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Evidence-based Suicide Screening and Prevention Protocol for Licensed Nursing Staff

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Abstract

Background

Suicide is a serious public health crisis that affects over 1,000,000 adults in the U.S every year. Suicide rates are rising, and it is a major problem encountered by licensed nursing staff working in psychiatric settings. On estimate, there are 1,500 suicide deaths on inpatient psychiatric units each year in the U.S. A third of these patients are on every 15-minute checks or one-to-one level of observation (Busch, Fawcett, & Jacobs, 2003).

Aim

The aim of this manuscript is to identify evidence-based best practices for suicide prevention that can be used in psychiatric emergency services and inpatient psychiatric units.

Method

A systematic search of literature was conducted to determine evidence-based best practices in suicide prevention. PubMed, DynaMed, and CINAHL databases were searched using the following key words: *suicide prevention, interventions,* and *suicide in adults.* Results were limited to English only publications focusing on suicide prevention for adults 18 and older.

Results

The search yielded over 6000 articles which were narrowed by adding a peer review limitation. This yielded 234 articles which were scanned for relevance to the topic of interest such as suicide prevention, treatment of mental illness, and suicide screening. There was a final yield of 8 articles that were included in this review.

Limitations

Only research published in English was selected, and no articles over 10 years old were included.

Conclusion

Clients at-risk of suicide assessed in psychiatric emergency services or admitted to inpatient psychiatric units, need to receive evidence-based care effective in preventing suicide.

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In recent years, suicide has become an important public health focus. World Health Organization (2014), states that the total number of lives lost to suicide exceeds 800,000 individuals every year worldwide. That is about one person every 40 seconds. Globally, more men die of suicide than women, and the highest suicide rates are seen in adults age 70 and older. Currently, WHO predicts that by 2030, suicide will rise from the 16th to the 12th leading cause of death worldwide.

Center for Disease Control (CDC, 2014) reports that in the U.S., 1.3 million people attempt suicide each year, 2.8 million people have a suicide plan and 9.8 million seriously contemplate about carrying out suicide. In addition, as of 2009, suicide as a cause of death, was number seven among males and the 16th for females in the U.S. As of 2014, suicide as a cause of death was placed by CDC as number 10 in the U.S. The rate of death by suicide is rapidly rising in the United States, with adults between 45 and 54 years of age recording the highest rate (19.72%) and those aged 85 or older recording the second highest rate (18.98%) in 2016 (American Foundation for Suicide Prevention, 2018). Suicide was responsible for about 45,000 deaths in the U.S. in 2016, which translates into one suicide every 12 minutes (CDC, 2016).

Suicide attempts are common among individuals suffering from mental illnesses such as depression and anxiety disorders (Subica et al., 2016). Unfortunately, the number of successful suicides among the mentally ill is rising. According to the National Institute of Mental Health (2017), suicide rates have risen by 24% in the last 15 years in populations suffering from mental illness. The importance of evidence-based assessments and interventions for these at-risk individuals cannot be overstated. Owens, Fingar, Heslin, Mutter, and Booth (2017) reported that emergency department (E.D.) visits due to suicidal ideation doubled in the U.S. between 2006

and 2013. Despite the significant increase in ED visits related to suicidal ideation, there is still no systemic way to approach suicide prevention in the U.S.

Nursing staff need to be familiar of risk factors related with suicide. There are various risk factors involved in mental illness such as social, physiological, and environmental risks that can trigger suicidal feelings. Some of the most common risk factors include substance abuse disorder, divorce, loss of job, diagnosis of chronic illness, and death of a spouse or child (Heisel, Neufeil, & Flett, 2016). The staff should consider each patient's risk factors during screening and assessment. This is because identifying early those at-risk individuals and improved clinical intervention can decrease morbidity and mortality by suicide. Early identification promotes individualized care and interventions to prevent death by suicide (Tait & Michail, 2014).

Those who die of suicide have often contemplated doing so over a long period (CDC, 2014). The person can lose hope, thinking they are better off dead. Most people whose death is by suicide have various stressors that make them feel hopeless and hence willing to take their own lives. It is important that nursing staff assess these stressors and feelings of hopelessness during suicide screenings.

