# Job-Related Problems Prior to Nurse Suicide, 2003-2017: A Mixed Methods Analysis Using Natural Language Processing and Thematic Analysis

Judy E. Davidson, DNP, RN, MCCM, FAAN; Gordon Ye; Melissa C. Parra, BSN, RN; Amanda Choflet, DNP, RN, OCN; Kelly Lee, PharmD; Arianna Barnes, MSN, RN, CCRN, SCRN, PHN; Jill Harkavy-Friedman, PhD; and Sidney Zisook, MD

**Background**: Nurses have a higher rate of suicide than the gender-matched general population at baseline. Quantitative data from the Centers for Disease Control and Prevention National Violent Death Reporting System have been previously analyzed to reveal that nurses have more known job-related issues prior to death by suicide. However, no known study has focused on the context of those job-related problems prior to nurse suicide. **Purpose**: The aim of this study was to provide context to job-related problems experienced before nurse death by suicide. **Methods**: Cases were selected either because they were coded as having a job-related problem prior to death or the words "job" or "work" appeared in the case investigation narrative. Natural language processing and thematic analysis of free-text medical examiner and law enforcement investigation narratives were performed to better describe nurse deaths by suicide in cases with known job-related problems prior to death. **Results**: Narratives from a total of 203 nurse deaths from between 2003 and 2017 were included in this study. Very little was reported regarding the actual work of being a nurse. Job-related problems of these 203 deaths focused on substance use, mental health problems, chronic pain, or job loss due to investigations for substance use or diversion of medication. **Conclusion**: Nurses who lose a nursing position or leave the profession because of substance use, mental health issues, or chronic pain are at risk for nurse suicide. Alternative-to-discipline programs for nurses with substance use disorder need to be improved and standardized. Earlier or more complete treatment for mental illness may help prevent suicide in this population.

The work of a nurse is challenging, with stressors imposed by the nurse or by unhealthy work environments (Melnyk et al., 2020; Melnyk et al., 2018). For example, occupational issues such as work compression (too much to do with too little time), short staffing, mandatory overtime, feeling ill-prepared for the role, lateral violence, and conflict in the workplace add to the psychological burden of being a nurse (Davidson, Accardi, et al., 2020; Melnyk et al., 2018; Moss et al., 2016; Shanafelt et al., 2019). The burdens associated with documentation standards, inefficiencies with electronic health record systems, and overregulation further increase nurse stress (Kroth et al., 2019; West, 2016). The negative impact of these stressors is so well documented that the National Academy of Medicine issued a call for action to improve the work environment and optimize workforce resiliency (National Academy of Medicine, n.d.). Witnessing patient suffering and death and the raw emotions of patients' families creates additional stress. Chronic stress has many adverse effects, and in nursing, it may lead to anxiety, depression, panic disorders, and suicidal intent (Jun et al., 2020).

Nurses in the United States (US) have a higher rate of suicide than the gender-matched general population at baseline (Davidson, Proudfoot, et al., 2020; Patrician et al., 2020). In a focused study of nurse anesthetist students (who were already nurses), 245 (21%) recalled suicidal ideation at one point in their training. There was no difference in this cohort between male and female students. In another study, student registered nurse anesthetists ($n$ = 60, 6.3%) reported knowing someone who had completed suicide while in school (Chipas et al., 2012).

Internationally, when compared to educators, suicide rates in Denmark were found to be higher in nurses (RR = 1.90, 95% CI = 1.63–2.21), physicians (RR = 1.87, 95% CI = 1.55–2.26), and pharmacists (RR = 1.91, 95% CI = 1.26–2.87), suggesting that there is a higher suicide risk in medical professions (Hawton et al., 2011). In Australia, researchers found that male medical doctors had a lower incidence of suicide than educators (RR = 1.23, 95%CI = 0.72–2.10) and that female medical doctors had higher rates than educators (RR = 3.88, 95% CI = 2.54–9.34) (Kölves & De Leo, 2013). Both sexes of nurses had a significantly higher inci-

dence of suicide than educators (male RR = 2.30, 95% CI = 1.31–4.00, female RR = 2.24, 95% CI = 1.34–3.74) (Kölves & De Leo, 2013). A critical review of nurse suicides conducted by Canadian researchers identified 9 empirical studies reported since 1999 and concluded that nurses are at a higher risk of suicide than the general population or educator reference group (Hawton et al., 2011). In Norway, physicians and nurses were both found to have a higher risk of suicide than other college-educated graduates (Aasland et al., 2011; Hem et al., 2005). In a 1-year study of 850 nurses in Hong Kong, 14.9% had thought about suicide and 2.9% had attempted suicide one or more times (Cheung et al., 2016). An analysis of 10 years' worth of data (2007–2016) retrieved from Chinese media reports and medical websites yielded 46 cases of attempted nurse suicide, of which 45 were successful (Zeng et al., 2018). Authors did not report a proportional analysis against the profession or the general public, but 9 suicides were completed by student nurses. Suicide risk of student nurses is a new thread in the literature not previously reported. The majority (*n* = 26) died by jumping off a building. Only 5 deaths involved the use of medication (Zeng et al., 2018), which is different from nurse suicides reported in other countries, where medications are consistently the most common method of suicide (Davidson, Proudfoot, et al., 2020; Hawton et al., 2011; Hawton et al., 2002). Furthermore, it has been recently identified that although physicians and nurses both endure similar stressors, depression, and burnout (Cañadas-De la Fuente et al., 2015; Shanafelt et al., 2015), physicians in the United States are not at higher risk of suicide than others as was once thought (Ye et al., 2020).

