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# Implementation of a Mental Health Environmental Risk Assessment Tool

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## Abstract

**Background:** Patient suicide is a serious safety issue, especially in mental health settings since suicides disproportionately affect psychiatric patients. Environmental hazards are a primary contributing factor in patient suicide cases.

**Problem**: Mental health staff may lack tools and training to perform proper environmental risk assessments, which is the case at a psychiatric crisis residential center in northern California that utilized no environmental risk assessment tool.

**Methods**: An environmental risk assessment tool was implemented at the site for four months to increase staff confidence, ability to identify hazards and decrease risk of patient suicides.

**Interventions**: The Suicide and Self-Injury Patient Checklist (SSIPCL) was implemented, which is an evidence-based tool that has demonstrated efficacy in the standardized identification of hazards and reduction of patient suicide rates.

**Measures**: Primary outcome measures observed pre and post implementation include patient suicide attempt rate (indicated by 5150 DTS [danger to self] holds placed at the site per month or case of suicidal ideation [SI]). Staff confidence scores were measured in regards to perceived site patient safety and ability to identify environmental hazards.

**Results:** Patient suicide attempt rate (in holds per month) did not change after implementation, remaining the same at 0.25. For holds placed per case of SI, there was a decrease of 66% (1 to 0.33). There was a marked improvement in staff satisfaction scores.

**Conclusions:** The SSIPCL can be effective in reducing risk of patient suicide and increasing staff satisfaction in a residential setting, but more research is needed over a longer time span.

***Key words***: environment, suicide prevention, patient suicide, psychiatric, hazard

# Introduction

## Background

Patient suicide has been consistently ranked as the first or second most common sentinel event (which involves risk of or results in significant harm or death) but has dropped to the fifth in recent years (The Joint Commission, 2019; Williams et al., 2018). This high ranking incurs subsequent visits from regulatory bodies such as the Joint Commission, Centers for Medicare & Medicaid Services, and the California Department of Public Health. While this ranking has dropped, suicide prevention is no less important and most of these events involve psychiatric patients, which are a high-risk group (Williams et al., 2018). The most important contributing factor is perhaps the physical environment, which was a primary contributing factor in the bulk of reported suicides (Sakinofsky, 2014). Statistics on patient suicide from the Centers for Disease Control and Prevention's (CDC) National Violent Death Reporting System (NVDRS) Restricted Access Database (RAD) and the Joint Commission's Sentinel Event (SE) Database show that the majority of patient suicides (as high as 80%) involve psychiatric inpatients, making them a high-risk group and the physical environment was a main factor in 84% of reported suicides (Sakinofsky, 2014; Williams et al., 2018).

## Problem Description

Mental health staff may lack tools and training needed to perform proper risk assessments in order to identify environmental hazards and mitigate patient suicide (Sakinofsky, 2014). Patient suicide and the presence of environmental hazards are an issue because if not addressed or mitigated, a greater means to facilitate suicide will exist in healthcare settings, which results in ultimate patient harm, decreased staff satisfaction and increased healthcare costs in addition to a consistently high sentinel event ranking (Cardell et al., 2009; Sakinofsky, 2014). Patient suicide,

especially in mental health settings, is a serious patient safety issue that needs to be addressed, disproportionately affects psychiatric patients, and could be approached by targeting environmental hazards, which are a primary contributing factor (Sakinofsky, 2014; Williams et al., 2018).

### *Setting*

Patient suicide can occur in any healthcare setting where patients have potential suicidal ideation, but most commonly occur in mental health settings, including the one where the intervention was implemented. The project setting was a fifteen-bed mental health crisis residential facility located in northern California that is owned by the Telecare Corporation, which serves clients for ongoing stabilization of psychiatric issues coming from incarceration (court mandated treatment) or from the community to engage in treatment on a voluntary basis. Mental health settings, including the project site, employ a number of measures to minimize risk of suicide due to the unit environment, with the most prevalent being environmental safeguards (e.g., breakaway fixtures) and surveys (e.g., room searches) that primarily target the most common suicide method of hanging by removing ligatures (Cardell et al., 2009; Hunt et al., 2012; The Joint Commission, 2018). Another intervention is searching and the restriction of belongings, especially sheets and towels due to their most common usage of ligatures, for high-risk patients (Hunt et al., 2012; Mills et al., 2013). Unfortunately, due to a lack of comprehensive criteria in these measures (considering that existing interventions focused on hanging-related suicide methods) along with shortcomings in standardized tools and training among staff needed to perform proper environmental risk assessments, the mental health facility where the intervention was implemented was vulnerable to the potential for increased patient suicide rates.

The project site utilized no environmental risk assessment tool and earlier efforts were

not made to address this, which presented a major opportunity for improvement and gaps in the organization in relation to their mission, considering that Telecare's mission is to deliver excellent as well as effective behavioral health services that engage individuals with complex needs in recovering their health, hopes, and dreams (Telecare, 2018a). The mission also involves balancing the important need for client safety with the need for patients to be personally empowered in their lives and recovery process (Telecare, 2018a). The potential for increased suicide risk generated by the lack of an environmental risk assessment tool at the project site created a gap particularly in Telecare's ability to meet the need for client safety in their mission and needs to be addressed, especially considering that no earlier attempts were made to do so. Efforts were made to address this gap through a change of practice project involving implementation of such an environmental risk assessment tool (seen in Appendix A). Staff at the site were supportive in meeting this need and provided a letter of support (Appendix B).

**Specific Aim**

The purpose of this project was to implement a comprehensive, standardized tool to be used in environmental risk surveys along with appropriate training for staff at the aforementioned site (a psychiatric crisis residential facility) in order to properly perform environmental risk assessments and identify hazards to mitigate overall suicide rates. The purpose of this report was also to identify available evidence on environmental hazards and various measures of abatement that could inform implementation of an environmental risk assessment tool, to rationalize the significance of evidence for implementation, and to synthesize evidence to identify metrics for evaluation. The project's aim statement was: Over the course of four months, the proposed mental health setting will initiate and implement an environmental risk assessment tool to be used in environmental surveys in order to decrease suicide rates by at

least 20% from baseline among mental health patients, have 100% of staff attain adequate self-efficacy in tool usage, and to attain a staff satisfaction rating of at least 80% (in regards to improved safety of the unit environment as a result of tool usage) among 90% of all staff surveyed via Likert scale.

## Available Knowledge

### PICOT Question

The following PICOT question was used to guide a literature search on this topic: In adult patients (aged 18 and over with any mental health diagnosis having potential for suicidal ideation or self-harm) (P), how does the utilization of an environmental risk assessment tool to identify environmental hazards (I) compare to the current practice of no environmental risk assessment (C) and impact the number of hazards, patient suicide as well as self-harm rates (O) within a period of four months (T)?

### Search Methodology

The literature search was conducted on Cumulative Index to Nursing and Allied Health Literature (CINAHL) Complete, PubMed and American Psychological Association (APA) PsycInfo using the following key terms in various combinations: “Suicide prevention,” “mental health,” “psych*” “environment*” and “tool or checklist.” Cross database searches (e.g., CINAHL and PsycInfo) were also conducted with more expansive search terms for the intervention (tool* or survey* or instrument* or checklist) and the setting (hospital* or inpatient* or residential). Limitations applied to the search were subject age (18 years or older), language (English), peer-reviewed articles, and year of publication (2009 to 2020). Types of studies and publications included in the search consisted of individual research as well as critically appraised research studies, clinical practice guidelines, electronic textbooks and systematic reviews or

meta-analyses. Inclusion criteria in terms of relevancy included articles with a population related to adults with mental health conditions (or experiencing suicidal ideation) and involved interventions or recommendations for targeting environmental hazards to mitigate self-harm or suicide especially in, but not limited to, psychiatric health care settings. Manual searches of reference lists of relevant articles that met the inclusion criteria and removal of duplicates were also performed. Journals searched included Crisis: The Journal of Crisis Intervention and Suicide, Issues in Mental Health Nursing, Archives of General Psychiatry and Psychiatry Research. Total initial yield from this search across all three databases consisted of 255 articles, with 71 from CINAHL Complete, 24 from PubMed, 143 from PsycInfo, and 18 from the cross-search between CINAHL and PsycInfo. Final yield after filtering for relevancy and applying inclusion criteria consisted of ten articles which were chosen for inclusion in this integrated review.

## Integrated Review of the Literature

Critical appraisal of the articles was performed using the Johns Hopkins (JH) Non-Research and Research Evidence Appraisal Tools (Dang & Dearholt, 2017). The evaluation table in Appendix C details the characteristics and appraisal results of each article. Environmental suicide hazards, checklists for environmental risk assessments, and additional measures for hazard abatement were topics that emerged upon reviewing articles.

### *Environmental Suicide Hazards*

Nearly all studies that provided data on suicide methods found that hanging was the most frequent method (Mills et al., 2013). Other common methods included cutting or using weapons, strangulation, and overdose with a foreign substance (Frost et al., 2020; Mills et al., 2013; Mills et al., 2010). Environmental suicide hazards found to be the most common were anchor points on

doors, with other common fixture points located on beds, in showers, and in wardrobes (Hunt et al., 2012; Mills et al., 2013; Mills et al., 2010; Watts et al., 2012). Studies that included data on ligatures found that sheets and bedding were most commonly used in hanging, and other common ligature types included clothing, belts and shoelaces (Frost et al., 2020; Hunt et al., 2012; Mills et al., 2013). Other hazards include razor blades, plastic knives and weapons in cases of cutting, plastic trash liners for suffocation, and cleaning products in poisoning and overdose cases (Mills et al., 2013; Mills et al., 2010). Hazards were most commonly located in bedrooms and bathrooms (Hunt et al., 2012; Mills et al., 2013; Mills et al., 2010). While other studies found hanging as the most common suicide method, Frost et al. (2020) found that the most common method for suicide completions and attempts in their study was ingestion of hazards, followed by strangulation, cutting and self-hitting. Hazards listed by Frost et al. (2020) across all of these methods included plastic bags, sheets, towels, scissors, utensils, glass, pens, and anything else small enough to be swallowed. These studies concluded that interventions should focus on these hazards (hanging-related in particular) and provide guidance for measures to target such hazards in practice as well as inform the practice change project through highlighting hazards that should be included on the criteria of the environmental risk assessment tool.

### *Checklists for Environmental Risk Assessments*

Four articles examined the effect of implementing a checklist on the identification and abatement of environmental suicide hazards and its impact on inpatient suicides in a large health care system. Mills et al. (2010), Watts et al. (2017) and Watts et al. (2012) implemented a Mental Health Environment of Care Checklist (MHEOCC) across inpatient psychiatric units in Veterans Health Administration (VHA) hospitals and reviewed Root Cause Analysis (RCA) reports of suicide cases. Similarly, Frost et al. (2020) implemented the Suicide and Self-Injury Patient

Checklist (SSIPCL) in nonpsychiatric units at a large general hospital and reviewed safety reports on self-injury and suicide attempts. In studies that examined the efficacy of the MHEOCC, all resulted in a statistically significant reduction in the number of inpatient suicides after implementation within the first year and also after four years (Watts et al., 2017; Watts et al., 2012). For instance, Watts et al. (2012) found that checklist implementation resulted in a statistically significant reduction in inpatient suicide rates (2.64 per 100,000 inpatient mental health admissions before use and decreased to 0.87 afterwards with $P<0.001$). Use of the checklist was also associated with a sustained reduction in the number of suicides over a period of greater than seven years (Watts et al., 2017). The suicide rate prior to implementation was 4.2 suicides per 100,000 admissions and afterwards, the rate decreased to 0.74 with no loss of effect in seven years after implementation with $P<0.001$ in the implementation phase (Watts et al., 2017). Similar results were found with use of the SSIPCL, which decreased self-injury and suicide attempts by approximately half after implementation (a 42% decrease, and those who had temporary/minor injuries from attempts decreased by 57%) (Frost et al., 2020). These studies support the use of checklists and demonstrate their efficacy as a measure of hazard abatement that could be used in practice, which provides value to the project by offering guidance in the type of environmental risk assessment tool to implement.

### *Additional Measures for Hazard Abatement*

Cardell et al. (2009) and Mills et al. (2013) state that other measures for abatement of environmental suicide hazards include structural safeguards (such as slanted door hinges and breakaway structures) as well as restriction of personal belongings to prevent suicide by hanging from fixtures, jumping and use of personal items. Mills et al. (2013), Mills et al. (2010) and Cardell et al. (2009) all recommend the use of environmental surveys alongside structural

safeguards. Cardell et al. (2009) and Cox et al. (2013) also recommend staff training that includes awareness of environmental precautions, but Cardell et al. (2009) goes on to include institutional policies on patient belongings, visitation, and suicide risk assessment questionnaires. Mills et al. (2013) and Mills et al. (2010) focused on preventing the most common suicide method of hanging via similar measures such as environmental surveys, structural safeguards (e.g., breakaway fixtures), policies on patient belongings (restricting sheets/towels for high-risk patients) and systematic elimination of ligatures and ligature points, placing the most importance on ones that have resulted in greatest harm. In regards to hazard locations such as suicide hotspots (e.g., jump sites), measures detailed by Cox et al. (2013) in their systematic review include restricting access to means of suicide via structural barriers (which had the strongest evidence) and increasing likelihood of third-party rescue (staff training near hotspots), both of which align with the recommendations of Cardell et al. (2009) to use non-breakable glass to prevent jumps and staff training on environmental precautions. Other measures discussed by Cox et al. (2013) consisted of encouraging help seeking (e.g., signs for crisis lines) and guidance on responsible media reporting of suicides/hazards. Mohl et al. (2012) performed review of secondary data and Pirkis et al. (2013) conducted a meta-analysis, both which supported the efficacy of structural safeguards and aligned with Cox et al. (2013). These studies recommend the use of combined measures of hazard mitigation (structural safeguards, training, and policies) and provide guidance for methods of hazard mitigation aside from checklists, which lend insight on possibly more effective ways to address the environment beyond a risk assessment tool.

**Summary/Synthesis of the Evidence**

Analysis of the literature review by Cardell et al. (2009) resulted in a level V-B rating because it did not identify knowledge gaps and use up-to-date literature. The systematic review

by Cox et al. (2013) was appraised at level III-B because it consisted of quasi-experimental and non-experimental studies, did not search multiple databases, and did not detail limitations. The meta-analysis by Pirkis et al. (2013) was level II-B because it consisted of all quasi-experimental studies. The study by Watts et al. (2012) was a level II-B quasi-experimental study with manipulation of the MHEOCC as an independent variable. Frost et al. (2020), Hunt et al. (2012), Mills et al. (2013), Mills et al. (2010), Mohl et al. (2012), and Watts et al. (2017) were level III-B non-experimental research studies that did not have independent variable manipulation and used review of secondary data. The six aforementioned studies analyzed data between pre and post intervention periods and did not possess a control group, resulting in level B ratings. This may be justified, considering that the absence of a control group is inherent in almost all studies evaluating suicide prevention measures due to ethical concerns.

Overall, the evidence had similar strength levels except for Cardell et al. (2009) with a level V-B rating. In articles with findings on the most common environmental suicide hazards and methods, hanging was the most common method with the most frequent hazards as anchor points on doors and sheets/bedding used as ligatures (Hunt et al., 2012; Mills et al., 2013; Mills et al., 2010; Watts et al., 2012). Studies examining the efficacy of a hazard identification checklist had similar findings that supported their use. For instance, implementation of the MHEOCC on VHA inpatient psychiatric units resulted in a statistically significant reduction ($P<0.001$) in the number of inpatient suicides after implementation (Watts et al., 2017; Watts et al., 2012). Similarly, Frost et al. (2020) found that using a hazard identification checklist on nonpsychiatric inpatient units decreased self-injury and suicide attempts by approximately half after implementation. Study findings detailing measures for abatement of environmental suicide hazards all included structural safeguards, environmental surveys and staff training on

environmental precautions (Cardell et al., 2009; Cox et al., 2013; Mills et al., 2013; Mills et al., 2010; Mohl et al., 2012). However, Mills et al. (2013) and Mills et al. (2010) focused on utilizing these measures to prevent the most common suicide method of hanging. Pirkis et al. (2013) and Cox et al. (2013) focused on use at suicide hotspots and supported efficacy of structural measures, but Cox et al. (2013) also examined help seeking and responsible media reporting of suicides/hazards.

There was a lack of evidence on the use of tools other than checklists and their use in other mental health settings (e.g., non-inpatient or non-VHA hospital settings). Evidence on the most common suicide method (hanging) and hazards (door fixtures as anchor points and sheets/bedding as ligatures) was found, but there was not as much evidence on other hazards. Evidence was found supporting other measures of abating environmental hazards through means such as structural safeguards and staff training of environmental precautions, but there was a lack of evidence of their efficacy alongside use of environmental risk assessment tools. However, the lack of evidence supports the project because it presents opportunities where these knowledge gaps can be addressed with the information gleaned from the project, including efficacy of environmental risk assessment tools alongside staff training in a non-inpatient psychiatric setting and the potential to shed light on more non-hanging related hazards.

Findings lent information that could help address the PICOT question and supported a practice change with recommendations. For instance, findings that reported hanging to be the most common suicide method with frequent hazards of door fixtures and sheets/bedding mandated that these should be part of any potential risk assessment tool. Findings also support the efficacy of checklists as viable tools in identifying and abating hazards to decrease patient suicide rates. Findings that discuss other measures to abate environmental hazards provide

insight on other ways to answer the PICOT question without the use of environmental risk assessment tools (e.g., if other measures are valid or should be used in conjunction with such tools). Overall, there is enough strength in the evidence to recommend a change in practice (environmental risk assessment tools in particular), especially for settings with no environmental risk assessment tool or measures to identify and abate environmental suicide hazards. However, findings note that additional research is needed on the efficacy of environmental risk assessment tools, particularly for non-study sites (e.g., checklists in non-VHA psychiatric settings)- which the project could contribute towards considering its implementation in a psychiatric crisis residential setting.