The Joint Commission (TJC) defines suicide as a "never event" that is preventable (Williams at el., 2018). According to the TJC 2016, individuals whose death is by suicide, usually have within the year visited and seen a healthcare provider before their death. During the visit, providers misses to detect suicidal thoughts or ideations of individuals who end up dying of suicide. Per TJC, 2016, most of these individuals who receive health care services within the last year and die by suicide, most of them the reason for their care is not related to mental health or suicide. Therefore, our healthcare system may have failed to identify and treat suicidal individuals in a timely manner, an intervention which may have prolonged their lives (Joint

Commission, 2018). This highlights the importance of suicide screening, effective recognition of those at-risk, and prompt treatment.

TJC 2016, states that with the suicide rates rising, suicide now causes more deaths compared to traffic accidents and more than double the homicides. According to CDC (2014), for every adult whose death was as a result of suicide in 2014, there were nine adults who received treatment in the ED for self-harm injuries, and 27 stated they had made a suicide attempt, and 227 were contemplating suicide.

Improvements need to be made in the way those at-risk for suicide are identified and the evidence-based interventions that are offered to them. The Joint Commission (2016) made suicide prevention a national safety goal and plans to aid all health care organizations to improve identification and treatment of persons who have suicide ideation being treated in both inpatient and outpatient setting. The Center for Medicare and Medicaid Services (CMS, 2017) stated in order for hospitals setting to be considered a safe environment for care, hospitals are required to recognize patients at-risk for danger to self or others, be aware of the risks posed by the environment to such patients and provide teaching and training for employees and volunteers. Presence of ligature risk is an immediate jeopardy citation. The aim of this manuscript is to identify evidence-based interventions and best practices for suicide prevention.

Method

A comprehensive review of evidence-based literature provided a basis for finding best practices in suicide prevention. An electronic search was done via PubMed, DynaMed, and CINAHL databases using the following key words: *suicide, suicide preventions, suicide interventions, suicide awareness, suicide risk factors, mental health disorder,* and *suicide in adults.* The review yielded over 6000 articles, which were then narrowed to only peer-reviewed

publications in English that focused on patients' adults 18 and older. This yielded 234 articles which were scanned for relevance to the topic of interest such as suicide prevention, treatment of mental illness, and suicide awareness. Articles were reviewed and excluded that did not mention *universal suicide screening.* Out of the 234 articles, five were selected for inclusion and analyzed based on their relevance and key significance to the nursing problem of suicide prevention. Johns Hopkins Research Evidence Appraisal Tool and Non-Research Evidence Appraisal Tool (Dearholt & Dang, 2018) were used to critically appraise these articles. This review of literature critically appraises and summarizes evidence about suicide prevention. The level and quality ratings are displayed in an evaluation table (See Appendix A).

Review of Evidence

Staff Training

Clark, Matthieu, Ross, and Knox (2010) conducted a study to evaluate the impact a three-hour training for staff (both lay and professional) that included effective suicide prevention strategies, had on improved staff awareness and understanding of suicide, their knowledge of how to deter suicide, and how to best intervene when dealing with a suicidal person. The second part of the training was on sensitivity training. This training addressed how personal values and characteristics can impact or impede how staff respond to those at-risk for suicide and how to best overcome them by using non-judgmental behavior.

The researchers used a pre and post-training survey, and their response rate for all staff was 65%. The scores were analyzed using t-test, bivariate correlations analyses, Pearson's r, and two linear regressions. The results demonstrated that there was a significant impact on the staff that received training. Staff scores increased after training was conducted; there was improved knowledge about suicide, ability to intervene, and suicide prevention. There was a 78.5%

increase in staff ability to assess suicide risk, a 78% increase in their comfort to talk about suicide, and more than 90% of the participants stated that the training was important and that they would recommend it to someone else. The researchers also reported that health professionals may have inadequate training on screening and treating mental illness to competently prevent suicide. Therefore, the authors suggest that there is need for community involvement in preventing death by suicide, promoting public awareness, and educating healthcare professionals on suicide prevention using new evidence and best practices (Clark et al., 2010).

Some limitations of the study included possible selection bias since most trainees were from New York and the participants self-selected to attend the training. Also, there was no control group, so the results cannot be conclusively be attributed to the training (Clark et al., 2010).

Heyland, Delaney, and Shattell (2018) did a review of "evidence from the opinion of authorities and/or reports of expert committees" on doing suicide screening on all patients that present to emergency rooms and found that a multilevel approach needs to be adopted. One of the conclusions they found was universal screening in a variety of settings is necessary to enable early detection because suicide does not have to be related only to a mental health issue but can be triggered by life stressors and financial hardship.