Coded data from the Centers for Disease Control and Prevention (CDC) National Violent Death Reporting System (NVDRS) have been previously analyzed to reveal that quantitatively, nurses had more known job-related issues prior to death by suicide than the general population (Davidson, Proudfoot, et al., 2020). The nature of these job-related issues was not reported. In a study of nurse suicides by use of firearms, a thread in the data implied that job loss may be a risk factor (Davidson, Ye, et al., 2020). However, no known study has focused on the context of job-related problems prior to death by nurse suicide.

The aim of this study was to provide context to job-related problems experienced before nurse death by suicide. Our work was guided by the question, "What job-related problems are nurses experiencing before death by suicide?" The goal of this exploration was to identify actionable risk factors to inform future suicide prevention strategies and nursing regulation.

## Ethics

This study was determined to not require oversight by the Institutional Review Board because it was an analysis of deceased people (#170165). The CDC provided ethical oversight for this project.

## Methods

The Interacting Risk and Protective model for understanding suicide utilized by the American Foundation of Suicide Prevention (Moutier & Harkavy-Friedman, 2004) was used as the conceptual framework for this study. The model is derived from the suicide prevention research literature and is taught during seminars from the American Foundation of Suicide Prevention on how to conduct suicide research (Harkavy-Friedman, 2020). According to this model, there are longer term and short-term biological, psychological, and social and environmental contributors to suicide risk (e.g., mental health conditions, physical health conditions, early life stress, history of abuse or neglect, family history, history of head trauma) that converge in the context of stressors such as divorce, marital strain, job problems, pain, illness, or financial difficulties to increase risk for suicide. Access to lethal means is the factor that determines whether suicidal behavior results in death. In contrast, supportive relationships, financial stability, social resources, faith and spirituality, access to mental healthcare, and willingness to seek healthcare can serve as protective in nature and can help to mitigate risk. Suicide risk fluctuates based on the interrelationship among risk and protective factors and stress (Harkavy-Friedman, 2020).

### Design

This study was conducted in a mixed method descriptive design coupling manual thematic analysis (Smith, 2015, pp. 222–248; Guetterman et al., 2018) with natural language processing (NLP) (Vaismoradi et al., 2013). Descriptive statistics were used to quantify risks found in the deductively derived codes to demonstrate relative prevalence.

### Sample/Sampling Method

The sample consisted of 203 nurse deaths by suicide extracted from the NVDRS between the years 2003 and 2017 using the coded column "JobProblem_c" plus deaths where "work" or "job" were found in the law enforcement (LE) or certified medical examiner (CME) narratives and were related to problems in the workplace prior to death. The NVDRS pre-coded field for "JobProblem_c" is defined as any problem with employment known by friends, family, or co-workers or found in suicide notes. The NVDRS is a voluntary state reporting system of the CDC. The number of states contributing to the dataset has grown annually, from 7 states in 2003 to 40 in 2017. This is the only dataset of national U.S. suicide mortalities coded by occupation and includes information coded from toxicology results and CME and LE investigations (CDC, 2019). No medical record data were used in the dataset other than toxicology reports.

Each of the nurse deaths had one or two narratives to review. Two investigators (J.E.D., a doctorally prepared researcher, and M.C.P., a graduate nursing student), independently removed false positives and then compared notes. False positives were identified as those who had "work" or "job" in the notes but were not

related to job issues prior to death (e.g., "came home from work"). There were no cases of disagreement regarding false positives. The complete NVDRS dataset between 2003 and 2017 included 2,302 nurses and 182,662 non-nurses aged 21 years or older. There were 415 nurse deaths with codes or notes that included an entry about job or work. After removing false positives, 203 cases remained for analysis.

### Thematic Analysis

The free-text investigation narratives from CME and LE agents associated with each case were analyzed. These narratives were one paragraph long for each death. Suicide notes were not available in the dataset. Occasionally, the narratives include clues regarding suicide risks derived from suicide notes.

Thematic analysis was performed by the same two investigators, first deductively and then inductively. Steps of the process included becoming familiar with the data, initial code generation, theme identification, team review of the themes, confirmation of themes, and report writing (Braun & Clarke, 2006, 2014; Smith, 2015, pp. 222–248). Investigators began deductively with a set of preliminary research codes assigned based upon knowledge gained from previous work (Davidson, Ye, et al., 2020). Deductive codes were independently mapped for the first 100 narratives, and findings were compared and revised through consensus. Once the investigators were confident in applying consistent data coding, the remaining 103 narratives were divided between the two researchers and coded. The entire coded dataset was then reviewed together. After gaining a complete understanding of the meanings within the narratives, the deductive codes were expanded and refined through the inductive process in team meetings (J.E.D., M.C.P.). Themes were assigned to latent meanings derived from the manifest content in the text. Findings were discussed to create a preliminary conceptual model. Findings were shared iteratively with the entire interdisciplinary and intergenerational research team (doctorally prepared nurse researcher specializing in substance use disorder [A.C.], psychiatrist specializing in suicide [S.Z.], pharmacist specializing in mental health [K.L.], researcher specializing in NLP [G.Y.], and graduate student learning research methods [A.B.]), discussed, and revised as needed. Finally, the resultant themes, subthemes, and codes were mapped in a crosswalk to the theoretical framework Interacting Risk and Protective Model (Harkavy-Friedman, 2020) to assess fit.