## Rationale

The Integrated Behavioral Model (IBM) seen in Appendix D is a conceptual framework that can help guide project implementation because it explains factors that determine particular behaviors that may be carried out and could be applied to suicide (Fishbein, 2009). It posits that the greatest determining factor of behavior is intention to perform it, which is influenced by attitude, subjective or perceived norms and personal agency, which includes perceived control and self-efficacy (Fishbein, 2009; Glanz et al., 2008). Perceived control is the perceived ease or difficulty of carrying out a behavior, determined by the anticipated impact of environmental facilitators and barriers on performance (Fishbein, 2009; Glanz et al., 2008). Four other elements also affect behavior, which include knowledge or skill needed to perform it, environmental barriers, salience (perceived importance of behavior), and experience in performing the behavior (Fishbein, 2009; Glanz et al., 2008). The IBM helps explain the behavior of patient suicide in relation to environmental hazards through the elements of perceived control and environmental constraints, as well as their influence on intention and behavior. Even if a person has a strong

behavioral intention, environmental barriers can make acting on it difficult or impossible, and the presence of these barriers can decrease perceived ease of behavior performance, lowering perceived control and intention (Fishbein; 2009; Glanz et al., 2008). The presence of environmental hazards as facilitators increases the perceived ease as well as control of suicide behavior and intention, making it more likely to be carried out. An assumption is that environmental barriers or facilitators are primary influential factors in suicidal behavior and intention in a health care setting. This helps develop or select an intervention that is expected to work through targeting environmental facilitators to decrease suicide rates, considering that these features of the environment are primary contributing factors in increasing perceived ease and control of suicidal behavior/intention.

This conceptual framework informed the implementation plan because staff used the intervention when an individual presented with the ideation to carry out a particular behavior (e.g., verbalizing suicidal threats or intent) and abated environmental hazards to decrease perceived ease of this behavior as well as chance of it being performed. In addition, when it comes to staff behavior of using the tool, the plan included attempts via unit in-services to improve perceived self-efficacy (around tool utility and performing environmental risk assessments) and subjective or perceived norms around use of such an intervention in the crisis residential setting (where norms usually involve no such tool with the belief that if clients required this level of monitoring, they would be better suited for an inpatient unit) to increase intention to perform the behavior of tool usage and adherence. The IBM assists in outcomes analysis because it helps identify variables and outcome measures of interest (as well as improvements in them) including staff self-efficacy (of utilizing the intervention and performing an environmental risk assessment), perceived effectiveness of environmental hazard assessment

practices (subjective norms related to the setting), tool usage/adherence (a reflection of staff intention to perform such behavior), the counts and rates of suicide as well as self-harm (completions and attempts) pre and post implementation (a reflection of patient intention to carry out suicidal behavior).

## Methods

### Context

The context in which the intervention took place was largely dependent on the attributes of the setting and support among staff who utilized the tool. As stated before, the setting is a fifteen-bed mental health crisis residential facility that serves clients for ongoing stabilization of psychiatric issues (stemming from a variety of conditions whose symptom exacerbation can manifest in suicidal ideation) coming from incarceration (court mandated treatment) or from the community to engage in treatment on a voluntary basis. Patient demographics consist of adults of any gender (male, female or transgender) aged 18 and older (although there have been rare instances where individuals 16 or 17 years of age have been admitted) with mental health conditions whose exacerbations can result in harm to self, others or extreme distress (this includes but is not limited to, major depressive disorder, bipolar disorder, schizophrenia, schizoaffective disorder and unspecified psychosis). Clients must also be able to provide self-care and perform activities of daily living without severe functional impairment and grave disability to reside in/receive treatment at the facility.

The facility can see up to fifty clients per month (due to clients leaving earlier than expected) and is staffed by sixteen individuals that consist of mental health staff such as nurses, clinicians, care coordinators, leadership and records personnel. Frontline staff mix consists of two clinical directors, one quality and patient safety coordinator/clinician, three mental health

counselors, three nurses (Licensed Vocational Nurses or Registered Nurses), and seven care coordinators (who make up the bulk of staff due to their role in facilitating therapy groups, transporting them to appointments, performing rounds and supporting other staff as needed).

The stakeholders involved in the issue and project are organization executives (Chief Executive Officer [CEO], Chief Medical Officer [CMO]), the setting's director, supervisor, healthcare staff (e.g., nurses and mental health workers), patients and medical records staff (e.g., IT). Staff at the setting were not aware of the issue presented with the lack of an environmental risk assessment tool but were open to the need for change and supportive of any evidence-based means to address this need, which the project was a reflection of. Initial steps included presenting the concept of the tool and its projected outcomes to these individuals with highlights based on the management culture that each stakeholder belongs to and correlated with their role related to the issue. For instance, sharing information on financial benefits due to suicide prevention can increase support from the CEO, directors and supervisors since they are part of CEO culture concerned with cost of implementation and care quality (Schein, 1996). These individuals have high interest levels due to the potential benefits in cost savings and administrative penalties avoided from suicide prevention (a non-reimbursable 'never' event). Presenting the tool as a way to enhance patient care through standardized risk assessments and increase safety among healthcare staff, who are part of the operator culture, can increase support from them since they are focused on providing the highest care quality to remedy issues and expect to be given the necessary resources to do so (Schein, 1996). This group had the strongest interest levels, because the tool serves as a resource to increase clinical efficiency, care quality and patient safety. Medical records staff are part of the engineer culture, which is concerned with information management in relation to the issue (e.g., storing data the checklist provides)

(Schein, 1996). This group had moderate interest levels because they were concerned with information management at the setting, including storing data that the intervention provides. Engaging stakeholders, making them feel involved with open communication and conveying the importance of projected project outcomes relevant to their practice can build support, increase interest, and more successfully bring the project to fruition (Weberg & Davidson, 2019).

## Interventions

The intervention was implementation of an environmental risk assessment tool called the Suicide and Self-Injury Patient Checklist (SSIPCL), which is an evidence-based tool that has demonstrated efficacy in the standardized, comprehensive identification of environmental hazards and has resulted in reduction of patient suicide rates (Appendix E). In addition to hazard identification, the tool also includes protocols for safety monitoring and emergency management for patients experiencing active suicidal ideation with intent as well as attempting self-harm. Other aspects of the intervention involve associated training among staff (any department or team member can utilize it after training) on tool usage to perform proper risk assessments to effectively identify hazards. Frost et al. (2020) found that using the SSIPCL on nonpsychiatric inpatient units decreased self-injury and suicide attempts by approximately half after implementation. Frost et al. (2020) implemented the SSIPCL on nonpsychiatric inpatient units, but it could perhaps be applied to mental health settings similar to this (e.g., crisis residential/stabilization) since they have similar patient restrictions and architecture, unlike inpatient psych settings (which often have environmental safeguards and utilize checklists that possibly require significant structural changes to be made to other settings).

### *Gap Analysis*

A gap analysis in Appendix F displays the current state of practice surrounding suicide

prevention via environmental risk reduction, the future intended state post-implementation, the gaps present (e.g., in resources or knowledge among staff), and actions to close the gap provided by the project. For the current state, the setting and others similar to it utilize a number of interventions that have been proposed in the literature to minimize risk of patient suicide due to the unit environment, such as environmental safeguards (e.g., breakaway fixtures), searches, restriction of belongings (such as sheets and towels) and surveys (e.g., room searches) that primarily target the most common suicide method of hanging by removing ligatures (Cardell et al., 2009; Hunt et al., 2012; The Joint Commission, 2018). At the project site, no environmental risk assessment tools are utilized, making it vulnerable to increased potential for suicide rates/attempts. An intended future state is one that involves more standardized, comprehensive identification of environmental suicide hazards resulting in decreased patient suicide rates/attempts. The gap that exists at the project site and behavioral health settings in general is that staff at these settings may lack standardized tools and training needed to perform proper risk assessments in order to identify environmental hazards, which can contribute to the issue and leave room for improvement in further minimizing suicide occurrences (Sakinofsky, 2014). Actions to close the gap include the implementation of the SSIPCL as an evidence-based, standardized tool for environmental risk assessments because it can move the environment towards best practice. This would allow for more comprehensive, consistent assessment by addressing several non-hanging related hazards (such as electrocution, poison and suffocation risks) and further mitigate suicide rates (Mills et al., 2010; Watts et al., 2017; Watts et al., 2012).

### *Gantt Chart*

A Gantt chart is displayed in Appendix G, detailing steps for project design and implementation. These include performing searches for potential project sites, a literature search

on the topic area (thirteen months), establishing the project (as well as its goals and objectives for three months), obtaining approval from review personnel and stakeholders at the chosen project site (two months), designing and implementing a pre tool implementation survey (to assess staff self-efficacy in tool usage as well as perceived safety of the environment with design taking two months), providing staff educational training (in the same week as administration of the pre-tool survey with ongoing training during implementation as needed), and then commencing setting-wide usage of the SSIPCL in environmental risk assessments for an implementation runtime of four months. At the end of the tool implementation period, a post tool implementation survey was conducted (after the four-month runtime) and evaluated along with a staff meeting (in the same week as the post-tool survey) to determine whether refresher training sessions are needed. Afterwards, all survey results as well as the impact of tool usage on reducing suicide rates were evaluated and findings were presented, which occurred over two months.

### *Work Breakdown Structure*

The work breakdown structure in Appendix H shows the phases of a project involving implementation of an environmental risk assessment tool, which could consist of staff training, utilization of the tool, and evaluation. In addition, ongoing project details (e.g., goals, planning, and progress) were shared with these parties as well as other stakeholders (including organizational executives, directors, supervisors, frontline psychiatric staff and medical records personnel) in order to foster support, involvement and provide updates on steps taken toward successful implementation.

For staff training, in-services were first conducted, where staff were provided education in person on the background and problem of environmental suicide hazards, how to perform an

environmental risk survey using the tool and properly document. These face-to-face in-services were centered around shift change conferences where the highest number of staff would be present to receive training and engage in simulations using the tool. Online resources for training would be provided for staff not present at the in-person meetings or serve as reference material that would include virtual conferences with the aforementioned staff and PowerPoint slide presentations. Next, staff would utilize the tool in environmental risk surveys (for an implementation runtime of four months) when a client presented with suicidal ideation and document the hazards identified as well as protocols followed to mitigate the hazard accordingly. In terms of evaluation, a survey was administered pre and post tool implementation to gauge staff self-efficacy in tool usage and perceived safety of the environment with as well as without tool usage. Also, chart/documentation reviews (e.g., of incident reports) were performed post implementation as well as twice during the implementation period to see changes in the number of 5150 holds for Danger to Self (DTS) placed during implementation compared to before for the same timespan (four months). In these reviews, tool adherence/uptake would also be observed through examining whether tool documentation was present for every instance where a client presented with suicidal ideation, signifying if staff were using the tool correctly or not. Objectives for these components of project implementation are discussed into the outcome measures section of this report. Documentation audits would also be performed to gauge the need for refresher training courses.

***Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis***

The SWOT analysis in Appendix I helps identify internal and external factors (that may be conducive or not) regarding project planning. A strength of this project is that implementation of an environmental risk assessment tool includes its extensive criteria compared to current

environmental safeguards in psychiatric settings (which are primarily focused on hanging) and effectiveness in reducing suicide rates, especially considering that the project site currently utilizes no such tool (Mills et al., 2010; Watts et al., 2017; Watts et al., 2012). In addition, such an intervention with associated training can address the resource and knowledge gap among mental health care staff, which may lack tools and information needed to perform proper risk assessments in order to identify hazards and mitigate patient suicide (Sakinovsky, 2014).

A potential weakness regarding checklist implementation is how highly dependent the efficacy of the tool is on the levels of acceptance and compliance among users, which could be remedied by simulations to raise awareness and increase use (Thomassen et al., 2011). In addition, implementation of the tool and the outcomes generated are not as generalizable to settings that are not similar to the project site, considering that other practice types (e.g., inpatient) can usually employ a higher level of abatement when it comes to environmental hazards such as having locked units, which residential settings cannot implement. However, findings can inform and improve practice at sites similar to non-inpatient psychiatric settings. An opportunity exists for project implementation, considering that the culture of suicide prevention is trending towards increased safety in psychiatric facilities and use of risk prevention tools (Jayaram, 2014). Successful project implementation could present opportunities for improving patient safety and increasing staff satisfaction, considering that the project can serve as a model for what could be improved in other settings within or outside the organization. Potential threats include a possible lack of support for long term implementation from leadership staff and general staff considering the culture at non inpatient psychiatric sites, which may believe that the clients there do not require hazard identification tools because if they did, they would generally require a greater level of care or be better suited for inpatient settings. Resistance among staff to accept

and utilize the tool stemming from this notion also serves as a potential threat. If long term support is not maintained, this could impact future tool design and implementation, staff training as well as checklist utility, and may result in decreased patient safety.

***Responsibility/Communication Plan***

The communication matrix in Appendix J displays the three types of meetings (along with aspects such as their associated communication mediums) that were used to implement, refine and evaluate the SSIPCL. These meetings include the initial stakeholders meeting to present the concept of the tool, gain support, approval, and glean feedback that will aid in implementation. Afterwards, staff training sessions took place so that the tool can be utilized properly and efficiently in environmental risk surveys with a combination of face-to-face in-services and online resources/presentations. Meetings focused on assessment of proper documentation, tool competency and soliciting feedback from staff (such as through surveys) occurred post-training (twice during the implementation period and one post implementation) and could happen periodically after the initial project implementation run to continuously improve the SSIPCL and promote effective usage.

***Budget and Financial Analysis***

Expenses can be observed in Table K1 of Appendix K, which consist of startup costs involving checklist materials (printer ink and paper considering the setting does not implement electronic medical records), training for each personnel based on their hourly pay, and cost elements if the project continued to be implemented to provide a one-year financial forecast (ongoing annual costs for checklist materials and new employee training in addition to recurring training and materials costs). Training expenses for each type of relevant staff member were generated based on hourly pay to provide an hour of training quarterly to account for the most

cost-inducing scenario, even though this may not be the case, as staff may only need to attend the initial training to be competent in tool usage rather than all quarterly trainings. Training costs are for relevant, frontline mental health care staff that will be using the checklist and ongoing training is for new employees that need to be trained on usage, which is based on an average 17% employee turnover rate and average hourly pay rate at the site (Telecare Corporation, 2018b). Total startup costs for the project (duration of four months or approximately one quarter) were calculated to be $605 (e.g., the quarterly column of startup costs were the actual costs incurred for this project) and projected to be $2,440 in the first year if all staff who were trained initially had to attend quarterly trainings as a refresher and if checklist materials were used at the same rate (Table K1 in Appendix K). Total ongoing costs would be $716 annually, consisting of checklist materials and training of new employees who might have to attend all quarterly training sessions. The total expenses in the first year, which consist of the combined start up and ongoing costs (as new hires would also happen within the same year of implementation), would be $2,836 (Table K1 in Appendix K).

Revenue generated would be a function of cost savings due to patient suicides prevented compared to pre implementation of the checklist. Considering that the project site utilizes no environmental risk assessment tool, resulting in the potential for increased suicide rates, we can use the findings of studies where hazard identification checklists were implemented to project revenue for our own use of the SSIPCL, albeit in a less directly applicable manner. For instance, Watts et al. (2017) found that 24 suicides occurred in the seven years prior to implementation but decreased to five within four years post implementation and none occurred afterwards after use of a hazard identification checklist. Also, Frost et al. (2020) found that using the SSSIPCL on nonpsychiatric inpatient units decreased self-injury and suicide attempts by approximately half

after implementation. Although the efficacy of the SSIPCL will vary at each site, the safest forecast of its application at the setting is that it will at minimum prevent one patient suicide a year. Since the average cost of one suicide is $1,329,553 (including administrative penalty fees, etc.), the organization will generate this much revenue (by preventing suicides and saving funds that would otherwise be spent on completed suicides) at minimum every year the checklist is implemented (Telecare Corporation, 2018b).

The three-year pro forma in Table K2 in Appendix K synthesizes expense as well as revenue information and assists in performing a financial forecast by providing an accurate view of the financial impact of the project. Total expenses in the first year would be $2,836 consisting of both startup and ongoing costs due to the fact that new hires would also happen in the same year of implementation that might need to attend all quarterly trainings, and total expenses in the following years would be $716 due to ongoing costs (Table K2 in Appendix K). Gross revenue generated per year would be dependent on the amount of money saved by preventing patient suicides, which would be $1,329,553 (cost savings of one suicide) at minimum each year the checklist is used (Telecare Corporation, 2018b). Total net profit for each year was obtained by subtracting total expenses from gross revenue, which yielded $1,326,717 for the first year and $1,328,837 for the following years (Table K2 in Appendix K). Just one suicide prevented overall is required for gross revenue to offset total expenses by a large margin and yield great net profit, and one prevented per year amplifies this.

To calculate our return on investment (ROI) the net profit from investment must be examined, which totals $3,984,391 based on a minimum of three suicide cases prevented over three years. The amount invested over the course of three years ($2,836 the first year and $716 each subsequent year all combined) is $4,268. Dividing the net profit from investment by amount

invested ($3,984,391 by $4,268) would give us a 933.55 to 1 ROI based on three cases for the first three years. For the first year, the ROI would be 467.81 to 1 based on one case (net profit from investment of $1,326,717 divided by an investment of $2,836) and across the first two years it would be 747.62 to 1 based on two cases ($2,655,554 divided by $3,552). Over a greater timespan, the ROI would increase provided that a minimum of one suicide was prevented per year, considering that ongoing annual investment is minimal compared to the annual profit from investment.