Heyland et al. (2018) reviewed the barriers that impede universal screening and detection of suicide ideation in emergency departments (EDs) and how to overcome them. Barriers that may affect successful universal screening and detection include how many providers of mental health services are available, healthcare providers' attitude, personal beliefs about suicide, comfort level, and knowledge about suicide screening among the staff working in the ED. Based

on their review of evidence, the authors also reported that provider level of confidence and self-efficacy were significant barriers to their ability to assess and screen for suicide. The ED providers reported they could screen for suicide but did not feel as confident in assessing actual risk levels, coming up with a safety plan or counseling those at-risk. Nurses were more confident that physicians in developing a safety plan for suicidal patients.

In addition, the authors found that ED providers had a negative attitude towards patients that visited the ED with suicide ideation. They also had low hopes for successful intervention, and 60% of the time ED providers did not provide counseling to those patients at-risk or ask them if they had access to lethal means and provide counseling. Instead, these ED medical providers believed it was not their responsibility and deferred to psychiatrists, social workers, or mental health nurses to do this assessment. These ED medical providers did not understand the regulatory requirement of suicide screening and viewed individuals with suicide ideation presenting to the EDs as competing for resources and time with patients with medical emergencies. They also perceived that universal screening would result in clinical care delays and add more constraints to their workflows and systems. However, the ED nurses believed the workflow would be able to accommodate universal screening (Heyland et al., 2019).

These barriers which include availability of providers of mental health services, healthcare providers' attitude, personal beliefs about suicide, comfort level, and knowledge about suicide screening among the staff working in the ED, may hinder universal screening. To overcome them, providing training and education would help to increase healthcare employee's knowledge on how to provide care for individuals at high risk for suicide seeking care in the Eds. Regulatory requirement and regulations will also alleviate and address barriers to suicide screening. In order to promote suicide screening and prevention, EDs must increase the

availability of screening tools, use safety plans with patients, streamline workflows, facilitate referrals, improve providers' attitude and self-confidence, have a procedure in place to address positive screens, make available psychiatric providers when further evaluation is needed, and provide continuing education classes for staff. The author calls upon the nursing professionals to work towards achieving universal suicide screening to help prevent suicide and decrease the rate. They also note the regulations are supporting this goal by stating that it is expected patients in psychiatric or general hospital be screened for suicide (Joint Commission, 2016). The primary limitation of this review was the small amount of research available on universal screening.

Universal Screening Program

Roaten, Johnson, Genzel, Khan, and North (2018) conducted a descriptive study to evaluate a universal screening program that was implemented to improve suicide prevention in the general population served by Parkland Health and Hospital System, a large safety-net hospital in Dallas, Texas. A 20-member task force was formed to develop a screening tool and implement the universal screening program across the system with patient safety as the focus. There were various steps involved that included studying past research that supported universal screening, identifying the resources needed, designing the screening process using Colombia Suicide Severity Rating Scale (C-SSRS), and rolling it out to E.D., inpatient, clinic, and outpatient settings.

STOP Posner et al. (2011) stated that the suicide screening tool C-SSRS has 99% validity and reliability for determining suicide risk. The C-SSRS addresses the full range of suicidal thoughts and behaviors which includes intensity, frequency, and changes over time. It identifies risk not only if someone has previously attempted suicide, but also if they considered suicide, prepared for an attempt, or if aborted plans for suicide (Posner et al. 2011). In 2011, the CDC

adopted the C-SSRS and recommended it for data collection. In 2012, the Federal Drug Administration approved the use of the C-SSRS and declared it the standard for measuring suicidal ideation and behavior in clinical trials.

Roaten et al. (2018) reported the first department to implement screening for suicide with the C-SSRS was the Emergency Department (ED) and inpatient units (Internal Medicine, Obstetrics/Gynecology, Observation, Burn, Trauma and Critical Care, surgery, Neurology, Physical Medicine and Rehabilitation, and Psychiatry). Next, the Community Oriented Primary Care Clinic and Correctional Health Services implemented the screening. A total of 328,064 adults were screened within a period of nine months. Two thirds of those screened were female, with around 42% of the screenings from the ED, more than 50% from clinics and outpatient settings, and less than 5% from inpatient units. Approximately 3% of patients left without being seen. Overall, 96.1% of all patients screened were negative, and of those that screened positive, men had a higher percentage of positive answers to any of the six questions asked from the C-SSRS screening tool. Positive results from ED screening were higher compared to inpatient units 4.29 times and outpatient clinics 3.13 times. The universal screening was successfully implemented, and the findings suggested that the "universal suicide screening program" should be considered for extension to new locations such as in medical settings and the ED and should not just be limited to psychiatric settings (Roaten et al. 2018).