The CDC requires investigators to create composite cases to use within the results; direct quotes are not allowed. Composite cases are presented for each theme and subtheme. Each composite case included in this article is blended from at least two different cases selected because they had similar presentations. They were paraphrased to blind the case, protecting the identity of the decedent while retaining the meanings surrounding the death experience. The chronology of risks as they appeared in the time sequence before the death were assessed (e.g., job loss the day before death). Apparent associations between risks are described in these com-

posites (e.g., job loss, financial ruin, then death). Known actionable risk factors such as having a gun in the home or untreated depression were identified with the goal of informing future suicide prevention strategies and nursing regulation.

### Natural Language Processing

Latent Dirichlet allocation (LDA) was also performed (G.Y.) on the 203 sets of CME and LE narratives (Blei et al., 2003). In LDA, it is assumed that there exists a small number of abstract topics within the document collection and that each document is made up of a mixture of those topics, where each topic consists of a set of words used more commonly than in other topics.

Standard NLP preprocessing steps were performed. The filtered narratives underwent a second filter, where all empty notes, not applicable (N/A) values, and narratives under five characters long were removed. The TreebankWordTokenizer (Bird et al., 2009) was used to tokenize the narratives, splitting each narrative into a list of words. The WordNetLemmatizer (Bird et al., 2009) was used to tag each token of each narrative with its part of speech and standardize different inflections of the same word (e.g., to allow "nurse" and "nurses" to have the same meaning, rather than being two unrelated entities).

Stopwords, which are commonly used words that may not add meaning (e.g., "a" and "the"), were identified from the Natural Language Toolkit's (Bird et al., 2009) list of English stopwords and removed. We then identified the most commonly occurring remaining terms in the bodies of narratives and removed the following custom stopwords from both the CME and LE narratives: "find," "victim," and "suicide." These three words added very little, if any, value to the analysis, as all narratives concerned suicide victims.

Upon completion of preprocessing steps, we prepared bi- and trigrams to identify pairs and triplets of words frequently occurring together (e.g., "history_depression" vs. "history" and "depression" in isolation). We used the Gensim Python package (Rehurek & Sojka, 2010) and Mallet (Machine Learning for Language Toolkit; http://mallet.cs.umass.edu/about.php) to perform LDA analyses, treating CME and LE narratives as two distinct collections of documents. We used Mallet in this work to enable hyperparameter optimization when using distributed computing across 8 cores to accelerate model training (such functionality is not available in the Gensim implementation of LDA). Standard hyperparameters were used ($\alpha$ = 1/number of topics and $\beta$ = 0.01). Optimization was performed for every iteration, and the default burn value was used (double the optimization interval, so 2). To identify the ideal number of topics, we performed coherence score analysis using the C_V metric on each collection of documents, iteratively running LDA to identify from 2 to 25 topics for a total of 24 iterations (Syed & Spruit, 2017). These "test" runs had parameters and hyperparameters identical to the final LDA analysis, except for the number of topics, which was intentionally varied. We checked death investigation narratives' distributions between the topics and deter-

mined the ideal number of topics through two criteria: (1) having a maximum C_V following a consistent C_V value increase; and (2) a distribution of narratives in which there were neither empty topics nor a single topic containing nearly all narratives.

We subsequently determined that there were six topics within the CME narratives and four topics within the LE narratives. LDA was then run on the CME and LE narratives with the same parameters. Wordclouds capturing the top 35 words of each topic and word lists capturing the top 150 words of each topic were exported for review. The pyLDAvis package (a Python implementation of LDAvis) (Sievert & Sherley, 2014) was used to visualize CME and LE topic separation and identify prominent words unique to specific topics.

Two clinician investigators (J.E.D., M.C.P.) reviewed the topic word lists and word clouds to discern whether findings had clinical relevance and compared and contrasted the findings to initial manual thematic content analysis findings. Initial topic interpretation steps were focused on the word clouds to ensure that human interpretation was based on the core components of each topic. Investigators re-entered the data, with each narrative tagged to a topic of interest, to explore new concepts yielded from the NLP analysis. The codes, crosswalk, and proposed conceptual model were adjusted as indicated by this secondary analysis.

### Report Preparation

The consolidated criteria for reporting qualitative research (Tong et al., 2007) method for conducting and reporting qualitative research and the Squires and Dorsen (2018) method for reporting qualitative research findings with the intent of regulatory change were followed. "Victim" in the case studies refers to the deceased nurse.

## Results

Two hundred and three entries included death investigation notes that could be evaluated related to job problems. Nearly all (*n* = 187, 92%) of these nurses were out of work or in the process of losing their position as a nurse, and nearly all nurses with job issues also had known (through LE or CME interview with friends, neighbors, family, or co-workers) depression (*n* = 167, 82%). The second most common mental illness was bipolar disorder (*n* = 15, 7.4%), and only one mention of schizophrenia was found. Table 1 provides further quantification of codes derived from the deductive thematic analysis of the qualitative data.