Even with the most cost inducing scenario (checklist materials used at the same rate and all staff to be trained attend all quarterly trainings) and least revenue generating condition (minimum of one patient suicide prevented per year), the project yields revenue that increases with time provided that the efficacy of the checklist is sustained. Fortunately, the long-lasting effectiveness of hazard identification checklists have been supported in previous studies spanning several years after implementation (Watts et al., 2017). The project is ultimately expense-reducing because the revenue generated due to preventing patient suicides and saving costs associated with these cases could be spent elsewhere in the organization.

**Study of the Intervention**

The Suicide and Self-Injury Patient Checklist (SSIPCL) was chosen as the environmental risk assessment tool to be used in this project because it offers comprehensive guidance on identification and mitigation of environmental suicide hazards at a level appropriate for the project site (psychiatric crisis residential), compared to other tools that possess levels of hazard abatement more suited for inpatient and not feasible for the project setting (for instance, the MHEOCC implemented on VHA inpatient psychiatric units involved restricting rods of any kind, plastic trash can liners, shower curtains, and more restrictions/architectural modifications to

be present at all times). Overall, the SSIPCL was chosen because it is an evidence-based tool that has demonstrated efficacy in the standardized, comprehensive identification of environmental hazards (and features protocols for safety monitoring/emergency management of clients experience suicidal ideation) and has resulted in reduction of patient suicide rates (Appendix E). The approach chosen for assessing the impact of the intervention and whether outcomes were due to the intervention included medical records/incident report reviews to show changes in the patient suicide attempt rate (suicide attempts indicated by 5150 DTS [danger to self] holds placed at the site per month or per case of suicidal ideation) pre and post implementation. The approach to assess impact of the intervention also included pre and post implementation surveys that showed changes in staff perceived site patient safety, efficacy of environmental risk assessment protocols (with and without the tool), and ability to identify environmental hazards in an environmental risk assessment.

**Outcome Measures**

A Plan-Do-Study-Act (PDSA) plan was used to outline phases of the project including the implementation of interventions, gathering of data, analysis of outcome measures to inform adjustments and foster future improvements in findings/project design (Appendix L). Quantitative measures were mainly used to assess the efficacy of the intervention and project. The primary outcome measure observed was patient suicide attempt rate (suicide attempts indicated by 5150 DTS holds placed at the site per month, or 5150 DTS holds placed per case of suicidal ideation). How this measure was chosen and when such holds are placed is unique to the project site and may differ from other behavioral health settings. At the site, the holds are not placed on admission- clients are admitted relatively stabilized and fit for a level of care at the residential setting. The holds are placed at the setting after admission if a client's level of suicidal

ideation (SI happens with symptom exacerbation but clients are often stabilized without SI for the majority of their stay) escalates to a point of higher risk or action/attempt resulting in the hold placed- (e.g. intent with plan and means, or a certain rating on the setting's suicide risk assessment scale [high on the Columbia-Suicide Severity Rating Scale]). Verbalizing SI is not enough for a hold at this particular setting because in many of the SI cases that do occur at the residential setting in the past, clients resolve without attempt or escalating to higher risk levels. Ideally, observing suicide attempts that could have been prevented with environmental control measures would be the primary measure, but for the runtime of this project, it may not yield enough data. Thus, 5150 DTS holds were chosen as the primary outcome measure considering the runtime and to see how to tool/environmental hazard reduction reduced cases of SI from escalating to levels of danger that would necessitate holds being placed (e.g. those presenting with SI resolving, not escalating or having potential attempts not occur due to environmental monitoring and mitigation that the tool provided to staff). This measure was compared pre and post implementation to show improvement and efficacy of the intervention through reduction of hazards, with the goal of reducing suicide attempt rates by at least 20% from baseline within the four-month implementation timespan. Data was obtained through reviewing the setting's case reports such as incident reports of relevant adverse events. Tool adherence/uptake was observed through such documentation reviews and examining whether tool documentation was present for every instance where a client presented with suicidal ideation, with the goal of 80% adherence (e.g., tool documentation present for at least 80% of the time a patient presented with suicidal ideation) within the four-month period.

Staff confidence scores were measured pre and post tool implementation in regards to perceived site patient safety, efficacy of environmental risk assessment protocols (with and

without the tool), and ability to identify environmental hazards in an environmental risk assessment. Pre- and post-tool implementation Likert scale surveys were used to measure these outcomes (Appendix M). Staff satisfaction in regard to improved safety of the unit environment as a result of tool usage had the goal of an 80% satisfaction rating (4 out of 5 on the scale) among 90% of staff. Another aim was that 100% of staff would display adequate self-efficacy when it came to performing an environmental risk assessment with the SSIPCL, signified by an 80% rating (4 out of 5) on the survey scale. The only qualitative data measurement was an open-ended response portion on staff satisfaction surveys to obtain more detailed, less closed-ended data on satisfaction regarding unit safety, the tool and feedback for tool improvement.

**Analysis**

The Qualtrics software was used to produce and administer the aforementioned surveys and Microsoft Excel was utilized to analyze survey data (Likert scale satisfaction results) and formulate percentage of satisfaction ratings among survey takers, respectively. Excel was also used to perform descriptive statistical analysis, such as generating frequency counts of events (e.g., of holds placed) and mean patient suicide attempt rates pre as well as post implementation. For the open-ended response portion on staff satisfaction surveys, the qualitative data was to be analyzed using the Qualtrics word cloud builder and qualitative thematic analysis (coding common themes and grouping them based on similarity in concept) to visualize and interpret responses with the top ten most occurring themes or words.

**Ethical Considerations**

This project was approved by the USF DNP program as a qualitative improvement project exempt from IRB approval. Policies surrounding the Health Insurance Portability and Accountability Act can pose a potential concern when it comes to data collection and

presentation (reviewing incident reports and compiling information from suicide attempt events to analyze as well as present). For this ethical consideration, participant confidentiality was maintained and HIPAA standards were met during the course of the project. Participant confidentiality was maintained through administration of a right to confidentiality form to all participants (the form was even included in the admission packet for all patients during implementation as well as part of the intake process before implementation, for they could all potentially be involved in a case contributing to outcome measures). In addition, any data that was transported or reported had participant information (names or dates of birth) redacted and outcome measures were focused on numerical values (e.g., counts of holds placed) besides qualitative satisfaction/feedback data from staff, who also had no identifying information as part of the administered surveys. Project participation has no impact on staff performance reviews.

The project was carried out in a fashion that upholds the American Nurses Association (ANA, 2015) ethical provision of promoting and protecting the rights, health and safety of the patient considering that SSIPCL implementation was to help improve the state of a safe patient care environment and prevent suicide while maintaining the right to confidentiality. The project also promoted the Jesuit value of fostering a culture of service that respects and promotes the dignity of every person (and principle of Cura Personalis or caring for the individual person) by implementing an intervention that can increase safety of service compared to status quo practices, which every patient is deserving of, while individualizing care considering that each instance of safety monitoring and risk assessment using the tool could be performed on a case-by-case basis in scenarios where individuals are experiencing suicidal ideation (University of San Francisco, 2020).

## Results

Review of the setting's incident reports were performed to see the patient suicide attempt rate (suicide attempts indicated by 5150 DTS [danger to self] holds placed at the site per month or holds placed per case of suicidal ideation) for the four-month implementation timespan, and to compare this to the same timespan before implementation. In the four months before implementation, only one client presented with suicidal ideation (with intent and plan) and a 5150 DTS hold was placed at the site for this client, coming out to 0.25 holds per month. During the four-month implementation timeline, despite the fact that more clients (three cases) presented with suicidal ideation as well as intent (with and without plan), the number of holds did not change- only one 5150 DTS hold was placed resulting in 0.25 holds per month. While this value remains the same pre and post implementation, in terms of holds placed per case of suicidal ideation, this decreased from 1 to 0.33.

Pre and post implementation surveys were administered to assess impact of the intervention through staff perceived site patient safety, efficacy of environmental risk assessment protocols (with and without the tool), and ability to identify environmental hazards in an environmental risk assessment. A visual overview of survey responses for pre- and post-tool implementation surveys among participants can be seen in Appendix N. On the pre-tool implementation survey, 18.75% of survey participants strongly agreed (5 out of 5 on the survey scale) that environmental suicide hazards posed a potential concern and could increase the risk of suicide attempts at the project site. 37.50% agreed for this prompt (6 out of 16 participants, the highest proportion), 31.25% were neutral, and 6.25% disagreed/strongly disagreed (4, 3, 2, 1 out of 5 on the survey scale, respectively). On the post-tool implementation survey with the same prompt, 31.25% of survey participants strongly agreed that environmental suicide hazards posed a potential concern and could increase the risk of suicide attempts at the project site. 62.50%

agreed for this prompt (10 out of 16 participants, the highest count), and 6.25% were neutral.

On the pre-tool implementation survey, 6.25% of survey participants perceived the environment at the project site to be very safe for clients experiencing thoughts of self-harm or suicide. 12.50% perceived the environment as safe, 62.50% saw it as somewhat safe (neutral being the highest proportion), and 18.75% viewed it as unsafe. For this prompt on the post implementation survey, 37.50% of participants perceived the environment to be very safe, 50% (the highest portion) perceived the environment as safe, and 12.50% saw it as somewhat safe (neutral). On the pre implementation survey, no survey participants believed existing practices (no environmental risk assessment tool) to be very effective when it came to environmental risk assessments to identify physical hazards and reduce suicide risk. 18.75% saw these practices to be effective, 50% saw it as somewhat effective (neutral, the highest portion), and 31.25% viewed it as ineffective. After tool implementation, 37.50% believed current practices (which now included the tool) to be very effective in identifying physical hazards and reducing suicide risk, 50% (the highest percentage) saw these practices to be effective, and 12.50% saw it as somewhat effective (neutral), with no responses viewing them as ineffective/very ineffective.

On the pre implementation survey, no survey participants were very confident in their current ability to perform an environmental risk assessment for suicide hazards, 37.50% were confident, 56.25% (the highest amount) were somewhat confident (neutral), and 6.25% were unconfident. For the post implementation survey, 62.50% were very confident, 37.50% were confident, and no participants were somewhat confident (neutral), or unconfident/very unconfident. On the pre implementation survey, 12.50% of survey participants were very confident in their ability to utilize the tool to perform an environmental risk assessment for suicide hazards, 43.75% were confident (the highest percentage), 37.50% were somewhat

confident (neutral), 6.25% were unconfident and none were very unconfident. Post implementation survey, almost all participants (93.75%) were very confident, 6.25% were confident, and none were somewhat confident (neutral) or unconfident/very unconfident. Having such a high proportion of individuals be very confident in using the tool to perform environmental risk assessments was an unexpected benefit of the intervention and initial improvement plan (which did not really evolve over time) that may likely be due to the intervention itself (inherently serving as a reference for such assessments when staff had none) and its elements (e.g., follow up meetings centered around tool competency) which can boost self-efficacy.

The post implementation survey also included two additional questions gauging participants' beliefs on the support that the tool provided (after using it) that were not on the pre implementation survey. For the first question, half (50%) of survey participants strongly agreed that the tool supported consistent practice related to identifying suicide hazards through environmental risk assessments at the project site and the other half agreed for this prompt. For the last question, 75% (12 out of 16) of survey participants strongly agreed that the tool helped guide them in identifying suicide hazards and safely monitoring patients at risk for suicide and self-injury and 25% agreed for this prompt, with none being neutral or disagreeing on this prompt. There were no responses for the open-ended section of the surveys. When comparing the visual overview of responses in Appendix N for the post-tool implementation survey to pre, it is clear that a much greater number of participants responded with 4 or 5 (agree or strongly agree) on the Likert scale than before.

For tool adherence/uptake, documentation reviews were performed to examine whether tool documentation was present for every instance where a client presented with suicidal

ideation. Across the implementation period, there were three instances of clients presenting with suicidal ideation, and two pieces of tool documentation forms for these cases, signifying 66% adherence. These changes or improvements impacted clinical/organization processes by highlighting the importance of tools, items of reference and general documentation- during implementation, the organization placed greater emphasis in having such resources in processes such as physician medication ordering, medication administration record transcribing and controlled drug monitoring as well as destruction. Contextual elements that interacted with the interventions and could account for outcomes include having the support of leadership and having their presence at all meetings during implementation, staffing mix (e.g., fewer nursing staff compared to other individuals places more perceived importance on content when presented by nursing staff) and acuity of patients (higher acuity patients presenting with greater incidence of suicidal ideation) because they highlight the importance of the intervention (even if indirectly) and place a greater onus on staff to thoroughly review tool-related content during trainings/meetings.

## Discussion

### Summary

Key findings included that the patient suicide attempt rate (when measured in terms of 5150 DTS holds placed per case of suicidal ideation) decreased from 1 to 0.33, despite the fact that the number of holds placed per month during pre and post implementation periods (four months each) remained the same at 0.25. Basically, the pre implementation period had 100% of cases involving suicidal ideation with intent (with or without plan) result in 5150 DTS holds placed and this decreased to 33% during the implementation period. This signifies a 66% decrease and meets the project aim of at least a 20% decrease from baseline during the four-

month implementation period. By the end of the implementation period, at least 90% of staff agreed or strongly agreed that environmental suicide hazards posed a potential concern and could increase the risk of suicide attempts at the project site, showing that awareness of the problem increased as a result of the intervention and the training surrounding it. Post implementation, 87.50% of staff perceived the environment at the project site to be safe or very safe for clients experiencing thoughts of self-harm or suicide, just barely missing the aim of having a staff satisfaction rating of safe (in regards to improved safety of the unit environment as a result of tool usage) among at least 90% of all staff surveyed via Likert scale. However, 87.50% of staff believed practices including the tool to be effective or very effective in identifying physical hazards and reducing suicide risk compared to an initial 18.75% believing that the status quo practice of having no environmental risk assessment tool was effective/very effective. Post implementation, all survey participants were confident or very confident in their current ability to perform an environmental risk assessment for suicide hazards compared to an initial 37.50% being confident/very confident in such ability. When it came to self-efficacy in tool usage, almost all participants after implementation (93.75%) were very confident and 6.25% were confident (compared to an initial 43.75% being confident and 12.50% very confident) which met the aim of having all staff attain adequate confidence (at least 4 out of 5 on the survey scale) in utilizing the tool. In regards to whether the tool supported consistent environmental hazard monitoring practices and helped staff identify hazards/safely monitor at risk clients, all survey participants agreed or strongly agreed on these prompts. Tool adherence (measured as a percentage of documentation present for each case of suicidal ideation during implementation) was 66%, with one case out of three missing documentation, missing the project aim of 80% adherence (e.g., tool documentation present for at least 80% of the time a patient presents with

suicidal ideation) within the four-month period.

What contributed most importantly to any successful changes was most likely how the intervention addressed a deficiency in the initial context of the setting- e.g., no environmental risk assessment tool and the inherent nature of the intervention as a resource that could fill this gap and be used for guidance or reference when none existed initially, fostering positive outcomes even if adherence was not 100%. Also, the follow up meetings that occurred throughout the implementation period that focused on assessment of proper documentation, tool competency and soliciting feedback from staff likely contributed toward successful change because they likely served as reminders to continue utilizing the tool and building support to address the lack of such a tool. With a longer implementation period and continued meetings with the same personnel, it is possible that adherence would be even greater and aims regarding perceived safety of the unit environment as a result of tool usage would have been met. Implications for advanced nursing practice include utilization of the tool or having references for environmental safety monitoring in settings such as these where there are limited medical staff and often only one advanced practice nurse on site (e.g., outpatient, residential, or independent practice) working alongside unlicensed staff providing care to patients who can experience suicidal ideation in order to reduce the risk of suicide in settings with limited restrictions and support.

**Interpretation**

Results of the project were relatively comparable with findings from other publications- however, there are obvious contextual differences (e.g., setting and timeline) between studies that yielded such results. For instance, use of the intervention in the project decreased the patient suicide attempt rate (when measured in terms of 5150 DTS holds placed per case of suicidal

ideation) by 66% and similar results were found with use of the SSIPCL in another study, which decreased self-injury and suicide attempts by approximately half after implementation- but the tool was piloted for four years at a large general hospital rather than four months at a much smaller residential setting (Frost et al., 2020). In addition, similar survey prompts were utilized by Frost et al. (2020) regarding staff outlook on the intervention that generated similar results to the findings of this project- staff agreement was high (approximately 90% among participants in both this study and the project) when it came to beliefs of the intervention helping guide staff in identifying environmental safety risks, safely monitoring at risk patients and supporting consistent practice. The project impacted people at the setting and systems involved (especially quality control, safety monitoring and documentation) by highlighting the importance of tools, items of reference and general documentation while showing that they were effective as the intervention was implemented and less cases of suicidal ideation resulted in holds placed. This impact was shown during implementation, where the organization placed greater emphasis in having such resources for monitoring in processes such as physician medication ordering, medication administration record transcribing and controlled drug monitoring as well as destruction.

Observed and anticipated outcomes generally aligned- it was expected that survey findings would result in general support of the intervention (90% or more agreeable) with the majority being tool adherent (80%), and that the tool would result in a decrease of patient suicide attempt rates (at least 20%), considering the status quo practices had no environmental risk assessment tool, but it was not known to which degree these measures would increase. There was an expected amount of support from the post survey responses (approximately 90% or more in agreement), below expected (66%) tool adherence and greater improvement (66% decrease) in

5150 holds placed per case of suicidal ideation. Difference between the observed and anticipated outcomes when it came to impact on patient suicide attempt rate (holds per case of SI) may be due to the initial context of having no environmental risk assessment tool and the introduction of the intervention filling this gap and even serving as a reference when it was not being utilized in an active SI case and allowing staff to prepare mentally beforehand (e.g., going from no guidance to a tool with available information for guidance/reference may have resulted in this large of an impact). Below expected tool adherence may be due to the low frequency of suicidal ideation cases that occurred at the site during the implementation period, giving staff less opportunities to ingrain the habit of tool use in daily practice whenever facing a client with SI.