One of the limitations of this study was that it only involved one safety-net hospital and a unique population which may limit the translation of the results to other settings. This study also did not document what happened after each patient's disposition which is essential information and may be a limitation. Lastly, since universal screening requires a lot of resources, the burden

placed on the hospital system because of this study was significant, but there was effective allocation of resources which helped alleviate the burden (Roaten et al., 2018).

Roaten et al. (2018) reported that their data was summarized and analyzed using counts, proportions, means, standard deviation, and medians within SPSS. Most variables compared were statistically significant at p-value of less than 0.0001, and the odds ratio was calculated. The study supports the need to adopt measures to target the at-risk population by screening, identifying, and offering treatment.

Fontanella et al. (2017) conducted a descriptive study goal to build momentum and improve suicide prevention efforts by shedding light on the clinical profiles and usage of healthcare services of individuals who were enrolled in the Ohio Medicaid program and who died by suicide between January 1st, 2008 and December 31st, 2013. The total number of participants in the study (aged 19-65) was 1338. The methodology included reviewing data from the death certificates of the 1338 adults linked with Medicaid, aged 19 to 65, and whose death was by suicide. The suicide incidences were calculated for various disorder categories such as "psychiatric, chronic general medical, substance use and combinations" (Fontanella et al., 2017, p. 675). The researchers used SAS 9.4 software to calculate p-values, logistic regression analyses, chi-square analysis, and a multivariate multinomial logistic regression analysis.

Fontanella et al. (2017) reported that there were 18.9 suicides per 100,000 people enrolled in the Medicaid program. The least incidence of suicide occurred among participants with one diagnosis and was highest in participants with many comorbidities. Of the individuals whose death was by suicide, 83% had a health care visit within a year prior to their suicide, 50% visited the doctor 30 days before their expiry, and 27% saw a healthcare professional a week before their death. Twenty-seven percent of participants who committed suicide had a mental

health disorder, substance abuse, or a chronic medical condition. The authors reported that these individuals were not screened, identified or treated during their recent visit, which could have prevented their death by suicide.

Some limitations of the Fontanella et al. (2107) study involved possible underreporting of death by suicide since the data used was from death certificates. In addition, since the data was from a single state Medicaid program, it is not possible to generalize the results to other payment programs in other states given there may be different reimbursement and service options.

Boudreaux et al. (2017) conducted a quantitative study using a quasi-experimental design in eight hospitals from seven states. These eight hospitals screened for suicide using three phases: phase one, treatment as usual; phase two, universal screening; and phase three, universal screening with interventions. The hospitals assembled a team that used the best available evidence to create a screening tool (Patient Safety Screener-3, PSS-3) that could be implemented in the emergency setting. The team also used a continuous quality improvement cycle, i.e., the Plan-Do-Check-Act, to improve the process. The study required that each of the participating hospitals use the PSS3 tool with all patients. Screening logs extracted data from medical records, and data analysis was done with Stata version 13.1, using chi-square tests, with CI of 95% and medians with interquartile ranges. They also used p-values which were two-tailed, with $p<0.05$ determined as statistically significant. The 236,791 total Emergency Department (ED) visits reviewed, 10,625 patients screened positive for suicide. The documentation of screening improved from 26% in phase 1, to 73% in phase 2, and 84% in phase 3. This was more than a 300% increase. The detection rate increased in phase one from 2.9% to 5.2% in the second phase, and 5.7% in the third phase.

The researchers reported that the screening done by the provides during regular patient visit to the ED increased significantly and there was an outstanding increase in risk detection. All these was made possible due to the implementation of universal screening. By identifying those at-risk, it enabled interventions to be applied as needed, thus decreasing successive suicidal behavior (Arias et al., 2017).

The limitations of the Boudreaux et al. (2017) study included the EDs involved in the study, even though they were diverse, do not represent the nation's Eds. This is because the patient's population and demographics in this study may be different from those of the rest of the nation's Eds. Also, there is a need for follow up to see if the protocols and the results of the study can be adapted by other EDs in other states. In addition, there may be some bias that led to inflation of the screening of suicide risk and detection improvements. Since, the study phase was not blinded to the research assistants who helped interview all patients whose chart showed they screened positive. Interview of all patients was done to help validate what was documented on the patients' charts by staff. Lastly, the study did not choose the individuals or sites who participated in a random manner, and this may have led to bias related to clinicians' behavior as they were aware, they were being observed.