During the inductive analysis of the data, investigators learned that each set of notes presented a timeline of events leading up to the deaths. These events followed common scenarios translated into themes. The themes assigned to clusters of meanings followed this rough timeline leading to suicide: *chronic struggle*, *peri-job loss*, *trapped in crisis*, *no way out*, and *finding a way out*. Co-existing factors such as *relationship issues* and *last-straw events* added to risks of suicide. After a complete thematic analysis, the

TABLE 1

**Nurse Deaths by Suicide and Codes Abstracted From Qualitative Data and Incidence, 2003–2017 (*N* = 203)[a]**

| Code | *n* | % |
|---|---|---|
| Alcohol issues | 78 | 38.4 |
| Substance use disorder or misuse | 132 | 65.0 |
| Prescription medications | 134 | 66.0 |
| Medication abuse or theft | 74 | 36.5 |
| Diversion of medications from workplace | 13 | 6.4 |
| Chronic pain | 52 | 26.0 |
| Bipolar disorder | 15 | 7.4 |
| Depression | 167 | 82.3 |
| Previous suicide attempt | 89 | 43.8 |
| Job loss | 124 | 61.0 |
| Unemployed | 89 | 44.0 |
| Fired | 35 | 17.2 |

[a] Codes represent themes that were noted or suggested in narratives of nurse deaths by suicide. Multiples may exist for each nurse death.

NLP results were reviewed and an additional code of *previous suicide attempts* was identified, explored, and folded into the theme of *chronic struggle*. The qualitative data were reanalyzed to find that nearly half of nurses with job issues who died by suicide (*n* = 90, 44%) had a known previous suicide attempt.

### Chronic Struggle

Codes associated with this theme included previous suicide attempts, thoughts of suicide or mental illness, being trapped in substance use or chronic pain, conflict with a manager, and stress on the job. Stress related to being a nurse was mentioned on occasion, usually simply stating that the nurse hated their job, could not stand the stress of the job, or was having trouble adjusting to a new nursing position. The actual job stressors were not fully described except in situations of job loss, which were plentiful, as reflected in this composite case composed from combined similar narratives:

> *History of depression and previous suicide attempts related to poor performance on the job. Attempted suicide after the last yearly evaluation. She felt that she was being singled out inappropriately by her manager. Her supervisor reported that she was upset by another counseling session due to poor performance. Her family stated that she was quite upset by her situation at work and had been drinking more and more over time. Cause of death was alcohol overdose. An empty bottle of antidepressants was also found at the scene that had been filled the week before.*

**Peri-Job Loss**

The term *peri-job loss* reflects the period just before an impending job loss where nurses know that they are at risk for termination (through investigation for substance use or absenteeism due to mental health issues), the day of termination, and then following termination. Some nurses also lost their licenses due to substance use issues or were troubled by the potential loss of license looming in the future. The vulnerable period following termination lasted days to years of problematic unemployment prior to death. Consider the following composite case:

> *The victim had lost her job for absenteeism the day prior. She had a lifelong history of depression and bipolar disorder with multiple hospitalizations. Family stated she was panicked about not being able to pay rent or feed herself.*

In another common scenario:

> *The victim was addicted to opiate pain medication and also drank alcohol heavily. The victim was suspected of diverting patients' medicine for her own use at a hospital where she worked as a nurse, but the case was going to be adjudicated administratively instead of criminally. The victim went on medical leave to deal with her addiction to pain medication and alcohol. She was going to voluntarily admit herself into a residential treatment program in a few days.*

Third, consider the common experience of nurses who kill themselves after losing a job:

> *The victim was a nurse who was terminated from his job at a hospital the night before death. His wife said he was terminated from his job because of an investigation the hospital was conducting. This morning the victim's wife reported him missing to the police when he did not return home from work.*

**Trapped in Crisis**

After job termination, the nurse may become desperate in their situation. There are reports of financial strain; inability to obtain care or treatment for physical, substance use, or mental health issues; inability to pay rent or mortgage; and loss of car and/or home. Feelings of despair and hopelessness are conveyed through the eyes of family, friends, or supervisors reporting to investigators. On occasion, snippets shared from suicide notes shed light on the devastating emotional toll of the situation.

> *The victim's mother and brother had died by suicide in the past 2 years. She had lost her job recently for what friends described as moodiness and inability to concentrate. Her cat had died the week before.*

> *The victim had lost her job 2 months ago and had financial difficulty, which also caused marital strain. She had been fired for stealing medications from work and had issues with chronic pain. Her suicide note stated, "I am so sorry. I know you tried to help. I will now finally be at peace."*

An identity crisis unfolds as the nurse reflects, *who am I if I am not a nurse?* A conclusion at some point unfolds: *I am a failure because I cannot keep or get a job.* The nurse facing termination or living unemployed may feel a lack of purpose and lose faith in self. The loss of identity as a nurse can be derailing. Even if there was no history of mental health problems, losing a job as a nurse caused extreme situational distress. Consider the following composite descriptions:

> *The victim had been upset about being counseled at work due to a patient complaint and feared losing her job. She had a history of illicit drug use and alcohol addiction. Her suicide note stated, "This is not a life I can lead any longer."*

> *Victim had been fired a week ago and became extremely depressed over the situation. Suicide notes were found describing how hopeless she felt the situation was and the depth of her sadness. Family reported that she was let go for stealing medications from work and could not face losing her license. When her body was found, a baggie with mixed pills was discovered at her bedside. She had a history of depression.*

Co-existing factors found under the subtheme of *making matters worse* included failed relationships and last-straw moments. On rare occasions, relationships were described by LE or CME as the primary reason for suicide and job issues were an aside. The more frequent narrative was that job loss was the impetus for the suicide with relationship issues adding fuel to the decision. Last-straw moments included issues such as a death of a family member or pet.

