanding of the inclusion criteria, all articles will be independently screened in two stages. Study eligibility will be determined beginning with a title and abstract scan, followed by a full-text review stage.

In order to be eligible, studies must involve the following criteria: (i) study the risk screening or assessment process around suicide (ii) include clinicians' thinking, attitudes, or experiences, and (iii) apply to patients being assessed within primary care, EDs, or mental health and addiction outpatient or inpatient settings. We will include published literature reporting on previous literature reviews, quantitative, qualitative, mixed or multi-methods research. Exclusions will include articles primarily detailing the assessment of risk of Deliberate Self Harm (DSH) or Non-Suicidal Self Injury (NSSI). This is because DSH and NSSI differs from suicidal behaviours in intent, level of lethality, level of psychological pain and cognitive constriction. In general, DSH and NSSI are behavior undertaken to feel better or cope, whereas suicide-related behaviors are undertaken to end the capacity to feel at all by ending one's life.[27]

Ratings will be documented on the Covidence software as 'Yes', 'No' or 'Maybe', and at the end of each round, ratings will be compared and resolved by the pair through discussion and consensus, with a third reviewer in case of no further resolution. All reviewers will use a pilot-tested screening form developed for this review, including the 3 main criteria listed above. The inter-rater reliability will be calculated, with a Cohen's Kappa threshold of greater than or equal to 0.70, indicating substantial agreement.[28]

4. Charting the data

Charting data involves organising and interpreting data by sifting and sorting through material according to key issues and themes.[23] Included studies will be reviewed and charted independently by the two reviewers, using a standardized charting form including the required data, where available. Details of the charting form can be found within Table 2.

Table 2: Charting details

General Details

- Author(s)
- Year of publication
- Study location/ Country of publication

Study Characteristics

- Clinician's discipline (i.e. family physician, psychiatrist, mental health nurse, ED nurse)
- Patient population (e.g. diagnosis, age)
- Healthcare setting (i.e. primary care, ED, inpatient, outpatient)
- Study Methodology (i.e. qualitative, quantitative, mixed methods)

Non-patient specific factors affecting suicide risk assessment (RQ1)

- Factor(s) reported on as affecting suicide risk assessment (e.g. clinician's age, clinician's experience level, time, patient's legal status)
- Overall effect of factors on suicide risk assessment process (i.e. barrier, facilitator)

Biases (RQ2)

- Types of biases listed within study (as previously classified by Crosskerry 2003[17])

Training and educational initiatives (RQ3)

- Descriptions of training and educational initiatives that have aided clinicians with suicide risk assessment

Any additional details that pertain to the research questions will be detailed. This step will include an iterative process in which the two data extractors will revise the data-charting form as

required.

5. Collating, summarising and reporting the articles

To effectively present an overview of the information retrieved, and to establish the extent and nature of the literature on this topic, the results of the review will be presented using a PRISMA flow chart to identify the number of articles present at every major stage. Additionally, a tabular synthesis of the distribution of studies geographically (i.e. country of origin), distribution of studies by different clinician (e.g. nurses, primary care doctors) and patient populations (e.g. inpatient, outpatient, community mental health), methodology adopted (i.e. study design details) will also be included. This tabular synthesis will focus on metadata of the studies, and not consist of any statistical analysis of the results from the various studies. Using Covidence, we will be able to create a PRISMA flow chart and tabulate the required results. Finally, a qualitative narrative synthesis of the content of included articles will be presented.

The qualitative narrative synthesis will include a focus on three overarching topics, as identified by the three research questions. The first will include a breakdown of the non-patient specific factors affecting the suicide risk assessment process, while the second will report on results of the types of cognitive biases that emerge within the suicide risk assessment process. In order to organize the results within these two research questions, the Situated Clinical Decision-Making (SCDM) framework[29] will be employed. The SCDM framework was initially developed by Gillespie and Peterson (2005) as a means to help novice nurses reflect on the decisions they made within clinical practice, and as an aid in developing specific expertise. The framework balances depth with complexity, and incorporates components from *context*, *foundational knowledge* and *clinical decision-making processes*. For the purposes of the first research question, we will use the three contextual factors components, as follows:[30] (1) Micro level – this level is inclusive of the clinician and patient. Examples can include the importance of therapeutic alliance, moral or ethical issues present, the clinician's experience level relative to their patient assignment, the clinician's personal capacity for communication, the clinician's confidence, and the patient complexity; (2) Meso level – this level is inclusive of organizational factors that may affect a clinician's decision making, such as unit culture, workload and staffing patterns, availability of resources, and communication with the rest of the team; and (3) Macro level – this final level includes broader societal, governmental and professional related concepts that may affect the process. Results for the second research question will fall within the Clinical Decision-Making Processes construct, which focuses on cues, biases, and intuitive processes that may impact a clinician's decision-making ability. Finally, results for the third research question will be collated and reported through a narrative approach, summarizing education strategies and types of training initiatives found to help improve a clinician's decision making around suicide risk assessment.