Oyama and Sakashita (2016) conducted a long-term controlled cohort study whose goal was to study the effect of universal screening intervention for suicide in older adults suffering from depression. The participants were 60 years and older who participated in a two-year intervention period with six years between baseline and completion of follow-up. Interventions comprised of two years of mental health and regular health care and support service and a public education program. The measurements for changes in suicide rates/incidence were from baseline, the two-year intervention, and the four-year follow up. The changes and suicide rates

were checked against a matched control using mixed-effect negative binominal regression models and confidence intervals of 95%. There was a comparison of the rates of suicide between older adults screened and those participants in the control region.

The results reported by Oyama and Sakashita (2016) demonstrated a decrease in suicide rates by 48% in the region where interventions were applied, and this was high compared to three other areas. Also, participants exposure to suicide screening reduced suicide risk over the four years following the exposure. This is because only six suicides occurred out of 16,822 participants in the four-year the participants that screening was provided to were followed up. In addition, there were 20 suicides out of 32,062 persons among who were not provided with the screening in the region where interventions were applied in comparison to 45 suicides of the 54,160 individuals in control region. The researchers reported that universal screening reduced suicide rates in older adults.

Some of the limitations of the study reported by Oyama and Sakashita (2016) were suicide rates may have been influenced by changes in mental health and socioeconomic conditions of individual participants during the time of the study. Also, the regions being followed were noncontiguous hence making it difficult to compare between the quantities of unmeasured factor-related outcomes.

Williams et al. (2018) conducted a cross-sectional study using data which came from 27 states that reported to the National Violent Death Reporting System (NVDRS) between the year 2014 to 2015 and the Joint Commission's Sentinel Event (SE) database using data from 2010 to 2017. Most of the general and psychiatric hospitals that participated in this study were accredited by the Joint Commission. The inpatient national suicide rates were estimated using data from NVDRS reported in 2014 and 2015 because these two years had the largest reporting by the

states. In 2014, 18 states reported and in 2015 additional nine states reported totaling 27 states. The study used the information provided by the occurrence reporter including the method of suicide. A qualitative review and analysis were conducted of suicide events that occurred in these hospitals during inpatient hospitalization. Confidence intervals (CI) set at 95% were calculated, and the event account was reviewed qualitatively. The information from the review was then used to help the process of identifying and coding the suicide incidences that happened when treatment was being provided in the hospital in the inpatient units.

Williams et al. (2018) reported that from the hospitals reporting to the NVDRS, there were 139 incidents reported. Sixteen inpatient suicides occurred in 2014 and 30 in 2015. Eleven of the 16 inpatient suicides in 2014 and 23 of 30 in 2015 occurred in a psychiatric hospital. Thus 68.8% in 2014 and 76.7% in 2016 of the inpatient suicides occurred in a psychiatric hospital. Overall, at 95% CI, the suicide rate is 0.03 per 100,000 non-psychiatric admissions and 3.2% per 100,000 admission in the inpatient psychiatric units. When this data was extrapolated, the estimate is that the number of suicides occurring in inpatient units in the hospital each year in the U.S., is approximately 48.5 and 64.9, and 31.0 to 51.7 of these suicide incidences happen in a psychiatric hospital. The method of suicide most prevalent in the inpatient unit was hanging at a rate of 71.7% from NVDRS and 70.3% from SE databases.

According to the SE database, from 2010 to 2016, there were 505 suicide incidents reported by hospitals. Data was calculated and analyzed using calculation of a Poisson regression using SAS 9.4, GENMOD procedure. The breakdown was 174 (34.5 %) of the 505 suicides reported happened during treatment on the inpatient units in a hospital during the six-year period. Of these 174, 124 (71%) inpatient suicides happened in a psychiatric hospital. The yearly reported average of suicides in the hospital inpatient units was determined to be 24.9 and 17.9 in

the psychiatric inpatient units. The most preferred method of committing suicide reported was hanging. The authors recommend regular suicide screening and assessment of those at-risk and staff training is vital in improving efforts aimed to reduce the incidences of inpatient suicides. Also, suicide prevention efforts should be aimed at making sure the environment where those at-risk of suicide is ligature proof and has not ligature to mitigate hanging. Close monitoring of suicidal patients, improving discharge planning and disposition of those at-risk of suicide, and adapting strategies that mitigate risk is also required (Williams et al., 2018).

Some of the limitations of the study by Williams et al. (2018) include the national estimates were taken from SE and NVDRS data reported by 27 states but this study made no attempt to validate the data reported by the hospitals. Also, it is possible that the patients in reporting hospitals are different from to those in nonreporting areas hence limiting generalization of the results to all states. Lastly, the reporting was voluntary and, there may have been underreporting or overreporting of suicides, and some reporting lacked specific details in the narrative limiting the understanding of context.