> *The victim lost her job recently due to addiction to pain medications. She had originally started taking the medications due to a work-related back injury. The addiction and job loss caused financial difficulties for her and her husband. She had developed depression due to the chronic pain. Last night her husband told her he was going to divorce her due to her inability to shake the addiction. Cause of death was pharmacologic poisoning: OxyContin and antihistamine toxicity.*

**No Way Out**

At some point, a nurse in chronic pain may decide there is no way out: surgery didn't work, medications no longer quell the pain, and it is impossible to work. The pain is often related to musculoskeletal pain, such as back, knee, or shoulder pain, that could be con-

nected to job-related injuries. Ineffective pain management from cancer or chronic illness are also described.

> The victim had been injured at work. She had been out on workman's comp but complained about constant neck and back pain. She was prescribed various medications, but none relieved her pain. For the past week she had been complaining more and more about the pain and was spending most of her time in the bedroom. The victim had multiple health issues, including failed back surgeries. She was employed as a nurse but had stopped working about 2 weeks earlier because of the pain.

Nurses often kill themselves on the day of job loss or on the day that they realize the job will be lost. The seemingly impulsive nature of it—not giving themselves a chance to overcome the situation—makes that day of dismissal a very vulnerable time.

Regardless of the impetus—mental health crisis, financial ruin, the lingering aftermath of the pain of job loss—the feeling is that they have hit bottom. Nothing can be worse.

> The victim lost her job recently. She had a history of previous suicide attempts and depression. Her boyfriend stated she could no longer pay her bills or afford her medication. She was expressing feelings that the world was out to get her prior to death. Her suicide note stated that she could not take it anymore. There was no way out.

### Finding a Way Out

Once the nurse hits bottom, they may complete the suicide when access to a means is available. This could come in the form of having a gun or purchasing a gun on the day of death.

> The victim shot himself at home with a firearm he had purchased the morning of the incident. Investigators found that the weapon still had a price tag and was purchased by the victim at a gun show. The victim was depressed because of a pending foreclosure and was having some job issues. A note to his estranged wife stated he couldn't do this anymore, every day was the same, he never got better, and the pain was killing him.

Another means was pharmacologic poisoning either through medications prescribed by physicians or diverted from the workplace. Additionally, nurses with prior suicide attempts improve on the plan given past knowledge of failure. Others use their knowledge as a nurse to create an effective plan on first attempt.

> The victim had been suffering from depression throughout his life. This was worse now related to job loss due to his mental illness. He was seeing a therapist and told her that if he were to kill himself he would know the exact method to do it because of his nurse's training and that he had plenty of medications at home to complete the act if it came to that. He was released last week from inpatient psychiatric therapy for depression.

> The victim's wife discovered the victim lying in his bed with an IV in him. The victim also had a suicide note stating he had finally found peace. The victim had left letters to his children and notes in his diary about planning his death. He mentioned that he had a way to do it right this time. He also emailed his employer and a co-worker indicating that he had committed suicide. He was well liked and respected at his job.

### Mapping Themes to the Conceptual Model

Themes, subthemes, and codes were then mapped to key risks found within the Interacting Risk and Protective Model and assessed for fit. These risks included biological, psychological, social/environmental, a life event, and lethal means. Table 2 presents a crosswalk between our findings and the model. Each theme, subtheme, and inductively-derived code in the data was mapped to the model; there were no outlying codes that could not be mapped.

## Discussion

### Utility of NLP in Supporting Traditional Qualitative Methods

In this study, deductive codes (e.g., job loss, diversion, substance use) were derived from previous NLP and thematic analysis using a different subset of NVDRS nurse suicides by firearms (Davidson, Ye, et al., 2020). Following deductive and inductive thematic analysis, we performed the NLP strategies to confirm that all key topics of interest were included in the analysis. It was through the NLP process that *previous suicide attempt* was noted and added to the analysis. Exploring qualitative data using both methods yielded stronger results than either method alone.

### Fit of Findings to AFSP Interacting Risk and Protective Model

The results of this analysis demonstrated good fit between the risk factors and chronology identified through the results of thematic analysis NVDRS data and AFSP Model for Understanding Suicide. Nurses had biological (pain, chronic illness), psychological (mental illness, SUD, situational distress), and socio-environmental (conflict with manager, financial strain) risk factors leading to major life events (job loss, loss of license) prior to suicide. Having access to lethal means such as a weapon or medications was a facilitator to the act of suicide. After evaluating this crosstabulation, a proposed conceptual model of our findings was created (Figure 1) to depict the most common scenario represented in the data. The data presented suggest a relationship exists, yet further research would be needed to establish causality. The layer at the top of the spiral consists of implications for future research or enhanced methods of data collection in suicides. It is known that the antecedents to pain, substance use, and mental health issues could be related to biological (e.g., genetic or epigenetic factors; serotonin, brain-derived neurotrophic factor, adrenocorticotropic hormone dysregulation), historical (e.g., previous suicide attempts, childhood abuse, mental illness), and environmental (e.g., disconnected, poverty, homelessness) predisposing vulnerabilities, diatheses, and characteristics