It was assumed environmental barriers or facilitators were the primary influential factors in suicidal behavior and intention in the setting, as the theoretical framework supports this and previous research noted that environmental hazards were the primary contributor to suicide. Findings supported the theoretical framework (which states determining factors, including the environment, influence if a behavior is carried out) because a decrease in patient suicide attempt rates was observed with the implementation of the intervention, which targeted environmental facilitators for suicidal behavior. When it came to survey results and tool adherence, findings somewhat supported the theoretical framework because survey responses for influential factors such as perceived self-efficacy (around tool utility and performing environmental risk assessments) and subjective or perceived norms around use of such an intervention in the crisis residential setting improved, resulting in overall increased intention to perform the behavior of tool usage and adherence, evidenced by 66% tool adherence. Aside from the financial cost of $605 for the project, there were no opportunity costs or trade-offs; having a status quo practice of no environmental risk assessment tool presented a great opportunity to implement the

intervention with nothing to lose.

Implications of these findings for leadership of change in addition to the means necessary to sustain and increase levels of performance regarding the tool/suicide attempt rates indicate that a longer timeline (with continued follow up meetings) may be needed to foster greater tool adherence and for all team members to fully accept the tool into routine practice with more exposure to the tool/opportunities to use it, resulting in further decrease of suicide attempt rates. This also provides similar implications for future professional and staff development- introducing a resource when there is none present for a clinical scenario (even as a reference), having follow up refresher sessions, either a longer training timeline or enough to allow adequate exposure/practice with a new tool (e.g., at settings with higher occurrences of suicidal ideation, the tool would have seen more use in the field) can possibly result in greater acceptance of the intervention, adherence and more competent staff over a shorter period of time.

**Limitations**

Implementation of an environmental risk assessment tool such as the SSIPCL can result in a significant reduction of patient suicide rates by comprehensively identifying environmental hazards and addressing a resource/knowledge gap among mental health staff by providing the tools and training necessary to properly conduct environmental risk assessments (Sakinovsky, 2014; Watts et al., 2017; Watts et al., 2012). However, this process is not without limitations or barriers. A potential limitation is that efficacy of the checklist and accuracy of true outcomes depends greatly on the ability and decision of staff to use it. This also makes incompetency and resistance (e.g., individuals not using the tool and maintaining status quo practices) a barrier to successful project implementation. Efforts were made to mitigate this through highlighting the significance of the problem during initial training and having follow up meetings focused on

assessment of proper documentation, tool competency and soliciting feedback from staff that occurred post-training during the implementation period. However, in the future, issues related to acceptance, competency and compliance among users could also be remedied by hands-on simulation drills (in addition to presentations and learning modules) to increase familiarity, mastery and use (Thomassen et al., 2011). These simulations could be conducted using elements of democratic leadership, where the need of each individual is emphasized in achieving goals tied to the organization's vision (e.g., increased patient safety through tool competency and utility), which results in team members feeling valued and motivated to bring their best effort (Cunningham et al., 2015). This leadership approach along with soliciting feedback will help staff feel valued, promote collaboration and improve the tool in a manner that facilitates usage, especially after seeing that modifications are made based on their input (Weberg & Davidson, 2019).

Other limitations or characteristics that outcomes were dependent on included length of implementation runtime, considering that most studies examining the impact of an environmental risk assessment tool lasted anywhere from one to seven years (to collect enough data on suicide outcomes including completed attempts) compared to the project's runtime of four months. This was not enough time for suicide attempts/completions to occur and yield enough data to choose this as an outcome measure and observe it (ideally, the primary measure would be attempts that could have been prevented with environmental control measures). An effort was made to mitigate this by having outcome measures of 5150 holds for DTS placed per month or case of suicidal ideation (e.g., clients already admitted with SI that escalates to a level that presents a severe enough danger to themselves through action/attempt necessitating a hold placed at the site), rather than measures of suicide attempt and completion rates. Another characteristic is the

acuity of patients admitted before and after implementation- it was clear that more clients were higher acuity and expressed suicidal ideation during implementation compared to the timespan before, which may have impacted results when comparing pre and post implementation suicide data. Change in acuity or other characteristics of patients admitted that can impact outcomes is a factor noted in previous studies on environmental hazard suicide checklists as well (Watts et al., 2017). However, this limitation (e.g., lack of a control group) is inherent across almost all suicide prevention studies for ethical reasons (Mills et al., 2010; Mohl et al., 2012; Watts et al., 2017).

Using approaches to mitigate the limitations and barriers associated with resistance to or incompetency in tool implementation can help similar projects reach successful implementation. With this scenario in the short term, staff will be educated and feel motivated to use the checklist properly in environmental risk assessments, resulting in reduced patient suicide rates and decreased cost expenditures as a function of suicides prevented. In the long term, the efficacy of such tools is expected to be sustained if efforts are continually made to maintain compliance among tool users (considering that previous studies on hazard identification checklists showed the impact on reducing suicide rates was maintained up to several years after implementation) and the results of this project can advance suicide prevention efforts in other healthcare settings for any patient with potential suicidal ideation (Watts et al., 2017).

The size of the facility and practice type (psychiatric crisis residential) may make findings less generalizable to other mental health settings such as inpatient, which typically have greater sizing and can usually employ a higher level of mitigation when it comes to environmental hazards (e.g., having locked units, indefinite restriction of patient belongings and architectural modifications) which residential settings cannot implement. However, findings can be more applicable to non-inpatient psychiatric settings and the context can result in improved

outcomes considering that such practice types would benefit from utilization of an environmental risk assessment tool to best address hazards given the aforementioned site constraints regarding hazard abatement. Elements of the local care environment most likely influenced change/improvement at the project site because the practice type (psychiatric crisis residential with less restrictions), status quo practices (no environmental risk assessment tool or standardized procedure) and patient population (mental health patients whose symptom exacerbation can result in danger to self/others) set the stage for a scenario where any guidance or intervention can prove be beneficial in reducing suicide risk (along with having staff that are open to change/assistance as a result of the environment's circumstances).

## Conclusions

Potential short-term implications of this change of practice project include greater awareness of the issue of environmental suicide hazards at the project setting and increased value in the utilization of environmental risk assessment tools. Long term implications for nursing practice stemming from the project include the use of environmental risk assessment tools as a staple in environmental surveys alongside existing measures such as structural safeguards, observation, and training consisting of awareness of environmental precautions. Such tools can also be used to provide guidance in increasing the sustainability of mental health interventions, since checklists involve physical changes to the environment after hazards are identified that are more likely to be sustained (Watts et al., 2017). Also, findings provide guidance in the systematic abatement of commonly occurring, higher risk level hazards (e.g., greater emphasis on anchor points and ligatures in environmental risk assessments, especially in bedrooms and bathrooms) (Mills et al., 2013; Mills et al., 2010).

Moving forward, further research is needed to examine the efficacy of environmental risk

assessment tools in decreasing suicide rates, especially in non-VHA settings (Mills et al., 2010; Watts et al., 2017). Findings can be used to provide guidance in implementing environmental risk assessment tools or abatement measures such as checklists in settings similar to the project site (e.g., non-inpatient mental health) or other psychiatric settings to address the knowledge gap surrounding them. For instance, Frost et al. (2020) implemented the SSIPCL on nonpsychiatric inpatient units and the project implemented the tool at a crisis residential setting, but the tool could perhaps be applied to mental health settings similar to this since they have similar patient restrictions and architecture, unlike inpatient psych settings (which often have environmental safeguards and utilize checklists that possibly require significant structural changes to be made to other settings). Sustainability of the project can be assured by continuing to have training sessions and learning opportunities with hands-on simulation drills quarterly on the tool to continually address the knowledge/resource gap among staff regarding environmental suicide hazards as well as how to properly screen for them. Suggested next steps upon project completion include soliciting additional input from staff to enhance the quality of these training opportunities and acceptance/compliance of the tool among staff to increase sustainability. Findings can aid in the development and formation of health professionals by showing the potential benefit of standardized tools for environmental risk assessment (or any clinical process) and generally providing insight on introducing a resource when there is none present for a clinical scenario, as well as fostering acceptance, adherence and competency (through follow up refresher sessions or exposure/practice with the new intervention).

In summary, patient suicide is a consistent adverse event that primarily occurs in psychiatric settings, resulting in grave harm to patients, decreased staff satisfaction and increased healthcare costs (Cardell et al., 2009; Sakinofsky, 2014). Staff in healthcare settings may lack the

tools and training needed to perform proper risk assessments in order to identify environmental hazards (a primary contributing factor) and mitigate patient suicide (Sakinofsky, 2014). A project using the Integrated Behavioral Model as a framework to implement the SSIPCL (an evidence-based checklist that has demonstrated efficacy in the standardized, comprehensive identification of environmental hazards) can help address this need by providing the tools and education necessary to reduce risk of suicide and increase staff satisfaction in the short and long term at a psychiatric crisis residential setting, but more research is needed with a longer implementation runtime. The project can have a relatively minimal initial cost but result in increasing returns on investment over time and cost savings due to suicides prevented, even in the most initial cost-inducing, minimal efficacy scenario. While efficacy can greatly depend on staff utility and competency, barriers of resistance as well as incompetency can be mitigated through simulation training and leadership approaches geared towards self-perceived value of staff. The results of this project can advance suicide prevention efforts in other healthcare settings for any patient with potential suicidal ideation.

## Funding

This project received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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# Appendix A

## Non-Research Approval Documents

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### Doctor of Nursing Practice
### Statement of Non-Research Determination (SOD) Form

*The SOD should be completed in NURS 7005 and NURS 791E/P or NURS 749/A/E*

**General Information**

| | | | |
|---|---|---|---|
| **Last Name:** | Le | **First Name:** | Alan |
| **CWID Number:** | 20542778 | **Semester/Year:** | Spring 2021 |
| **Course Name & Number:** | NURS 749 NP QUALIFYING PROJECT: MANUSCRIPT DEVELOPMENT | | |
| **Chairperson Name:** | Trinette Radasa | **Advisor Name:** | Joan Fraino |

**Project Description**

1. ***Title of Project***

Implementation of a Mental Health Environmental Risk Assessment Tool

2. ***Brief Description of Project***

Clearly state the purpose of the project and the problem statement in 250 words or less.

The purpose of this project is to implement an environmental risk assessment tool to be used in environmental risk surveys in order to identify physical hazards, decrease patient suicide rates as well as incidences of harm and help address the issue of inpatient suicide in particular, which make up the bulk of patient suicides across healthcare settings. Patient suicide is an issue because it results in serious harm to patients, decreased staff satisfaction and increased healthcare costs in addition to a consistently high sentinel event ranking. Most of these events involve mental health patients, making them a high-risk group and the greatest contributing factor to this event is perhaps the physical unit environment. Staff may lack the tools and training needed to perform proper risk assessments in order to identify environmental hazards and mitigate patient suicide, especially in psychiatric settings, which adds to the issue. This calls for an increased need for patient suicide prevention, especially in mental health settings and using interventions that consider the unit environment, which such a tool can help address.

**3. AIM Statement: What are you trying to accomplish?**

- What do you hope to accomplish with this project? Aims should be SMART, specific, clear, well-defined, and at a minimum describe the target population, the desired improvement, and the targeted time frame.
- To improve (your process) from (baseline)% to (target)%, by (timeframe), among (your specific population)

*Complete this statement:*

To increase / **decrease**: _____patient suicide attempt rates_____ (process/outcome)

from: _____baseline_____ (baseline %, rate, #, etc.)

to: _____a minimum 20% reduction_____ (goal/target %, rate, #, etc.)

by: _____4 months_____ (date, 3 - 6-month timeframe)

in: _____mental health patients_____ (population impacted)

**4 Brief Description of Intervention (150 words).**

The intervention is an environmental risk assessment tool called the Suicide and Self-Injury Patient Checklist (SSIPCL), which is an evidence-based tool that has demonstrated efficacy in the standardized, comprehensive identification of environmental hazards and has resulted in reduction of patient suicide rates. Other aspects of the intervention involve associated training among staff on tool usage to perform proper risk assessments in order to effectively identify hazards.

**4a. How will this intervention be implemented?**

- Where will you implement the project?
- Attach a letter from the agency with approval of your project.
- Who is the focus of the intervention?
- How will you inform stakeholders/participants about the project and the intervention?

5. The planned site for project implementation is a psychiatric crisis residential setting. An inpatient mental health setting could find a need for the project as well since patient suicides occur more often in this setting, but non-inpatient settings such as crisis residential face a knowledge gap regarding mitigation of environmental hazards, which the project could help address. The intervention will focus on benefitting mental health patients, but it is also targeted at staff since they will be the ones using the tool to bring about these benefits in patient safety. Stakeholders/participants will be informed about the project and intervention through presentations at regularly occurring meetings (e.g. staff conferences or patient/community check-ins) and emails.

**Outcome measurements: How will you know that a change is an improvement?**

- Measurement over time is essential to QI. Measures can be outcome, process, or balancing measures. Baseline or benchmark data are needed to show improvement.

- Align your measure with your problem statement and aim.
- Try to define your measure as a numerator/denominator.
    - What is the reliability and validity of the measure? Provide any tools that you will use as appendices.
    - Describe how you will protect participant confidentiality.

The primary outcome measure that will be observed is patient suicide attempt rate (suicide attempts indicated by 5150 DTS [danger to self] holds placed at the site per month). Staff satisfaction scores will also be measured in regards to perceived site patient safety and ability to identify environmental hazards in an environmental risk assessment. These outcome measures will be compared pre and post implementation to show improvement and efficacy of the intervention. Data will be obtained through reviewing the setting's case reports such as incident reports of relevant adverse events. Participant confidentiality will be protected because data collection will be limited to these reports, which are electronically encrypted and physically secured (paper formats remain locked on site). Any data that is transported or reported will have participant information (names or dates of birth) redacted and outcome measures will be focused on numerical values. A right to confidentiality form will be administered at the setting to all participants (the form could be included in the admission packet for all patients during implementation, for they could all potentially be involved in a case contributing to outcome measures).

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## DNP Statement of Determination
## Evidence-Based Change of Practice Project Checklist*

*The SOD should be completed in NURS 7005 and NURS 791E/P or NURS 749/A/E*

**Project Title:**

Implementation of a Mental Health Environmental Risk Assessment Tool

| Mark an "X" under "Yes" or "No" for each of the following statements: | Yes | No |
|---|---|---|
| The aim of the project is to improve the process or delivery of care with established/ accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes. | X | |
| The specific aim is to improve performance on a specific service or program and **is a part of usual care**. All participants will receive standard of care. | X | |
| The project is **not** designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does **not** follow a protocol that overrides clinical decision-making. | X | |
| The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does **not** develop paradigms or untested methods or new untested standards. | X | |
| The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does **not** seek to test an intervention that is beyond current science and experience. | X | |
| The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP. | X | |
| The project has **no** funding from federal agencies or research-focused organizations and is not receiving funding for implementation research. | X | |
| The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., **not** a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients. | X | |
| If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: *"This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board."* | X | |

**Answer Key:**

- If the answer to all of these items is "Yes", the project can be considered an evidence-based activity that does not meet the definition of research. IRB review is not required. Keep a copy of this checklist in your files.
- If the answer to any of these questions is "No", you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used: http://answers.hhs.gov/ohrp/categories/1569

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## DNP Statement of Determination
## Evidence-Based Change of Practice Project Checklist Outcome

*The SOD should be completed in NURS 7005 and NURS 791E/P or NURS 749/A/E*

**Project Title:**

Implementation of a Mental Health Environmental Risk Assessment Tool

■ This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). **Student may proceed with implementation.**

☐ This project involves research with human subjects and **must be submitted for IRB approval before project activity can commence.**

**Comments:**

| | | | |
|---|---|---|---|
| **Student Last Name:** | Le | **Student First Name:** | Alan |
| **CWID Number:** | 20542778 | **Semester/ Year:** | Spring 2021 |
| **Student Signature:** | Alan | **Date:** | 4/11/2021 |
| **Chairperson Name:** | Trinette Radasa | | |
| **Chairperson Signature:** | *Trinette Radasa* | **Date:** | 4/27/21 |
| **DNP SOD Review Committee Member Name:** | Alexa Colgrove Curtis | | |
| **DNP SOD Review Committee Member Signature:** | *Alexa C. Curtis* | **Date:** | *4/13/21* |

# Appendix B

## Letter of Support from Agency

Telecare Corporation
RESPECT. RECOVERY. RESULTS.

April 27, 2021

To Whom It May Concern,

This is a letter of support for Alan Duy Khiem Le to implement his DNP Comprehensive Project: "Implementation of a Mental Health Environmental Risk Assessment Tool" at Telecare Muriel Wright Crisis Residential Treatment (CRT) center.