Subica et al. (2015) conducted a quantitative study where 962 adults receiving care in an inpatient private psychiatric hospital completed questionnaires upon admission. The questionnaires were used to determined depression and anxiety symptoms and how these symptoms related to self-harm behavior in these at-risk individuals. Bifactor solutions was used to analyze the data and calculate correlations with pre-hospitalization suicide history and behavior.

Subica et al. (2015) reported they found an association of recent distress and depression symptoms associated with suicide attempts in adults but no association with prior suicide history. As a result, the authors concluded that general distress may contribute to recent suicide

attempts/incidences and general distress usually underlies depression and anxiety. A comprehensive screening and assessment could help identify the stressors and appropriate interventions that should be implemented. Some limitations of the study include the sample was compromised by mostly homogenous white participants which restricts generalization of findings to more diverse populations and that the study did not examine other factors relating to anxiety.

The above research articles provided data that has been analyzed and reviewed to address suicide as a healthcare problem. The care provided to those at risk, should be guided by evidence-based interventions and best practices. Several strategies need to be utilized and implemented to reduce death by suicide in adults age 18 and over. These strategies include clinical staff training, universal suicide screening using a valid tool such as CSSRS, and effective identification and treatment of those at-risk in a timely manner. Also, providing a safe environment that is ligature proof, improving discharge planning and disposition of those at-risk, and identifying risk factors associated with suicide in staff training help staff better consider risk factors specific to a patient during assessment and interventions, which in turn promotes individualized care and prevents death by suicide.

Clinical Application

Based on findings from the literature reviewed and analysis above, this manuscript provides evidence that the training and education of clinical staff at all levels is very important to improve outcomes for those at-risk for suicide. Training will help improve healthcare providers' attitudes, personal beliefs about suicide, and comfort level and knowledge about suicide screening. Overall, this will improve how quickly those at-risk receive clinical care, thus reducing barriers to care in vulnerable populations. Furthermore, when patients at-risk for suicide

present for any healthcare visit, the clinical staff should use this opportunity to identify and intervene early. This early intervention will decrease the mortality rate by suicide. Identification and appropriate interventions are key in preventing death by suicide; therefore, clinical staff at all levels should be trained to screen every patient at every visit.

Also, it is important that universal screening using a validated tool be implemented in all health care settings. According to the review of evidence, universal screening provides a way to implement patient screening, patient safety interventions, and processes using an algorithm. Staff education about universal suicide screening and patient safety needs is very important. The training helps the staff understand the value of screening and that it is not just "another thing to do along with all of my other tasks." Hence, reducing health disparities by integrating mental health by universal screening addresses these issues.

Risk stratification is another essential component in universal suicide screening using a validated tool such as the C-SSRS. Risk stratification enables resources to be allocated appropriately. Early identification of and interventions with patients at highest risk have several benefits, including decreases in patient hospitalizations. A safe environment that is ligature proof and close monitoring are also needed during inpatient hospitalization. Those at low risk for suicide can utilize outpatient services, thus reducing the need for mental health provider services and unnecessary healthcare costs.

Conclusions

Suicide is a very serious healthcare problem that requires assessment and interventions that are guided by evidence-based best practices. Suicide as a cause of death is currently ranked as number ten and remains a serious public health crisis in the US per the CDC (2016). The evidence reviewed in this manuscript presents suicide prevention best practices such as training

of staff who work directly with patients to recognize and provide interventions to those at-risk. Also, universal suicide screening increases risk detection and enables interventions to be applied to reduce suicidal behaviors. The lack of proper screening, identification, and prompt treatment of individuals at-risk leads to many not receiving adequate help and hence death by suicide. Universal screening at every point of care using a validated suicide detection tool and completed by staff who are trained in early intervention and prompt referral can help reduce suicide rates and improve overall health while reducing the costs of mental health services. Some suicides can be prevented, especially when individuals at-risk are identified and treated in a timely manner.