**TABLE 2**

**Themes, Subthemes, and Inductively Derived Codes Crosswalked to Conceptual Model**

| Themes | Subthemes | Level | Codes | Model for Understanding Suicide | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Bio | Psych | Social/Env | Event | Means |
| Chronic struggle | | 1 | substance use disorder | x | x | x | | |
| | | 1 | chronic pain | x | x | x | | |
| | | 1 | mental health challenges (bipolar, depression) | x | x | x | | |
| | | 1 | previous attempt | x | x | x | | |
| Peri-job loss | | 2 | conflict with manager, hated job, trouble adjusting to new position | | | x | x | |
| | | 2 | diversion of drugs | | | | | x |
| | | 2 | job loss/unemployment | | | | x | |
| | | 2 | inability to access mental health and medications due to job loss | x | x | x | x | |
| Trapped in crisis | Emotional turmoil | 3 | despair | | x | | x | |
| | | 3 | hopelessness | | x | | x | |
| | | 3 | unable to cope | | x | x | | |
| | | 3 | situational emotional distress | | x | x | x | |
| | Identity crisis | 3 | lost faith in self | | x | | | |
| | | 3 | loss of purpose…out of work | | x | x | x | |
| | | 3 | loss of identity as a nurse (not a nurse) | | | | x | |
| | Making matters worse | 3 | relationship issues: family/partner/spouse/children | | x | x | x | |
| | | 3 | last-straw event (e.g., dog died) | | | | x | |
| No way out | | 4 | suicide impulsivity peri-job loss | | x | | | |
| | | 4 | unmanagable chronic pain | x | x | | | |
| | | 4 | mental health crisis | x | x | | | |
| Tipping point | | 5 | mental health out of control | x | x | x | | |
| | | 5 | financial ruin | | x | x | x | |
| | | 5 | lingering aftermath of despair after job loss | | x | | x | |
| | | 5 | no solution other than suicide | | x | | | |
| Finding a way out | | 6 | had a gun, bought a gun | | | | | x |
| | | 6 | drugs at home, increased medications, stole medications | | | | | x |
| | | 6 | had a plan, improved plan | | x | | | x |

*Notes:* Themes are presented chronologically. The Model for Understanding Suicide is the conceptual model from the American Foundation of Suicide Prevention. Level = antecedent to suicide level of abstraction; Bio = biological; Psych = psychological; Env = environmental; Event = life event; Means = lethal means.

(Mann & Rizk, 2020; CDC, 2017; Stone et al., 2017). In our study, we found that previous attempts, substance use, mental illness, and poverty were antecedents to nurse suicide. Additional research, including review of medical records to confirm other biological risk factors among nurses, is needed.

Future prospective research is indicated to determine specific antecedents leading to SUD in nurses. Did the disorder develop because of unhealthy work environments, work compression, or poor leadership? Did the nurse turn to drugs or alcohol due to the stigma of seeking mental healthcare? Furthermore, we do not know what led to the nurses' chronic pain. It is theoretically plausible that this chronic pain was connected to work-related injuries, yet only one narrative overtly stated that work was the root cause of the pain. It appears from both the quantitative (Davidson, Proudfoot, et al., 2020) and this new qualitative data

that nurses are seeking treatment for their mental health issues, yet these conditions are still not controlled. Why? Is it because of undertreatment, mistreatment, or persistent unrelenting triggers that override the effect of treatment? It is only through further prospective examination of these issues that targeted preventive measures can be developed.

**Previous Suicide Attempts and Mental Health Disorders**

A history of previous suicide attempts is widely regarded as one of the most robust risk factors and warning signs for completed suicide (Bostwick et al., 2016; Large et al., 2020). A 2019 World Health Organization fact sheet states that "by far the strongest risk factor for suicide is a previous suicide attempt" (World Health Organization, 2019). It stands to reason, then, that follow-up care for people who have attempted suicide and provision of community

support is considered one of the key approaches to suicide prevention. The results of this study suggest that is no less true for nurses as for other survivors in the community.

Quantitative analyses indicate that nurses have a higher rate of mental health issues than non-nurses prior to death by suicide (Choflet et al., In press; Davidson, Proudfoot, et al., 2020; Patrician et al., 2020). Also, in a suicide prevention program that used online encrypted anonymous screening, moderate- to high-risk nurses were found to have approximately a 10% incidence of previous attempts at suicide (Davidson, Accardi, et al., 2020; Norcross et al., 2018). In our study, 40% of the nurses who actually completed suicide with job issues had a history of previous attempts. Early identification of those with a previous suicide attempt is possible using tested screening programs like these. If scaled to be deployed nationwide and coupled with supportive therapy, the impact of screening has the potential to detect those in need of treatment to thus decrease the incidence of suicide (Davidson et al., 2018 ; Davidson, Accardi, et al., 2020; Norcross et al., 2018). However, given these results, proactive screening programs need to be disassociated with either local human resources departments or state boards of nursing (BONs).