Sincerely,

May 4, 2021

Nadia Nader, PhD, MA, LMFT #119631

Clinical Director

Muriel Wright Recovery Center | Crisis Residential Treatment (CRT)

298A Bernal Rd, San Jose, CA 95119

(408) 638-4744

# Appendix C

## Evidence Evaluation Table

| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Cardell R., Bratcher K. S., & Quinnett, P. (2009). Revisiting "suicide proofing" an inpatient unit through environmental safeguards: A review. *Perspectives in Psychiatric Care, 45*(1), 36–44. https://doi.org/10.1111/j.1744-6163.2009.00198.x | | | | | | | |
| To identify types of environmental precautions in psychiatric facilities that can be implemented to protect suicidal individuals from harming themselves and provide recommendation for how inpatient units can be made safer. | Literature review.<br><br>No details on design, method, or conceptual framework. | No sample size or comprehensive details on article pool/literature sources or databases mentioned. However, all sources mentioned pertain to the topic of environmental precautions in psychiatric facilities to reduce suicidal means.<br><br>Manual review of this work (e.g. references used) showed | IV: Content pertaining to the history of environmental hazards and precautions implemented in psychiatric units to decrease suicidal means in literature sources.<br><br>DV: Recommendations and implications for practice based off of the IV (findings/content from literature sources). | Authors summarized, reviewed and synthesized findings/content from literature sources with no explicit measurement or analysis method listed. | Authors summarized, reviewed and synthesized findings/content from literature sources with no explicit measurement or analysis method listed. | Proposed environmental safeguards included slanted door hinges/shower heads, breakaway shower rods, avoidance of bedrails, non-breakable glass and restriction of personal belongings to prevent suicide by hanging from fixtures, jumping and use of personal items.<br><br>Research suggests that while such safeguards do decrease the incidence of suicide, they should not be depended upon solely and instead be combined with observation and supportive, caring | **Level of Evidence:** Level V-B<br><br>**Worth to Practice:** Findings provide recommendation and direction on guidelines surrounding implementation of environmental precautions to decrease suicidal means in psychiatric facilities and increase unit safety (e.g. environmental safeguards alongside surveys, training and policies on belongings, assessment and documentation).<br><br>**Strengths/Weakness:** Strengths of this review include clear aim and objective, a meaningful analysis of conclusions from the literature sources, and reasonably consistent recommendations that were made for future practice/study with some reference to scientific evidence. Weaknesses include providing no details provided on design, method, article pool or literature sources/types reviewed. While the format of a literature review is nonsystematic, knowing the quality of the sources reviewed would be helpful in |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| | | that findings were obtained from fourteen literature sources (a combination of clinical practice guidelines, journal articles, and organizational reports).<br><br>Settings mentioned are inpatient mental health units (worldwide, due to country not specified). | | | | therapeutic interventions focused on patient moods and behaviors.<br><br>Implementing environmental safeguards is one of the first steps in decreasing inpatient suicide, but more research is needed to evaluate effectiveness of such safeguards and whether other interventions are as effective.<br><br>Environmental surveys should be used to identify hazards and make sure that precautions are in place. Training should involve awareness of such precautions, policies on patient visitation, belongings, suicide risk assessment and documentation. | assessing the quality of the literature review.<br><br>**Feasibility:** Environmental precautions can decrease suicide but feasibility depends on the setting's financial resources and approval.<br><br>**Conclusions:** Use of environmental safeguards is first of steps in inpatient suicide prevention but should not be solely depended upon. There are a variety of effective safeguards such as slanted door hinges/shower heads, breakaway shower rods, avoidance of bedrails, non-breakable glass and restriction of personal belongings.<br><br>**Recommendation:** Inpatient mental health care settings should utilize environmental safeguards alongside other measures: Environmental assessments (to ensure that precautions are in place to identify any hazards), observation, and training (which should include awareness of environmental precautions, institutional policies on patient belongings, visitation, suicide risk assessment and documentation). |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Cox, G. R., Owens, C., Robinson, J., Nicholas, A., Lockley, A., Williamson, M., Cheung, Y. T. D., & Pirkis, J. (2013). Interventions to reduce suicides at suicide hotspots: A systematic review. *BMC Public Health*, *13*(1), 214. https://doi.org/10.1186/1471-2458-13-214 | | | | | | | |
| To examine the evidence for the effectiveness of interventions available to reduce suicides at structural hotspots. | The systematic review was conducted in accordance with the PRISMA Statement. Searches were done on the Medline database of articles that described an intervention relating to a known suicide hotspot, and evaluated it using at least a before-and-after design with no comparison and used suicides as the outcome of interest. Stronger study designs were preferred and suicides could | Articles on the Medline database from its inception to April 2012 that met the inclusion criteria (described an intervention pertaining to a suicide hotspot and evaluated the intervention using at least a before-and-after design with no comparison, and use suicides as the outcome of interest).<br><br>Suicide hotspots in the US, Canada, UK, NZ, AU, | IV: Inclusion criteria (intervention relating to a suicide hotspot, evaluation using at least a before-and-after design with no comparison.<br><br>DV: Article yield and characteristics of studies with suicides as outcome of interest. | PRISMA statement checklist | Stage 1: Medline database search from inception to April 2012 was performed using inclusion criteria.<br><br>Stage 2: The following data was extracted for each study:<br>-Author(s)<br>-date of publication<br>-setting<br>-general approaches<br>-specific interventions<br>-study design<br>-observation period<br>-findings.<br><br>Stage 3: Data was examined on changes in number or rate of suicides at the hotspot site (and comparison sites | Nineteen papers describing fourteen studies at thirteen locations worldwide met the inclusion criteria. Five studies were ecological studies with quasi-experimental designs (non-randomized studies with before-and-after designs and comparison sites) and nine were the same design without comparison sites (non-experimental). Interventions studied consisted of 1) Restricting access (structural barriers), 2) Encouraging help-seeking (signs for crisis lines), 3) Increasing likelihood of third party rescue (staff training near hotspots), and 4) Guidance on responsible media reporting of | **Level of Evidence:** Level III-B<br><br>**Worth to Practice:** Findings provide information on the efficacy of interventions in reducing suicide at suicide hotspots that provide guidance for suicide prevention in practice at similar hotspots using these interventions. Namely, physical barriers at jump sites from a height.<br><br>**Strengths/Weakness:** There is consistent and relatively strong evidence from the review consisting of quasi-experimental design studies (demonstrating that decreasing access to suicide means through barrier installation at hotspots can be effective in averting suicides). Studies lack randomization, but it is ethically concerning to have randomized controlled trials in this topic area (suicide prevention) because randomly selecting some sites to receive the intervention (when it should be used for all sites if it has any potential benefit in preventing suicide) is generally not feasible. Investigators only had the capacity to search one database and it may not have been always possible to determine the |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| | be measured with or without other outcomes, such as suicide attempts.<br><br>No conceptual framework noted. | Europe and China. | | | if available). If the same core data was used in more than one paper and modified with follow-up data, it was regarded as relating to the same study to avoid double-counting of impact. If the same data was examined by different investigators, it was viewed as separate studies but findings were discussed together. | suicides/hazards. All demonstrated efficacy in reducing suicide rates, but the strongest evidence came from installing barriers at suicide hotspots. | nature of the intervention (one study's intervention had a complement but it was not reported, and this may not be an isolated scenario).<br><br>**Feasibility:** Implementing interventions to reduce suicide at suicide hotspots as outlined in the studies can be beneficial (especially when utilizing physical barriers at jump sites) but feasibility depends on the setting's financial resources and approval from organizational members.<br><br>**Conclusions:** Restricting access to means of suicide can work and while the majority of other interventions discussed can be effective (encouraging help-seeking, increasing third party intervention and responsible media reporting), they require further testing.<br><br>**Recommendation:** Restrict access to means of suicide (through installation of physical barriers) at known suicide hotspots (jumping from a height) to effectively avert suicides. This can translate to other similar hotspots in other behavioral healthcare settings, such as ensuring that the upper floors as these facilities have windows with |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| | | | | | | | glass that can withstand attempts to break it and prevent jumps. |

Definition of abbreviations: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Frost, D. A., Snydeman, C. K., Lantieri, M. J., Wozniak, J., Bird, S., & Stern, T. A. (2020). Development and implementation of a suicide prevention checklist to create a safe environment. *Psychosomatics: Journal of Consultation and Liaison Psychiatry*, *61*(2), 154-160. https://doi.org/10.1016/j.psym.2019.10.008 | | | | | | | |
| To describe the impact of implementing the SSIPCL for potentially suicidal inpatients on nonpsychiatric units in a large general hospital. | Non-experimental research study. Retrospective review of secondary data.<br><br>Data was obtained from safety reports between January 2014 and December 2018 on patient self-injury and suicide attempts.<br><br>No conceptual framework noted. | Sample consisted of safety reports on self-injury and suicide attempts. The setting was the Massachusetts General Hospital. | IV: Implementation of the SSIPCL<br><br>DV: Suicide and self-harm data from incident reports. Also, nurses' feedback on the checklist | Suicide and self-harm data include:<br>1) Attempt counts,<br>2) Counts and percentages for methods, and<br>3) Counts and percentages for severity of injuries from events.<br><br>Hospital-wide survey (using Likert scale) using Research Electronic Data Capture for nurse feedback on use of the checklist for:<br>1) Patients at risk of suicide,<br>2) Supporting consistent practice,<br>3) Safe monitoring of patients and<br>4) Identifying environmental safety risks. | Descriptive statistics were used for frequencies and percentages of suicide and self-harm data. They were also used for percentages (in relation to each category of the Likert scale) for survey responses. For instance, since the Likert scale used the categories of strongly agree, agree, neutral, disagree and strongly disagree, descriptive statistics was performed to identify the percentage who agreed for a question. | After SSIPCL implementation across 4 years, 47 attempts for self-injury and suicide were reported with no completed suicides. Ingestion was the most common suicide method, which happened in 34% (16 counts) of all events. Strangulation was 23% (11 counts) of attempts. Cutting as a means of self-injury occurred in 19% (9 counts) of all events and other means related to self-injury (self-hitting and banging) were 23% (11 counts) of all events.<br><br>Minor harm occurred in 53% (25 counts) of events, and 3 patients had permanent/major harm. From 2018 to 2014, these events | **Level of Evidence:** Level III B.<br><br>**Worth to Practice:** The SSIPCL provides a structured approach to maintaining safe environments (e.g. safety and environmental monitoring guidelines) on nonpsychiatric inpatient units for patients at risk for suicide and self-harm.<br><br>**Strengths/Weakness:** Strengths include this study being one that produces reasonably consistent results and draws fairly definitive conclusions from results. Sample sized may be insufficient based on study design, since implementing the SSIPCL over a larger health care system may yield more accurate data. Non-generalizable results are a weakness, since effects might differ at other hospital sites. Also, information is from reported suicide data so some suicide attempts may have been missed if unreported.<br><br>**Feasibility:** The SSIPCL can be implemented in any nonpsychiatric inpatient setting and settings similar to these depending on organizational budget/approval, but results may vary/differ from setting to setting. |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
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| | | | | | | decreased by 42% and associated minor injuries decreased by 57%.<br><br>For nursing survey feedback for checklist use, 89% were supportive. Agreement was 88% for the checklist's ability to assist in safe monitoring of at risk patients. Agreement was 90% for responses regarding the checklist's ability to identify environmental risks and support consistent practice. | **Conclusions:** The SSIPCL can lead to a decrease in self-harm/suicide-related incidents and provides a consistent approach in effectively monitoring the environment for hazards. The majority of nursing staff surveyed find the SSIPCL helpful in safe monitoring of at risk patients, identifying environmental hazards, and supporting consistent practice.<br><br>**Recommendation:** The SSIPCL should be used to provide a systematic approach to ensuring the environment is effectively monitored for potentially suicidal/self-harming patients in nonpsychiatric inpatient settings. Recommend its use in such settings or those similar to it (e.g. crisis residential or crisis stabilization) since they have similar patient restrictions and architecture, unlike inpatient psych (which often already have environmental safeguards and utilize checklists that possibly require significant structural changes to be made to other settings). |

Definition of abbreviations: Care of the Suicide and Self-Injury Patient Checklist (SSIPCL)

| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
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| APA Reference: Hunt, I. M., Windfuhr, K., Shaw, J., Appleby, L., & Kapur, N. (2012). Ligature points and ligature types used by psychiatric inpatients who die by hanging: A national study. *Crisis: The Journal of Crisis Intervention & Suicide Prevension, 33*(6), 87–94. https://doi.org/10.1027/0227-5910/a000117 | | | | | | | |
| To examine ligature points and ligatures used in hangings by psychiatric inpatients, to determine any trends over time in ligature points and ligatures used, and to compare characteristics of these patients with those in other inpatient suicides. | Non-experimental research study. Review of secondary data was performed, with data taken for a comprehensive national sample of death by from the ONS from 1999 to 2007. Next, information on whether those in the sample had been in contact with mental health services in their last year were obtained from hospitals and community trusts. Then, clinical data | The sample consisted of data from the ONS, hospitals, community trusts and physicians involving cases of suicides and self-poisoning/self-injury registered by the organization from January 1, 1999 to December 31, 2007. n=1,559 inpatient suicides were identified.<br><br>The setting was in England and Wales. | IV: Review of suicide case data from the ONS, community trusts and physicians.<br><br>DV: Data related to ligature points and ligatures used in hangings by psychiatric inpatients. | Dependent variable was measured by the percentage of ligature points and types used in psychiatric inpatient hanging cases, and patient characteristics as well as trends in regards to ligature usage. | Analysis was performed using Stata 11.0 software. Chi-squared analysis was used for subgroup analysis and the Fisher's exact test was used for any cell that had an expected frequency of less than 5. The Kruskal-Wallis test was used for age comparisons. For trends, the calendar year was input as a continuous variable in a Poisson regression model to test for linear trends in ligatures and points used over time, and then exhibited as | 448 cases of inpatient suicide happened on psychiatric units out of all (1,559) inpatient suicides. Out of these, 344 (77%) died by hanging. The most common ligature points were doors, hooks, handles and windows, all together which made up 59% of all anchor points. The most common ligatures were belts, sheets and towels which made up 61% of all ligatures. Overall, in 73% of cases, ligature was brought onto the unit by the patient via worn or as a personal belonging. There was an increase in proportion of hangings from doors and windows, but decrease in other ligature points. Using | **Level of Evidence:** III-B<br><br>**Worth to Practice:** Findings from this study can provide guidance in the identification and systematic abatement of the most common ligature points and ligatures used in the most common suicide method of hanging among psychiatric inpatients.<br><br>**Strengths/Weakness:** Strengths include sufficient sample size based on study design and rationale (comprehensive national sample), producing reasonably consistent results, and making fairly definitive conclusions and recommendations from these results. Weaknesses include the lack of a comparison sample and the fact that information from physicians/clinicians were based on clinical judgment rather than standardized assessment (however, the authors note a fair amount of other suicide studies used similar methods).<br><br>**Feasibility:** Findings can be used to provide direction on hanging-related suicide prevention measures in any setting with any potentially suicidal |

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| | was gathered by sending a questionnaire to respective psychiatrists of those within the sample.<br><br>No conceptual framework noted. | | | | likelihood ratio chi-squared tests. | shoelaces as ligatures increased but use of other items decreased. There were no gender differences regarding ligature selection, except females were more likely to use a clothing item as a ligature than males and those over 65 years were more likely to use a belt. | patient population, but feasibility depends on the setting's financial resources and approval from organizational members.<br><br>**Conclusions:** Hanging remains as the most common suicide method among inpatients. The most common ligature points are doors, hooks/handles and windows. The most common ligatures are belts, sheets and towels. Improving the unit environment can help reduce risk for potentially suicidal patients, especially early in admission.<br><br>**Recommendation:** Environmental safeguards along with audits should be continually implemented that factor in the identification and abatement of environmental hazards related to common ligatures/ligature points used in hanging. |

Definition of abbreviations: Office of National Statistics (ONS).

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| APA Reference: Mills, P. D., King, L. A., Watts, B. V., & Hemphill, R. R. (2013). Inpatient suicide on mental health units in Veterans Affairs (VA) hospitals: Avoiding environmental hazards. *General Hospital Psychiatry*, *35*(5), 528–536. https://doi.org/10.1016/j.genhosppsych.2013.03.021 | | | | | | | |
| To provide an updated list of environmental hazards on inpatient mental health units in the VA system to help others identify and address similar hazards. | Non-experimental research study. Retrospective review of secondary data. All RCA reports between December 1999 and December 2011 from VA hospitals were searched and reviewed to identify inpatient completed suicides or suicide attempts on mental health units by using event codes and use of natural language processing software | Sample population consisted of RCA records of completed suicides or suicide attempts in VA inpatient mental health units. Sample number not listed.<br><br>Setting: Inpatient mental health units in VA hospitals. | IV: Review of RCA reports relevant to inpatient completed suicides or suicide attempts on mental health units.<br><br>DV: Suicide and environmental hazard data in RCA records of completed suicides or suicide attempts. | Measures for suicide and hazard data included:<br>1) Counts of completed suicides and attempts<br>2) Counts and percentages of suicide methods<br>3) Number and percentage of types of hazards<br>4) Percentage of suicide by location | After the search, RCA reports occurring in any area outside of inpatient mental health units and those not involving suicide/suicide attempts were excluded. RCA reports were coded for method of suicide or suicide attempt, and the location of the event. For instance, in cases where hanging as the suicide method, the type of anchor point and ligature was coded. The coding system was created in previous studies of RCA reports involving suicide | The search revealed 406 suicide attempts, 65 completed suicides on all VA units between December 1999 and December 2011. 243 reports took place on inpatient mental health units. Within inpatient mental health units, 46.3% events were hanging related, 22.6% were cutting, 15.6% were strangulation and 7.8% were overdoses.<br><br>Of the 29 completed suicides on inpatient mental health units, 22% (75.9%) were hanging. Of the 106 reports for suicide attempts/completions by hanging, doors were 40.6% of anchor points, beds were 13.2%, showers were 12.3% and | **Level of Evidence:** Level III B.<br><br>**Worth to Practice:** The results of this study provide direction in providing a ranking system or hierarchy of the most commonly occurring and dangerous hazards, which can guide environmental interventions to target higher priority ones and have the greatest impact on inpatient suicide rates (e.g. since sheets were used in the bulk of completed suicides by hanging, we should replace sheets with bedding that is harder to use as a lanyard). However, results may differ at non-VA sites.<br><br>**Strengths/Weakness:** Strengths include reasonably consistent results, sufficient sample size based on the study design (review of secondary data over a large health care system) and drawing fairly definitive conclusions from results. Non-generalizable results are a weakness, since effects might differ at general, non-VA hospital sites (e.g. the majority of patients are men in VA hospitals). Also, information is from reported suicide data so some suicide attempts may have been |