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Appendix A
Evaluation Table

Citation	**Conceptual Framework**	**Design/ Method**	**Sample/Setting**	**Variables Studied and their Definitions**	**Measurement**	**Data Analysis**	**Findings**	**Appraisal: Worth to Practice**
Clark, Matthieu, Ross, & Knox, (2010).	Well-designed case control study.	This qualitative study used a descriptive research design.	Training Outcomes from the Samaritans of New York Suicide Awareness and Prevention Program Among Community- and School-based Staff	Three-hour training provided to staff. A pre and post training survey was conducted. Most variables compared were statistically significant at p value of less than 0.0001 and the odd ratio was done.	Pre/post training surveys. Paired t-test, Bivariate correlations computed	Statistical Package for the Social Science (SPSS) statistical tool The data was summarized and analyzed using counts, proportions, means, standard deviation, and medians.	The results demonstrated that there was a significant impact on the staff that received training. The scores increased after training was conducted.	Strengths: Participants completed the surveys. Training was comprehensive. Training procedure was well-established. Study was approved by an IRB. Limitations: Selection bias of participants, Lack of generalization of results to other training. Lack of control group. Critical Appraisal Tool & Rating: Using John Hopkins Tool was Level III, Quality B.

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Roaten, Johnson, Genzel, Khan, & North, (2018).	Well-designed case control study.	Qualitative study used a descriptive research design.	Parkland Hospital System in Dallas, Texas.	A total of 328,064 adults were screened, 42% of the screening completed in the ED, 50% from clinics and outpatient, 5% from inpatients. Overall, 96.1% of all patients screened were negative, men screened higher than women.	Mean, standard deviations, odd ratio, p-value, confidence limit,	The data was summarized and analyzed using Statistical Package for the Social Science (SPSS) statistical tool	Universal screening should be implemented in psychiatric and non-psychiatric medical setting so as to identify, provide treatment to those at-risk for suicide. This is in an effort of suicide prevention and promoting patient safety.	<u>Strengths:</u> Adequate sample size and diversity. Adequate clinical resources available to do the study. Specific screening procedures used. <u>Limitations:</u> Expensive system. Single hospital involved reducing generalizability of findings. <u>Critical Appraisal Tool & Rating:</u> Using John Hopkins Tool was Level V, Quality A

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Fontanella, et al. (2017).	Retrospective study-Review of death certificates-retrospective.	The type of research was quantitative, and the design was descriptive	Ohio Medicaid program	The total number of participants was 1338 aged 19 to 65. There were 18.9 suicides per 100,000 people enrolled. At least 83% had a health care visit within a year prior to their suicide, 50% visited the doctor 30 days before their expiry, and 27% saw a healthcare professional a week before their death. These 27% of enrollees had a mental health disorder, substance abuse, or a chronic medical condition.	p-values, logistic regression analyses, chi-square analysis and a multivariate multinomial logistic regression analysis.	Suite of analytics (SAS) 9.4 Software (12)	Study found these individuals were not treated during their recent visit in effective and timely ways to prevent death by suicide.	Strengths: Findings shed light to the clinical profile of those who died of suicide and inform suicide prevention strategies. Limitations: Possible number of suicides was understated in death certificates. Data from a single state may not be generalized to other states using Medicaid program. Critical Appraisal Tool & Rating: Using John Hopkins Tool was Level III, Quality B.

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Boudreaux, et al. (2017)	Quasi-experimental design. A Three phase interrupted time series design study.	This qualitative study used a descriptive research design.	Involved eight hospitals from seven states	A screening tool, the Patient Safety Screener-3 (PSS3) was used to screen patients. The team also used a continuous quality improvement cycle, i.e. the Plan-Do-Check-Act, to improve the process. Screening logs extracted data from medical records and data was analyzed. 236,791 Emergency Department (ED) visits were reviewed, 10,625 patients screened positive for suicide, and the documentation of screening improved from 26% in phase 1 to 73% in phase 2 and 84% in phase 3 detection. The detection rate increased from 2.9% in phase 1 to 5.2% in phase 2 and 5.7% in phase 3.	Chi-Square test and generalized estimating questions were calculated.	Stata version 13.1, using chi-square tests, with 95% CI and medians with interquartile ranges. The p-values are two tailed, with $p<0.05$ considered statistically significant	There was an outstanding and robust increase in screening by clinicians during regular care in EDs and an increase in risk detection.	<u>Strengths:</u> Sample size was adequate. Outcomes being measure were clearly defined. Increase in screening, detection, and documentation by clinicians. <u>Limitations:</u> EDs may not represent nation's EDs in terms of diversity. Protocols may not be successfully translated to other EDs. <u>Critical Appraisal Tool & Rating:</u> Using John Hopkins Tool was Level I, Quality B.