A second virulent risk factor, psychopathology (e.g., depression, bipolar disease) also frequently appeared in the reports of nurses who died by suicide. Like the prevalence of past suicide attempts among these nurses, known psychopathology was not unexpected. In the general population, aside from suicide attempts, mental illness is the next most important risk for suicide (Too et al., 2019; Turecki et al., 2019). Psychological autopsies consistently indicate that approximately 90% of individuals who die by suicide have had an identifiable mental health disorder prior to their death, most prominently substance use and depressive disorders (Yoshimasu et al., 2008). Major depressive disorders, associated with either depressive disorder or bipolar disorder, account for at least 50% of suicide deaths (Turecki et al., 2019). Other mental illnesses commonly associated with suicide include schizophrenia and schizoaffective disorders (Hor & Taylor, 2010), eating disorders (Kostro et al., 2014), and borderline personality disorders (McGirr et al., 2009). Most of these mental illnesses are more prevalent in women than men, suggesting that the contribution of mental illness among nurses, predominately women, as a risk for suicide may be even more robust than in the general population. In this study, we found strong evidence of both depression and bipolar disease among nurses who died by suicide but not schizophrenia, eating disorders, or borderline personality disorders. All of those nurses noted to have bipolar disorder in this study had lost their job recently or were unemployed. Early identification, treatment, and care of nurses with mental health disorders and SUDs represents another avenue of suicide prevention in this population.

### SUDs Among Nurses

The prevalence of substance use in nurses and its association with affective disorders and suicide in nurses was not previously well

FIGURE 1

## Proposed Conceptual Model: Job Loss Spiral
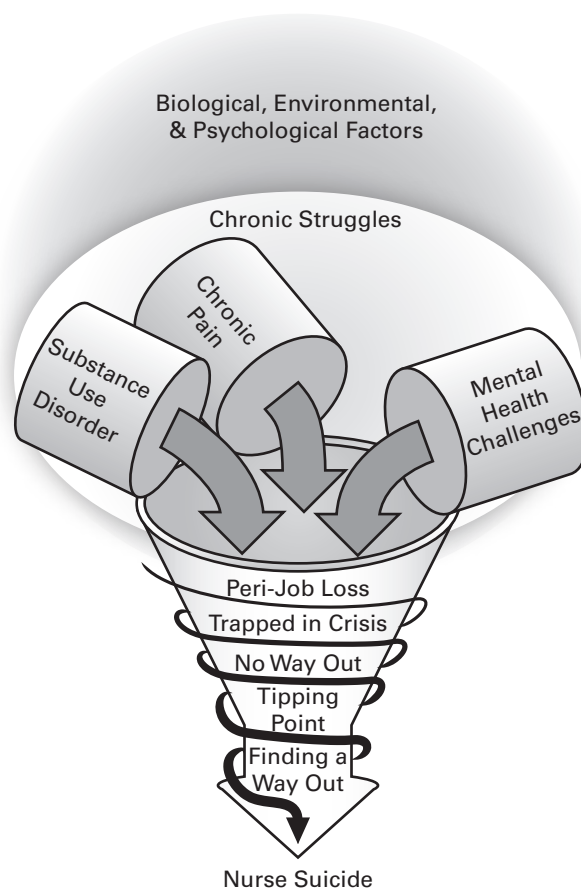


described in the literature. Despite this, our qualitative findings of an interdependent relationship between substance use, job problems, affective disorders, and resultant suicide are not surprising. Nurses have been reported to have similar SUD rates as the general population (Kunyk, 2015; Worley, 2017), but it has been difficult to further characterize the problem due to the legal and employment risks to nurses, which have almost certainly led to inadequate reporting (Foli et al., 2020; Monroe et al., 2013). An estimated 0.5% of employed nurses are enrolled in a substance use monitoring program in a given year (Monroe et al., 2013), but up to 20% of working nurses may exhibit signs of a SUD (Monroe & Kenaga, 2011). A widely cited study of Canadian nurses reported that more than 90% of nurses with an active SUD were practicing nursing with no substance use treatment (Kunyk, 2015).

The threat of the loss of employment or licensure, coupled with the shame of losing the nursing identity and the stigma many in the health professions associate with addiction, may create a seemingly insurmountable barrier to nurses seeking help for an active SUD (Kunyk et al., 2016). Painful misconceptions around substance use, such as the pervasive myth that substance use is a

personal failure, that a person with an active SUD must hit "rock bottom" before they will accept help, and a continuing disciplinary rather than rehabilitative approach to addiction all contribute to an environment that discourages self-reporting and promotes stigma (Kunyk et al., 2016; Mumba, 2018). To prevent the deterioration of circumstances that sometimes lead to nurse suicide, proactive nonpunitive approaches to substance use management are needed in the nursing profession (Worley, 2017).

### Alternative-to-Discipline Programs

BONs have two ways of managing nurses who experience SUD: a disciplinary approach and a nondisciplinary approach. A disciplinary approach involves a stepwise lengthy investigative process that can be costly for the BON and nurse under investigation (Bettinardi-Angres et al., 2012). Disciplinary action has significant ramifications for the nurse under investigation, oftentimes leading to their license being suspended. By contrast, a nondisciplinary approach involves the use of an alternative-to-discipline (ATD) program associated with the state's BON or a contracted third-party organization (Russell, 2020). Because SUD has been identified as a disease process, most BONs utilize the nondisciplinary approach of an ATD program to manage nurses who experience SUD and to protect the public from potential harm (Bettinardi-Angres et al., 2012; Monroe et al., 2011). Additionally, the use of ATD programs has allowed BONs to treat and monitor nurses with an *intention* to be nonpublic and nonpunitive. However, as we found in our study's case reports and as has been published earlier in an anonymous autobiographical case study ("Depression and Substance Abuse," 2018), the intentions are not always viewed as nonpunitive by the nurses experiencing this approach.