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| | (PolyAnalyst, Megaputer) to identify key term terms (pertaining to suicide or suicide attempt) in the report text.<br><br>No conceptual framework noted. | | | | and one author coded each report. | wardrobe/locker doors were 6.6%. Out of the 22 deaths by hanging, door parts were 52.2% of anchor points. For ligatures used in hanging events on inpatient mental health units, 58.5% were sheets/bedding, clothing were 17.0%, belts were 9.4% and shoe laces were 4.7%. Belts were 31.8% of ligatures used in completed suicides.<br><br>Of 52 cases that involved cutting, 23.1% used razor blades and 17.3% used plastic knives with no deaths for cutting cases. 42% occurred in the patient's bedroom, 28.1% in the bathroom, 8.7% in the general ward, and 21.1% did not list a location. | missed if unreported.<br><br>**Feasibility:** RCA reviews for suicide and environmental hazards involved can be performed at any setting. The results of this study can be used to guide hazard abatement at other facilities, but effects on inpatient suicide rates may vary/differ at non-VA sites.<br><br>**Conclusions:** Hanging is the most commonly reported method in inpatient suicide and many objects can be used as ligatures, especially sheets/bedding. Systematic abatement of useable ligature points (prioritizing ones that have resulted in greatest death/injury such as door parts) is a crucial step in increasing patient safety.<br><br>**Recommendation:** Recommend inclusion of ligatures (particularly sheets/bedding) and ligature points (especially door parts) as a required component of any environmental risk assessment for suicide hazards, with other elements such as belts and razor blades to be included as well. |

Definition of abbreviations: Veterans Affairs (VA), Root Cause Analysis (RCA)

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| APA Reference: Mills, P. D., Watts, B. V., Miller, S., Kemp, J., Knox, K., DeRosier, J. M., & Bagian, J. P. (2010). A checklist to identify inpatient suicide hazards in Veterans Affairs hospitals. *Joint Commission Journal on Quality & Patient Safety*, *36*(2), 87–93. https://doi.org/10.1016/s1553-7250(10)36015-6 | | | | | | | |
| To examine the implementation and efficacy of a standardized checklist for mental health units to identify suicide hazards in a large health care system. | Quasi-experimental research study.<br><br>The effect of MHEOCC implementation (and hazard identification/abatement associated with it) was performed by review of checklist data (types and location of each hazard identified along with ratings of severity and probability of occurrence using a risk-level classification chart, where 1 represented minimal risk | Sample population consisted of hazard identification data on each mental health unit in the VA system in a national database maintained by the Center for Excellence. Sample number not listed.<br><br>Setting: 113 US Department of Veterans Affairs hospitals. | IV: Use of MHEOCC on VA inpatient mental health units.<br><br>DV: Hazard identification data from VA inpatient mental health units where the MHEOCC was implemented. | Measures for hazard identification data included: 1) Number of identified hazards 2) Frequency of hazard types 3) Number of hazards by location 4) Risk levels 5) Percentage of hazards abated by a facility by the end of 2008<br><br>To evaluate the effect of the MHEOCC on identifying and abating hazards on mental health units. | The authors described the relative frequencies of hazards, locations, and used correlational analysis to find associations between hazard classification (which used a risk-level classification chart) and hazard type/location. Analysis was also performed for associations between facility age and size and the amount of hazards identified, as well as hazards abated by the facility at the end of 2008. | The facilities identified and rated 7,642 hazards, with 5,834 (76.3%) of these abated at the end of the 2008. For risk level, 2% (133) of identified hazards were rated as critical, 27% (2,059) were serious, 23.4% (1,781) were moderate, 25.8% (1,965) were minor, 22.1% (1,688) were rated as negligible, and 16 hazards were not rated. Hazards were in multiple locations but the most common places were in bathrooms and bedrooms. The most common type of hazard was anchor points (used in hanging attempts because they could support the weight of a patient) and the second most common were | **Level of Evidence:** Level II B.<br><br>**Worth to Practice:** The results of this study support the efficacy of the MHEOCC in identifying hazards and provide direction in mitigating hazards (e.g. systematic elimination of more prevalent, higher risk level hazards such as anchor points or risk assessments with greater emphasis on potential weapons). However, hazard data may differ at non-VA sites.<br><br>**Strengths/Weakness:** Strengths include this study being the first to examine the implementation and effectiveness of using a standardized checklist for mental health units in a large health care system. It also produces reasonably consistent results, has sufficient sample size based on the study design and drawing fairly definitive conclusions from results. For limitations, authors note that it is still too early to say that MHEOCC usage will decrease patient injury and suicides, and that there is no current evidence on this. They also note that there is no evidence to show that the MHEOCC was being used correctly, |

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| | and 5 denoted critical risk necessitating immediate abatement) submitted by the MSIT from Fall 2007 to Fall 2008 at each mental health unit in the VA system where the MHEOCC was used to a national database maintained by the Center for Excellence located at the VA Medical Center in Canandaigua, New York. No conceptual framework noted. | | | | | materials that could be used as weapons. Suffocation (mostly commonly due to plastic liners in trash cans) and poisoning risks (mainly due to cleaning products) were some of the least most common hazards.<br><br>Correlational analysis showed a positive relationship between facility age and amount of hazards identified but none between facility age and percentage of hazards abated by the end of 2008. There was a strong negative correlation between facility size (number of beds) and ratio of hazards identified per bed, but none between facility size and percentage of hazards abated. In terms of hazard types and risk level, anchor points had the greatest | which can yield and under- or over-identification of hazards, but the sheer number of hazards identified and consistency of results over a large healthcare system make this risk unlikely. Non-generalizable results are a weakness, since effects and hazard data generated may differ at non-VA hospital sites. Also, there is the lack of a control group, which is inherent in almost all studies evaluating suicide prevention measures due to ethical reasons.<br><br>**Feasibility:** The MHEOCC can be implemented at any mental health unit depending on budget and organizational approval, but sustained effectiveness may vary/differ at non VA sites. Also using the checklist to conduct a hazard assessment every three months with subsequent abatement (quarterly review) needs human capital to sustain this, which may not be possible at all facilities.<br><br>**Conclusions:** The MHEOCC is effective over a sustained period of time, and can be used to prevent suicide. But further research is needed to examine efficacy in decreasing suicide rates (especially in non-VA settings). |

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| | | | | | | association with higher risk-level ratings and suffocation risks were second. For location and risk level, bedrooms has the greatest association with higher risk levels, with bathrooms second. | **Recommendation:** Recommend use of the MHEOCC to identify environmental hazards and use it to provide guidance in abatement of more commonly occurring, higher risk level hazards (e.g. greater emphasis on anchor points and potential weapons in environmental risk assessments, especially in bedrooms and bathrooms). |

Definition of abbreviations: Mental Health Environment of Care Checklist (MHEOCC), Veterans Affairs (VA), Multidisciplinary Safety Inspection Team (MSIT)

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| APA Reference: Mohl, A., Stulz, N., Martin, A., Eigenmann, F., Hepp, U., Husler, J., & Beer, J. H. (2012). The "suicide guard rail": A minimal structural intervention in hospitals reduces suicide jumps. *BMC Research Notes, 5*, 408. doi:10.1186/1756-0500-5-408 | | | | | | | |
| To examine the effectiveness of a minimal structural intervention in preventing suicides by jumping at a Swiss teaching hospital. | Non-experimental research study to examine the intervention (a metal guard rail installed at each of the 1,240 hospital windows that mainly provided a psychological deterrent). Retrospective review of secondary data from police records and patient charts from the hospital from January 1995 to December 2010 was performed.<br><br>No conceptual framework noted. | Sample consisted of police records and patient charts from the hospital from January 1995 to December 2010. Sample number not listed.<br><br>The setting was a Swiss teaching hospital (the Cantonal Hospital in Baden). | IV: Review of police records and patient charts from the hospital.<br><br>DV: Suicide jump data before and after installation of the minimal structural intervention. | Measurement of suicide jump data included counts of suicides via jumping out of hospital windows pre and post-implementation across all patient cases. | To analyze the difference in suicide jump counts before and after implementation, Chi-squared statistics was performed with control for the number of patient cases treated in the hospital and number of inpatient days pre and post-implementation of intervention. | In the 114 month pre-implementation period, 10 counts of suicide by jumping out of hospital windows happened among 119,269 inpatient cases and this was reduced to 2 counts among 104,435 cases in the 78 month post-implementation period. There was a statistically significant reduction of suicide jumps after implementation when the number of inpatient cases was controlled and statistical significance was almost reached when controlling for inpatient days. | **Level of Evidence:** Level III-B<br><br>**Worth to Practice:** Results of this study provide support and guidance for the implementation of structural interventions in preventing suicide jumps among patients who not only suffer from mental health conditions, but general hospital patients with somatic disorders.<br><br>**Strengths/Weakness:** Findings align with previous research demonstrating efficacy of structural interventions in reducing suicide jumps. Other strengths include that the study produced reasonably consistent results, made fairly definitive conclusions and recommendations. However, there is a lack of a control group, which may be due to ethical reasons and is common among nearly all similar suicide prevention studies. In addition, it is not known whether there were patients who simply postponed their suicide attempt until after discharge.<br><br>**Feasibility:** This minimal structural intervention can be implemented in any high-rise facility with patients that |

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| | | | | | | | could potentially have suicidal ideation, but feasibility depends on the setting's financial resources and approval from organizational members.<br><br>**Conclusions:** Even with minimal structural interventions, suicide jumps can be prevented among psychiatric patients in addition to general hospital patients with somatic diagnoses. However, further research is needed to determine the efficacy of minimal structural interventions in preventing suicide jumps.<br><br>**Recommendation:** Use of minimal structural interventions are supported in preventing suicide jumps among psychiatric patients in addition to general hospital patients with somatic diagnoses. Recommend use of interventions such as the suicide guard rail in windows at any high-rise facility (with potentially suicide patients) to abate jumping-related suicide hazards. |

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| APA Reference: Pirkis, J., Spittal, M. J., Cox, G., Robinson, J., Cheung, Y. T. D., & Studdert, D. (2013). The effectiveness of structural interventions at suicide hotspots: A meta-analysis. *International Journal of Epidemiology*, *42*(2), 541–548. https://doi.org/ije/dyt021 | | | | | | | |
| To perform a formal meta-analysis and assess the effectiveness of suicide prevention measures involving structural interventions at jump sites. | Meta-analysis with systematic search of Medline, PsycINFO and Scopus electronic databases in July 2012 (search time period not specified). Inclusion criteria included studies that had structural interventions/barriers to prevent suicide at jump sites, and reported suicide data from jumping from the site before and after the intervention. | Articles that focused on a structural intervention to prevent suicide at jump sites and reported suicide data before and after implementation. Articles were from the Medline, PsycINFO and Scopus database. All were from 2005 to 2011 except one from 1993.<br><br>Settings included the US, UK, Canada, New Zealand and Switzerland. | IV: Inclusion criteria (intervention relating to structural intervention for suicide prevention at jump sites and report of data before and after implementation).<br><br>DV: Article yield and pooled suicide data before and after implementation of intervention (effect of interventions). | Percentage in reductions or increases in jumping suicides per year at study sites where the intervention was implemented, nearby comparison sites where the intervention was not implemented and study cities. | Random-effects Poisson regression analysis was used to estimate the effect of interventions. Number of deaths was regressed on a unique variable to distinguish all pre-intervention periods from post-intervention and effect size was seen as a risk ratio (change in expected number of suicides after implementation). A random-effects parameter was used to address variability between studies. | Nine quasi-experimental studies (eleven articles) were found that met inclusion criteria. After implementation of interventions, there was an 86% reduction in suicides via jumping per year at study sites where interventions were implemented, a 44% increase in nearby comparison sites where interventions were not implemented, and a net gain of a 28% reduction in all jumping suicides per year in study cities. | **Level of Evidence:** Level II B.<br><br>**Worth to Practice:** Results of this meta-analysis lend support and provide guidance for consideration of structural interventions in prevention of suicide via jumping.<br><br>**Strengths/Weakness:** Strengths include that this meta-analysis produced reasonably consistent results, made fairly definitive conclusions and recommendations based off of a fairly comprehensive search and analysis process (e.g. searched multiple databases, used statistical analysis methods that accounted for inter-study variability). However, there was a lack of randomization, perhaps du e to this being inherent in almost all suicide prevention studies due to ethical concerns. Also, the interventions in some studies may have been complemented by other measures, such as telephone crisis lines, that were not assessed.<br><br>**Feasibility:** Implementing structural interventions to reduce suicide at jump sites can be highly effective, but |

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| | No conceptual framework noted. | | | | | | feasibility depends on the setting's financial resources and approval from organizational members.<br><br>**Conclusions:** There is strong evidence that structural interventions at jumping sites are an effective measure of suicide prevention for the method of jumping. There can be some increases in suicide jumps at nearby sites, but there is an overall reduction in all suicides by jumping in the area observed.<br><br>**Recommendation:** Use of structural interventions (e.g. barriers or safety nets) is recommended at jump sites as an effective suicide prevention strategy. This can be utilized at mental health settings with any point of elevation that could serve as a jump site. |

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| APA Reference: Watts, B. V., Shiner, B., Young-Xu, Y., & Mills, P. D. (2017). Sustained effectiveness of the Mental Health Environment of Care Checklist to decrease inpatient suicide. *Psychiatric Services*, *68*(4), 405–407. https://doi.org/10.1176/appi.ps.201600080 | | | | | | | |
| To examine whether the effect of the MHEOCC) in decreasing suicide on VA inpatient mental health units is sustained. | Non-experimental research study. Retrospective review of secondary data. Relevant RCA reports from VA hospitals were identified (through "suicide" in the incident field or using PolyAnalyst 6 for key terms such as suicide in the report text) and reviewed to obtain the cases of completed suicides on inpatient mental health units from January 1999 to October 30, | Sample population consisted of RCA records of completed inpatient suicides on VA mental health units. Sample number not listed.<br><br>Setting: 150 US Department of Veterans Affairs hospitals. | IV: Use of Mental Health Environment of Care Checklist (MHEOCC) and the passage of time during which it is used on VA inpatient mental health units.<br><br>DV: Suicide rates on VA inpatient mental health units where the MHEOCC was implemented. | Measures for suicide rates included: 1) Rate of inpatient mental health suicide per 100,000 inpatient mental health admissions and 2) Rate of suicide per one million bed-days of inpatient mental health care.<br><br>To evaluate whether the effect of the MHEOCC on inpatient suicides on mental health units was sustained. | Poisson maximized sequential probability ratio test (maxSPRT) approach to repeatedly test whether inpatient suicide rates during the continuation phase (2011-2015) were significantly higher than the reference rate (rate of inpatient suicide during implementation phase [2008-2010]). | Suicide rate on inpatient mental health units prior to the MHEOCC was 4.2 suicides per 100,000 admissions or 2.72 suicides per million bed-days of care. After implementation, the rates were 0.74 suicides per 100,000 admissions or 0.69 suicides per million bed-days of care. Use of the checklist was associated with a sustained reduction in the number of suicides over a period of greater than seven years.<br><br>When initial implementation of the MHEOCC (2008–2010) is compared with the continuation period (2011–2015), it seems that the effect on suicides on VA | **Level of Evidence:** Level III B.<br><br>**Worth to Practice:** The results of this study support the efficacy of the MHEOCC over a sustained period of time and offer guidance in increasing sustainability of mental health interventions (changes to physical environment or architecture are more likely to be sustained), since the MHEOCC involves physical changes to the care environment or architecture after hazards are identified.<br><br>**Strengths/Weakness:** Strengths include reasonably consistent results, sufficient sample size based on the study design and drawing fairly definitive conclusions from results. Non-generalizable results are a weakness, since effects might differ at general, non-VA hospital sites. Also, there is the lack of a control group, which is inherent in almost all studies evaluating suicide prevention measures due to ethical reasons.<br><br>**Feasibility:** The MHEOCC can be implemented at any mental health unit depending on budget and |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
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| | 2015 to examine impact of implementing the MHEOCC preimplementation (2001-2007), implementation (2008-2010) and continuation (2011-2015).<br><br>Data on bed-days of care and number of mental health admissions were obtained for roughly the same period (2000-2015) through administrative data sets to determine suicide rates. No conceptual framework. | | | | | inpatient mental health units was not only sustained, but perhaps even enhanced. Except for 2012 when there was one inpatient suicide, there were no other suicides during the continuation phase. Inpatient suicide rates remained at levels equal to or lower than the rate during the implementation period. The trend suggests that the suicide rate continues to decline since implementation of the checklist. | organizational approval, but sustained effectiveness may vary/differ at non VA sites.<br><br>**Conclusions:** The MHEOCC is effective over a sustained period of time, and can be used to prevent suicide. But further research is needed to examine efficacy in decreasing suicide rates (especially in non-VA settings).<br><br>**Recommendation:** Recommend use of the MHEOCC to prevent suicide via identification of environmental hazards (alongside existing measures such as environmental safeguards, suicide risk assessment, etc.) and use it to offer guidance in increasing sustainability of mental health interventions (changing care environments after identifying hazards). |