Patient and Public Involvement

We will include consultation from stakeholder clinicians (i.e. an interdisciplinary suicide risk working group within a mental health hospital). Through providing these clinicians with preliminary results of the scoping review, they will be consulted on for suggestions for additional

helpful references, and for providing insights that are beyond those found within our thematic analysis. Additionally, we will also consult with a patient advocacy group (i.e. the empowerment council within a mental health hospital) to gather the perspective of those with lived experience.

ETHICS AND DISSEMINATION

6. Consulting and translating knowledge

This protocol presents a scoping review that will contribute to the advancement of the topic of suicide risk assessment, focusing in on an often understudied aspect of clinical decision making within the risk assessment process. This review will identify gaps in knowledge and research, while also helping to inform best practice. This review will guide the direction of future research on the topic, and aid in improving training and education around this practice. Future research can focus on measuring the impact of each contextual factor on a clinician's assessment of suicide risk. The results from this review can contribute toward developing appropriate qualitative interview guides or aid in survey development for studying such research questions. With regards to improving training and education, the results of this review can improve clinicians' awareness of the biases that exist within the suicide risk assessment process, helping them improve on more nuanced behaviours of this practice.

Approval from the Research Ethics Board is not required for this review. An integrated knowledge translation approach will be used by engaging knowledge users over the course of the study. Our team includes multiple knowledge users - two psychiatrists, a mental health nurse, and a decision maker in medical education. The team will review results and emerging themes amongst ourselves, as well as consult with an interdisciplinary suicide risk working group and patient empowerment group within a large mental health hospital. This consultation will collectively help ensure that study findings meet the needs of healthcare professionals and educators. Results will be published in appropriate peer-reviewed journals, as well as be presented at suitable academic conferences. Finally, educational materials will be created to disseminate study findings to appropriate mental health professionals.

AUTHOR CONTRIBUTIONS

The design and development of this study was led by LS, who also drafted the protocol. JS, DW, GS and VD provided guidance to the study conceptualization and protocol development and have revised all drafts of this manuscript. SB, an experienced medical librarian, developed the search strategy, conducted the search and edited the manuscript. All authors give approval to the publishing of this protocol manuscript.

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COMPETING INTERESTS STATEMENT
None to declare.

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PRISMA-ScR Checklist

Section	Item	PRISMA-ScR Checklist Item	Reported On
Title	1	Identify the report as a scoping review.	Yes
Abstract			
Structured summary	2	Provide a structured summary that includes (as applicable) background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Included the following sections: introduction, methods & analysis, ethics and dissemination
Introduction			Yes
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Yes
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g. population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	Yes – within methods section "Identifying the research question"
Methods			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g. a Web address); and if available, provide registration information, including the registration number.	This is a protocol
Eligibility Criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale	Yes
Information sources	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	Yes
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that could be repeated.	Yes – Table 1
Selection of sources of evidence	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Yes
Data charting process	10	Describe the methods of charting data from the included sources of evidence (e.g. calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Yes
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Yes – Table 2
Critical appraisal of individual sources of evidence	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Not applicable in protocol

Summary measures	13	Not applicable for scoping reviews.	-
Synthesis of results	14	Describe the methods of handling and summarizing the data that were charted.	Yes
Risk of bias across studies	15	Not applicable for scoping reviews.	-
Additional analyses	16	Not applicable for scoping reviews.	-
Results			
Selection of sources of evidence	17	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Not applicable in protocol
Characteristics of sources of evidence	18	For each source of evidence, present characteristics or which data were charted and provide the citations.	Not applicable in protocol
Critical appraisal within sources of evidence	19	If done, present data on critical appraisal of included sources of evidence (see item 12).	Not applicable in protocol
Results of individual sources of evidence	20	For each included source of evidence. Present the relevant data that were charted that relate i0 the review questions and objectives.	Not applicable in protocol
Synthesis of results	21	Summarize and/or present the charting results as they relate to the review questions and objectives	Not applicable in protocol
Risk of bias across studies	22	Not applicable for scoping reviews	-
Additional analyses	23	Not applicable for scoping reviews	-
Discussion			
Summary of evidence	24	Summarize the main results (including an overview of concepts, themes. and types of evidence available). Link in the review questions and objectives, and consider the relevance to key groups.	Not applicable in protocol
Limitations	25	Discuss the limitations of the scoping review process.	Limitations mentioned in the "Strengths and Limitations" section. Further details will be present in scoping review.
Conclusions	26	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Not applicable in protocol
Funding	27	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Yes