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Oyama & Sakashita (2016).	Controlled cohort study	This was a quantitative, long-term controlled cohort study.	Long-Term Effects of a Screening Intervention for Depression on Suicide Rates among Japanese Community-Dwelling Older Adults	The participants were 60 years and older who participated in a two-year intervention period with six years pre and post interventions. Interventions comprised of two years of care and support service and a public education program. The measurements were from the six-year baseline, the two-year intervention, and the four years follow up.	Mixed -effects negative binomial regression models, confidence intervals of 95%.	Mixed-effect negative binominal regression models.	The suicide rate in the intervention region lessened by 48%. The study found out that universal screening reduced suicide rates in older adults.	Strengths: There was a control group. Program had long term effects. Limitations: Suicide rates may have been influenced by changes in mental health and socioeconomic condition during the time of the study. Critical Appraisal Tool & Rating: The quality of the evidence found using the Johns Hopkins Tool is Level II, Quality B.

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Williams et al. (2018)	Qualitative review of event narratives	The study is designed as a cross-sectional analysis study	General and Psychiatric hospitals reported suicide events to National Violent Death Reporting System (NVDRS) between 2014 to 2015 and The Joint Commission's Sentinel Event (SE) data base from 2010 to 2017	Data from 27 states reporting to the National Violent Death Reporting System (NVDRS) for 2014–2015, and from hospitals reporting to The Joint Commission's Sentinel Event (SE) Database from 2010 to 2017.	Categorical variables and qualitative reviews of event narratives were used to identify and code suicide events occurring during hospital inpatient treatment.	Confidence Interval (CI) was calculated using estimated rate as the means of a Poisson distribution, upper and lower CI were set at 95%.	On average, it was determined that approximately 48.5 in 2014 and 64.9% in 2015 suicide incidents happen each year in the inpatient units in the U.S. Of these, 31.0 to 51.7 happen in inpatient units in a psychiatric facility. The method of suicide most prevalent in the inpatient unit was hanging at a rate of 71.7% from NVDRS and 70.3% from SE databases.	Strengths: Results provided reliable bench-mark of national inpatient suicide rates that can be used for policy, research, regulations etc. to prevent suicide in inpatient. Limitations: National estimates are taken from NVDRS data reported by 27 states, but this study made no attempt to validate the data reported by the hospitals. Critical Appraisal Tool & Rating: The quality of the evidence found using the Johns Hopkins Tool is Level III, Quality B.

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Heyland et al. (2018)	Review of evidence	Evidence from the opinion of authorities and/or reports of expert committees	Long-Term Effects of a Screening Intervention for Depression on Suicide Rates among Japanese Community-Dwelling Older Adults	Barriers that may affect successful universal screening and detection include availability of providers of mental health services, healthcare providers attitude, personal beliefs about suicide, comfort level and knowledge about suicide screening among the staff working in the ED.	Reports Opinions Study	Opinion of authorities and/or reports of expert committees	Training and education to increase healthcare personnel knowledge on how to care for those at-risk for suicide in the EDs, regulatory requirement and regulations will alleviate and address barriers to suicide screening. Increasing the availability of screening tools, using safety plan with patients, streamline workflows, facilitating referrals, improving providers' attitude and self-confidence, having a procedure in place to address positive screens, availability of psychiatric provider when further evaluation is needed, and continuing education classes, will promote suicide screening and prevention.	Strengths: Strong evidence reviewed. Recent articles used for review. Limitations: Limited research in universal suicide screening. Critical Appraisal Tool & Rating: The quality of the evidence found using the Johns Hopkins Tool is Level V, Quality C.

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Subica et al (2016)	Case control	Quantitative study. Adults totaling 962 receiving inpatient care at a private psychiatric hospital completed questionnaires at admission	Inpatient care at a private psychiatric hospital	The 962 participants were asked to complete questionnaires at admission to determined depression and anxiety symptoms and how these symptoms related to self-harm behavior in these at-risk individuals.	Checked correlation with pre-hospitalization suicide history and behavior	Bifactor solutions was used to analyze the data and.	The results demonstrated there was an association of recent distress and depression symptoms associated with suicide attempt in adults but no association with prior suicide history. As a result, the study results concluded that general distress may contribute to recent suicide attempts/incidences and it usually underlies depression and anxiety.	Strengths: It is the first study to look at symptoms of anxiety and depression and how they contribute to self-harm in clinical setting in adult inpatient. Limitations: The sample was compromised mostly by White and this limits generalization, also the study did not examine other factors relating to anxiety. Critical Appraisal Tool & Rating: The quality of the evidence found using the Johns Hopkins Tool is Level III, Quality B.