Definition of abbreviations: Mental Health Environment of Care Checklist (MHEOCC), Root Cause Analysis (RCA), Veterans Affairs (VA)

| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Watts, B. V., Young-Xu, Y., Mills, P. D., DeRosier, J. M., Kemp, J., Shiner, B., & Duncan, W. E. (2012). Examination of the effectiveness of the Mental Health Environment of Care Checklist in reducing suicide on inpatient mental health units. *Archives of General Psychiatry, 69*(6), 588–592. | | | | | | | |
| To evaluate the effect of implementing a MHEOCC and its associated process of identification and abatement of environmental hazards on inpatient suicides in the VHA. | Non-experimental descriptive study.<br><br>The effect of MHEOCC implementation (and the hazard abatement process associated with it) in VHA inpatient psychiatric units was examined by measuring change in suicide rate before and after the intervention.<br><br>To obtain the cases of completed suicides on inpatient | Sample population consisted of RCAs of completed inpatient suicides on VHA mental health units. Sample number unspecified.<br><br>The setting was all inpatient mental health units in VHA hospitals. | IV: Use of the MHEOCC on VHA inpatient mental health units.<br><br>DV: Occurrence of suicides on VHA inpatient mental health units where the MHEOCC was implemented and hazard abatement was completed. | Measures for occurrences of suicides included:<br>1) Number of completed suicides<br>2) Rate of inpatient mental health suicide per 100,000 inpatient mental health admissions and<br>3) Rate of suicide per one million bed-days of inpatient mental health care. | Several approaches were used in statistical analysis.<br><br>Segmented Poisson regression analysis of interrupted time series (which included all observed suicide rates from 46 quarters) to study change in suicide rates pre and post MHEOCC implementation and observe trends.<br><br>The proportion of quarters with any suicide was studied using the Fisher exact test, then an exact logistic regression. The | 22 suicides occurred prior to implementation (1999-2007) and 3 occurred after (2008-2011). Suicide rate was 2.64 per 100,000 inpatient mental health admissions before use and decreased to 0.87 afterwards. The rate of suicide was 2.08 per 1 million bed days before implementation of the MHEOCC, and it decreased to 0.79 after implementation.<br><br>The exact logistic regression showed that implementation of the MHEOCC was associated with a significant 87% reduction in the likelihood of having a suicide occur in a quarter. Poisson regression analysis found a significant | **Level of Evidence:** Level III B.<br><br>**Worth to Practice:** Study findings support the efficacy of the MHEOCC in decreasing inpatient suicide rates with subsequent identification and abatement of environmental hazards which can guide suicide prevention guidelines (as well as give direction on intervention development/implementation in this realm).<br><br>**Strengths/Weakness:** Strengths include reasonably consistent results, drawing fairly definitive conclusions from results and implementing the intervention over a large healthcare system. A weakness is the lack of a control group, which is inherent in almost all studies evaluating suicide prevention measures due to ethical reasons. Another is non-generalizable results, since effects might differ at non-VHA hospital sites.<br><br>**Feasibility:**.Barriers such as cost can impede implementation of the MHEOCC, and it remains to be seen whether such interventions can be |

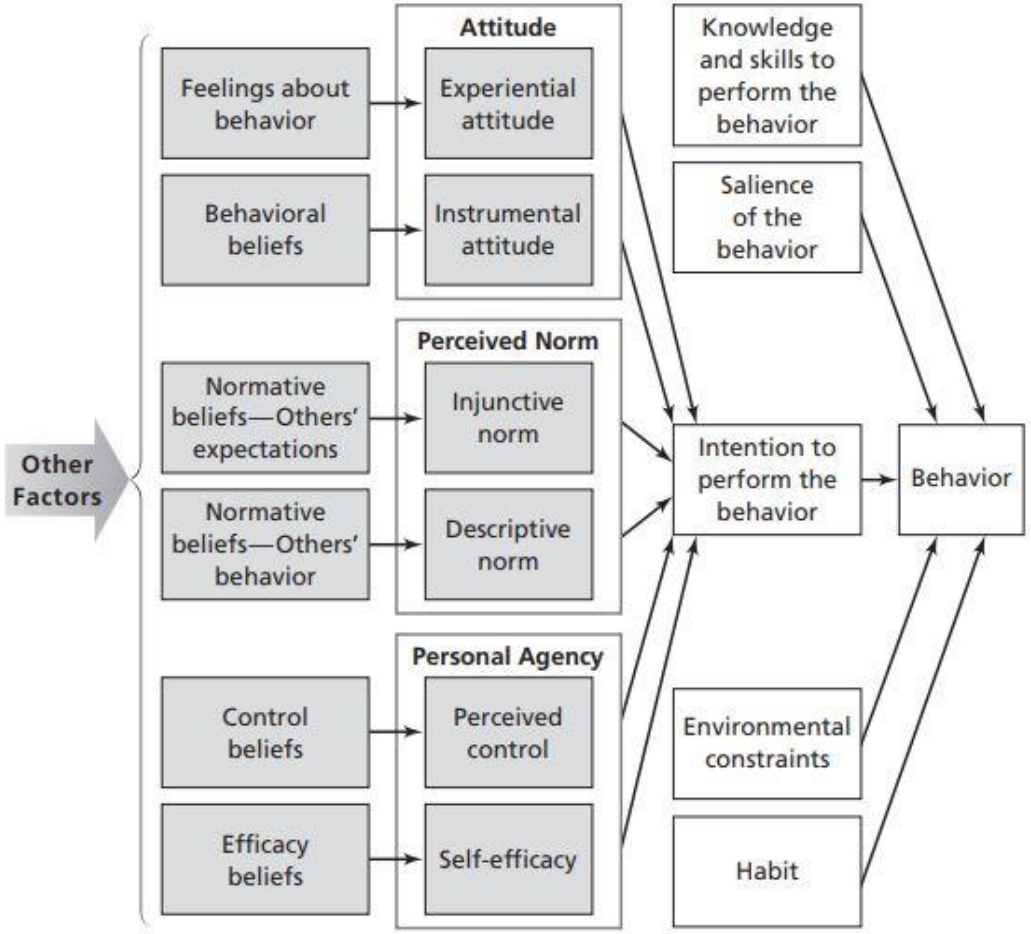
| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| | mental health units in the VHA database, all relevant RCA reports from VA hospitals between January 1, 1999 and March 31, 2011 were identified (through "suicide" or "suicide attempt" in the incident field or using PolyAnalyst natural language software for key terms such as suicide and self-harm in the report text) and manually reviewed.<br><br>Data for number of admissions | | | | Poisson distribution was used to study the number of suicide occurrences (because inpatient suicide happens rarely but has many opportunities to occur) as a rate (per 100,000 admissions or 1 million bed care days).<br><br>Rate ratios (RRs) and 95% CIs were calculated to represent the strength of association between MHEOCC implementation and suicide rates. | decrease of 62% in suicide rates associated with MHEOCC implementation and a visible trend in decreasing suicide rates. | implemented outside the VHA. If barriers are addressed and organization approval is obtained, the MHEOCC can be implemented on any mental health unit but effects may vary/differ at non VHA sites. Also using the checklist to conduct a hazard assessment every three months with subsequent abatement needs human capital to sustain this, which may not be possible at all facilities. In addition, engineering personnel can forget about hazard abatement when making repairs, which can result in the undoing of hazards which were previously abated.<br><br>**Conclusions:** Use of the checklist was associated with a significant decrease in inpatient suicide rates on VHA mental health units. Despite weaknesses/limitations, MHEOCC use successfully detected and mitigated hazards, which appear to have decreased suicides across a large healthcare system and authors advocate for considering its use in even non-VHA psychiatric units.<br><br>**Recommendation:** The MHEOCC checklist appears to be an evidence-based intervention to prevent suicide by identifying and abating |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / Setting | Major variables studied (and their definitions) | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| | and bed days per quarter from these units for the same time period were obtained from VHA administrative data sets to determine suicide rates.<br><br>No conceptual framework noted. | | | | | | environmental hazards, and it's use is recommended as such along with breakaway structures to abate the most commonly identified hazards found. |

Definition of abbreviations: Mental Health Environment of Care Checklist (MHEOCC), Root Cause Analysis (RCA), Veterans Health Administration (VHA).

## Appendix D

## The Integrated Behavioral Model




*Note*. Diagram of the Integrated Behavioral Model obtained from (Alligood, 2014).

# Appendix E

## The Suicide and Self-Injury Patient Checklist

| ELEMENTS | |
|---|---|
| **Initial Actions** | **Notes** |
| Secure order for the suicide precaution bundle (any prescriber can order), if applicable | |
| * 1:1 observation (family cannot act as observers). | |
| * Provide handoffs between caregivers and observers | |
| * Place patient in safe pajamas (no ties) | |
| * Psychiatry and Social worker consult, if needed/recommended | |
| **Safety Monitoring** | **Notes** |
| Do not leave patient unattended at any time (including in bathroom and/or shower). Patient always must be in sight | |
| Alert clinical staff if unable to visualize patient and/or patient attempts to hurt self or flee | |
| Patient room signage — "Check with Nurse Before Entering" | |
| Check any items brought in by visitors and communicate that dangerous items must be taken home. For illegal items (weapons, illegal drugs, etc.), call Policy & Security | |
| * Patient restricted to unit. If patient requires medical care that cannot be provided on unit, staff members accompany patients and provide constant observation. Bring hospital phone for emergency communication. Receiving area notified patient is on suicide precautions. | |
| **Environmental Monitoring** | **Notes** |
| * Search belongings in the presence of Police and Security or ask Police and Security to conduct the search. Remove environmental hazards if not medically necessary, which may include but are not limited to: | |
| • scissors/pill cutters (risk of cutting) | |
| • hospital gloves | |
| • plastic bags (including trash and patient belongings bags) | |
| • IV poles, bags and tubing not in use | |
| • electrical cords\telemetry wires when not medically necessary | |
| • headphones | |
| • extra sheets, towels and tie pajamas | |
| • anything small enough to swallow, e.g. paper clips, pin tack, toothpaste | |
| • medical equipment/supplies that may pose risk when not medically necessary | |
| • sharps box | |
| • hand hygiene dispenser | |
| • glass and vases | |
| • pens and pencils | |
| * use paper dietary tray and plastic utensils, no cans, metal utensils, plastic cups, plastic lids or breakable dishes. | |
| • scan environment around patient and continue to remove any new risks | |
| • If able, provide a private room and do not place patient's room near exit | |
| **Discharge Information** | **Notes** |
| Use discharge teaching/education documents (*Suicidal Thoughts*) found in EHR for patient and family | |
| Patient may not be discharged, including against medical advice, unless suicide precautions are discontinued | |
| **Emergency Management of Patient Attempting Harm** | **Notes** |
| DO NOT PLACE SELF AT RISK. Wait for security to intervene with patient | |
| Call for "HELP" press panic button at bedside, page 'Dr. Johnson' which is code to alert Police and Security for dangerous situation and/or call security and page patient's MD and Psychiatry consult MD | |
| If patient is trying to leave, do not block patient, but try to keep patient in sight. DO NOT PUT HANDS ON PATIENT | |
| Do not attempt to remove dangerous items from patient (weapons) | |
| Remove other patients from area, if able | |

* Elements included in suicide order set

## Appendix F

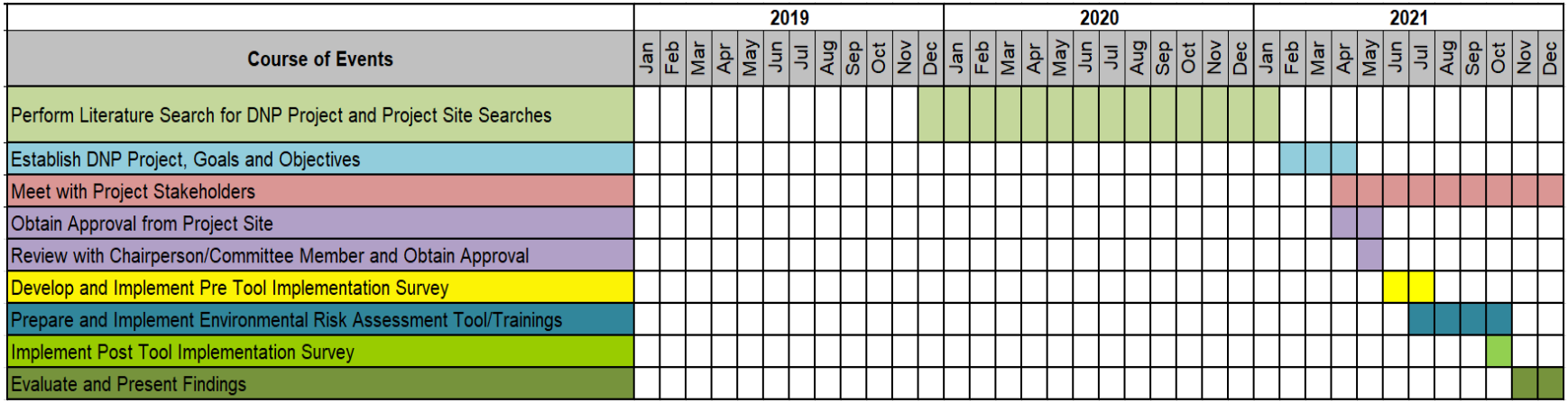
## Gap Analysis

| | Current State | Future State | Gap | Actions to Close Gap |
|---|---|---|---|---|
| Gap Analysis | Use of searches and measures primarily focused on reducing environmental hazards related to the most common suicide method of hanging. No environmental risk assessment tool is utilized. The setting is vulnerable to the potential for increased patient suicide rates/attempts that could be improved. | More comprehensive, standardized identification of environmental hazards related to all suicide methods resulting in decreased patient suicide rates. | Lack of appropriate tools and training among staff to properly perform comprehensive environmental risk assessments. | Implementation of an environmental risk assessment tool along with associated training to provide staff with a tool and knowledge to identify hazards and further mitigate patient suicide rates. |

*Note.* The gap analysis displays the current state of practice (at the project setting and others like it) surrounding suicide prevention via environmental risk reduction, the future intended state, the gaps present (e.g. in resources or knowledge among staff), and actions to close the gap provided by the project.

# Appendix G

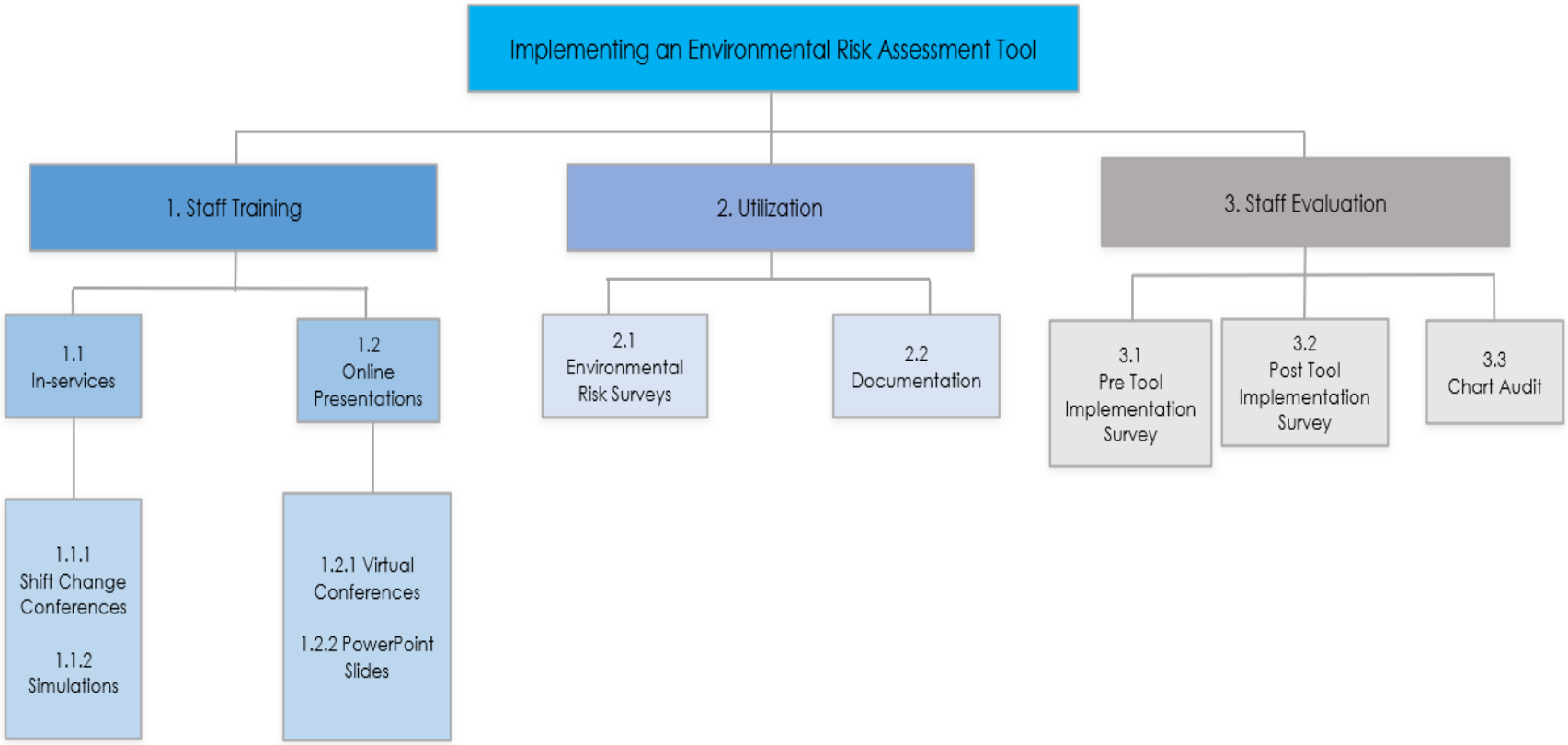
## Gantt Chart




*Note*. The Gantt chart displays a timeline of activities for SSIPCL project design and implementation.

## Appendix H

## Work Breakdown Structure




*Note.* The figure displays a work breakdown structure for a project based around implementation of an environmental risk assessment tool. This consists of three main components or phases: Staff training, utilization of the tool, and evaluation in addition to their sub elements.

# Appendix I

## Strengths, Weaknesses, Opportunities and Threats Analysis

| INTERNAL FACTORS | |
|---|---|
| **STRENGTHS (+)** | **WEAKNESSES (–)** |
| • Addresses staff resource and knowledge gap regarding proper environmental hazard identification<br>• The tool of choice (the SSIPCL) has extensive criteria applicable to the practice type, is evidence-based, and includes protocols for emergency management | • Efficacy of the tool is highly dependent on levels of acceptance and compliance among tool users<br>• Implementation of the tool and outcomes generated are not as generalizable to settings that are not similar to the project site |
| **EXTERNAL FACTORS** | |
| **OPPORTUNITIES (+)** | **THREATS (–)** |
| • The overall culture of suicide prevention is trending towards:<br>  • Increased safety in psychiatric settings<br>  • Use of risk prevention tools<br>• Improving patient safety and increasing staff satisfaction at multiple settings | • Possible lack of support for long term implementation impacting:<br>  • Tool design, refinement and implementation<br>  • Staff training and utility<br>• Resistance among staff to accept and utilize the tool, particularly at similar settings |

*Note.* The figure displays the strengths, weaknesses, opportunities and threats for a project involving implementation of an environmental risk assessment tool.

## Appendix J

## Communication Matrix

| Communication | Purpose | Medium | Frequency | Audience |
|---|---|---|---|---|
| Stakeholder Meeting | Present the concept of the SSIPCL, gain support and approval. Obtain feedback and review project objectives. | Face to face | Once | Stakeholders |
| Training Sessions | Provide education and training to staff on using the SSIPCL effectively in environmental risk surveys. | Face to face and online via Microsoft Teams | Initial/ Quarterly depending on evaluation meetings | Staff |
| Tool Evaluation and Update Meetings | Assess need for refresher training, solicit feedback from stakeholders and staff regarding tool usage and identify avenues of improvement. | In person/Face to face | Post-initial implementation run/ Quarterly | Stakeholders and Staff |

*Note*. The communication matrix displays the three types of meetings (along with aspects such as their associated communication mediums) that will be used to implement, refine and evaluate the SSIPCL.

# Appendix K

## Budget and Financial Analysis

**Table K1**

*Budget and Projected Expenses*

| Expense | Rate | Quarterly | Bi-Annual | Annual | Total |
|---|---|---|---|---|---|
| Registered Nurse (3) | $50/hr | $150 | $300 | $600 | $600 |
| Care Coordinator (7) | $24/hr | $168 | $336 | $672 | $672 |
| Clinical Director (2) | $45/hr | $90 | $180 | $380 | $380 |
| Quality and Patient Safety Coordinator/Clinician (1) | $33/hr | $33 | $66 | $132 | $132 |
| Mental Health Counselor (3) | $28/hr | $84 | $168 | $336 | $336 |
| Materials (paper and printer ink) | $80 | $80 | $160 | $320 | $320 |
| **Total Startup Costs** | | | | | **$2,440** |
| Training Costs (Ongoing) | $33/new employee | $33/new employee | $66/new employee | ($132/new employee) x 3: $396 | $396 |
| Materials (Ongoing paper and printer ink) | $80/quarter | $80 | $160 | $320 | $320 (excluded from first year) |
| Total Ongoing Costs | | | | | $716 |
| **Total Expenses** | | | | | **$2,836** |

**Table K2**

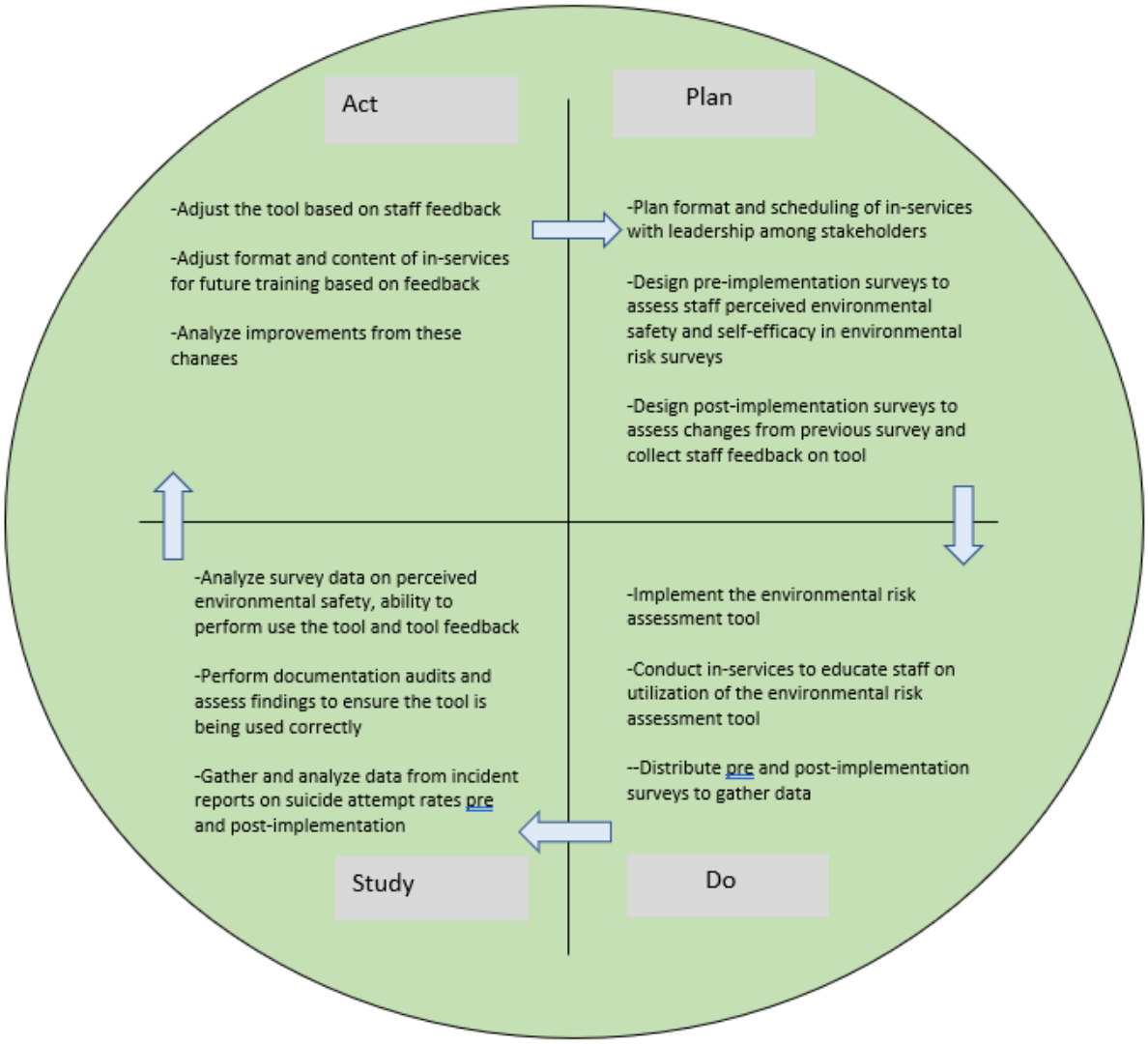
*Three-Year Pro Forma*

| **Line Item** | **Year 1** | **Year 2** | **Year 3** |
|---|---|---|---|
| Number of Suicides Prevented | 1 | 1 | 1 |
| Revenue from Prevented Suicides | $1,329,553 | $1,329,553 | $1,329,553 |
| **Gross Revenue** | **$1,329,553** | **$1,329,553** | **$1,329,553** |
| Start Up Expenses: Materials (paper and printer ink) | $320 | N/A | N/A |
| Startup Expenses: Training | $2,120 | N/A | N/A |
| Ongoing Expense: Training | $396 | $396 | $396 |
| Ongoing Expense: Materials (paper and printer ink) | $0 | $320 | $320 |
| Total Expenses | $2,836 | $716 | $716 |
| **Total Net Profit** | **$1,326,717** | **$1,328,837** | **$1,328,837** |

*Note.* A minimum of one suicide prevented per year was chosen because although studies have shown hazard identification checklists to prevent more (a decrease from 24 to 5 in the span of 4 years), not all settings would result in the same efficacy (Watts et al., 2017).

# Appendix L

## Plan-Do-Study-Act



# Appendix M

## Surveys

**Figure M1**

*Pre-Tool Implementation Survey*

At my site, environmental suicide hazards pose a potential concern when it comes to actively self harming/suicidal clients or clients experiencing related thoughts to do so, and can increase the risk of suicide attempts.

| Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

How safe do you perceive the environment at your site to be for clients experiencing thoughts of self harm or suicide?

| Very unsafe | Unsafe | Somewhat safe (Neutral) | Safe | Very Safe |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

How effective do you think existing practices are at your site are when it comes to environmental risk assessments to identify physical hazards and reduce suicide risk?

| Very ineffective | Ineffective | Somewhat effective (Neutral) | Effective | Very effective |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

How confident are you in your current abilities to perform an environmental risk assessment for physical suicide hazards?

| Very unconfident | Unconfident | Somewhat confident (Neutral) | Confident | Very confident |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

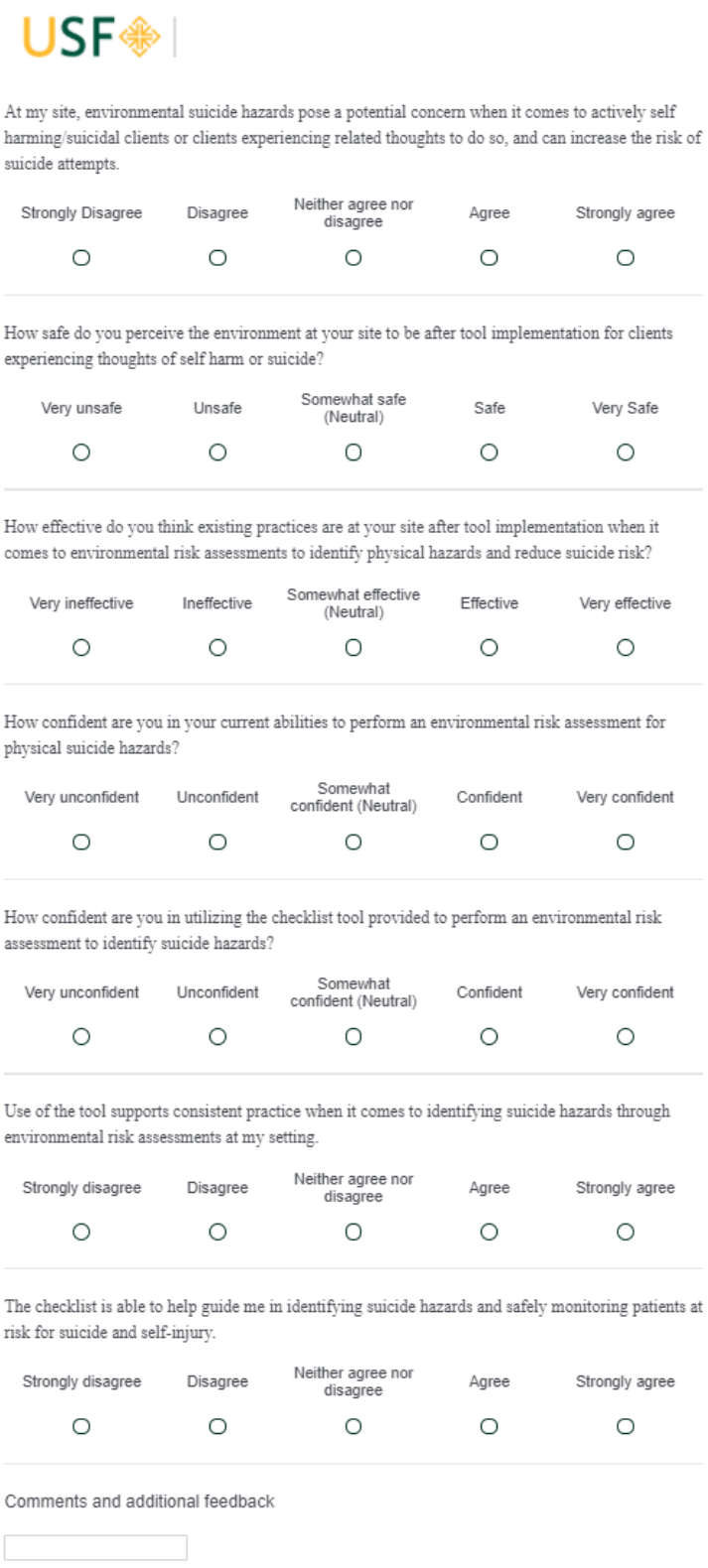
How confident are you in utilizing the checklist tool provided to perform an environmental risk assessment to identify suicide hazards?

| Very unconfident | Unconfident | Somewhat confident (Neutral) | Confident | Very confident |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Comments and additional feedback

**Figure M2**

*Post-Tool Implementation Survey*



USF

At my site, environmental suicide hazards pose a potential concern when it comes to actively self harming/suicidal clients or clients experiencing related thoughts to do so, and can increase the risk of suicide attempts.

| Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

How safe do you perceive the environment at your site to be after tool implementation for clients experiencing thoughts of self harm or suicide?

| Very unsafe | Unsafe | Somewhat safe (Neutral) | Safe | Very Safe |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

How effective do you think existing practices are at your site after tool implementation when it comes to environmental risk assessments to identify physical hazards and reduce suicide risk?

| Very ineffective | Ineffective | Somewhat effective (Neutral) | Effective | Very effective |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

How confident are you in your current abilities to perform an environmental risk assessment for physical suicide hazards?

| Very unconfident | Unconfident | Somewhat confident (Neutral) | Confident | Very confident |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

How confident are you in utilizing the checklist tool provided to perform an environmental risk assessment to identify suicide hazards?

| Very unconfident | Unconfident | Somewhat confident (Neutral) | Confident | Very confident |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Use of the tool supports consistent practice when it comes to identifying suicide hazards through environmental risk assessments at my setting.

| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

The checklist is able to help guide me in identifying suicide hazards and safely monitoring patients at risk for suicide and self-injury.

| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

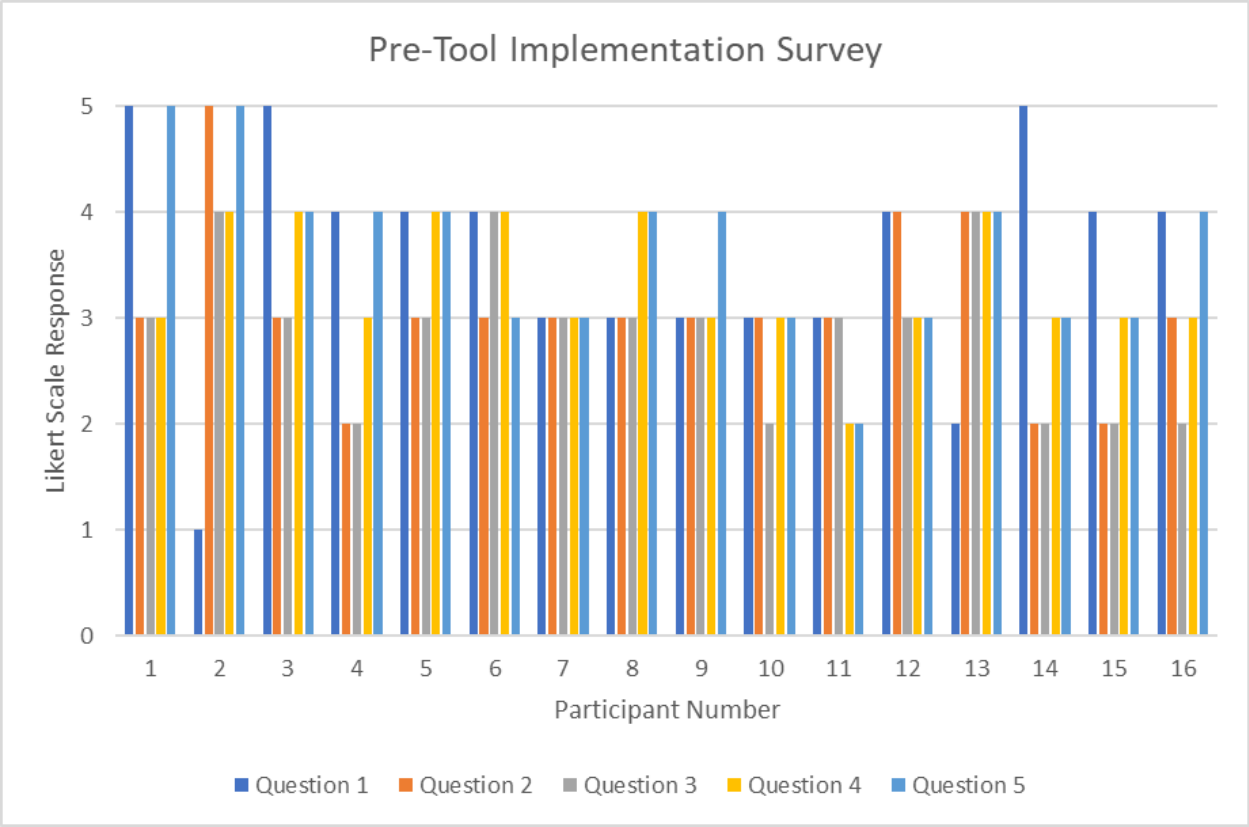
Comments and additional feedback

# Appendix N

## Survey Results

**Figure N1**

*Pre-Tool Implementation Survey Results*




*Note.* The graph provides an overview of survey responses for each question for each participant, with responses based on the Likert scale format the survey was administered in (e.g., generally with 1 being strongly disagree, 2 being disagree, 3 being neutral, 4 being agree and 5 being strongly agree).

**Figure N2**

*Post-Tool Implementation Survey Results*