In 2011, the National Council of State Boards of Nursing (NCSBN) published *Model Guidelines* to provide practical and evidence-based recommendations and set benchmarks for standardization for ATD programs throughout the country (Darbro, 2011; NCSBN, 2011). Generally, ATD programs require confidential, ongoing monitoring of the nurse and a well-developed plan for treatment and intensive monitoring if the nurse decides to return to work (Russell, 2020). The principle behind these programs is to quickly remove a nurse with a SUD so that they can begin treatment and be on the road to recovery (Darbro, 2011). However, as seen in our study, removing them from work often leads to financial strain that overwhelms the nurse's ability to access the care they need. To prevent suicide, nurses need to be able to retain employment, receive treatment on a leave of absence or disability, and return to the workplace following treatment.

Although the formation of ATD programs was developed with best practices in mind (Darbro, 2011), an opportunity for ATD programs to prevent nurse suicide related to substance use remains untapped. To date, only 39 of 50 states (78%) have ATD programs working with their respective state's BON. Moreover, despite the establishment of ATD programs in the 1980s (Bettinardi-Angres et al., 2012), it was not until 2020 that we

began to see empirical evidence to support the efficacy and quality of these programs (Smiley R & K, 2020). Smiley (2020) found that nurses who remain employed were more successful in the program.

On average, successful completion of an ATD program takes 3 to 5 years, and the longer the nurse remains in the program, the more likely the success (Smiley & Reneau, 2020). This further underscores the need to allow nurses to retain employment during the chronic recovery period.

From the data in our study, 10.8% of the nurse suicides were in three states (Georgia, *n* = 6; Michigan, *n* = 3; Ohio, *n* = 13) that had no ATD program or have an ATD program awaiting approval from the state's regulatory body. Yet, the state that accounted for the most suicides with job-related issues prior to death (15.3%, Colorado n = 31) has an existing ATD program that has been in place for 35 years. Additionally, 13 suicides directly related to the diversion of drugs in the workplace calls for early identification of nurses with SUD and prompt intervention for ATD programs in preventing suicides in the nursing profession. From these data, it is clear that ATD programs would benefit from broadening their scope to include interventions of suicide prevention. Because these programs are handled on a state-by-state basis and vary widely between states, despite recommendations by the NCSBN, the authors strongly suggest further standardization. Another option is to adopt the strategies used by physicians (Goldenberg et al., 2020; Hawton, 2015; Watson & Fellmeth, 2018; Ross et al., 2020) and suggested by others (Worley, 2017) to divorce substance use treatment from the BONs altogether. Also, to our knowledge, suicide is not currently measured as an outcome in ATD programs. Given these findings, a reduction in suicide may serve as a surrogate marker for one measure of success of an ATD program.

Our next steps are to conduct a study using the 2019 NVDRS data, when they are available, to evaluate the correlation between substance use investigation of suicides in nursing and the individual state-by-state difference in ATD programs. The 2019 data will be inclusive of all 50 states. Assessing the correlation between discipline and loss of license or unemployment on death in a cross-sectional (compared with longitudinal) manner has the potential to provide additional information to guide regulation in nursing.

## Limitations

Case findings were limited to the interpretation of the death circumstances by law enforcement, medical examiners, and individuals available for interview at the time of the nurse's death and therefore were not comprehensive. This analysis included only deaths for which narratives were available. Descriptive statistics are likely to be underestimated given that the data are derived from a tertiary source (testimonies come from family members and employers, through the medical examiner/law enforcement agent, to the investigators and not directly from the decedent). Therefore, descriptive statistics are provided only to depict an esti-

mate of gravity of risks. The NVDRS does not include all 50 states for the available years, but it is the most robust source for suicides coded by occupation. The study is limited by its non-experimental retrospective design and by its sample, which does not include unsuccessful attempts.

Trustworthiness was optimized by the experience of this research team with analysis of NVDRS data and suicide research and prevention and the addition of three new team members (A.C., M.C.P., A.B.) to reduce the risk of bias from previous research findings. Confirmability was maintained through the number of investigators coming to consensus on the findings, checking each other's biases openly with each decision point. The interdisciplinary nature of the research team lent a more robust analysis of the data. External validity and transferability are strengthened by using the largest national dataset available (vs. regional or cross-sectional) sampling. Although this study represents the first time these data are examined in nursing, authenticity was affirmed by the close matching of the codes, subthemes, and themes to biological, psychosocial, and environmental risks identified in previous literature.

## Conclusion

The major novel finding of this study is that the vast majority of job issues leading to death by suicide among nurses involve loss of employment and/or license. The events leading up to job loss are largely modifiable. ATD programs as they exist today are not focused on prevention of death by suicide and would benefit from standardization, national oversight, consistent use of non-disciplinary measures, and focus on treatment while temporarily removed from the workplace. Removal of license could be reserved only for those refractory to treatment. Additionally, suicide should be considered as an outcome measure in ATD programs. Furthermore, moving the treatment of nurses with SUD out of the scope of BONs, as physicians have done before us, should be considered.

Losing a job or leaving the profession due to substance use, chronic pain, or mental health issues is a risk for nurse suicide, and future research is indicated to better understand the factors that lead to these problems. However, our findings suggest several potential strategies to reduce suicide among nurses. Institutions need programs to help nurses manage the psychological transition of job loss to prevent death by suicide. Suicide prevention measures coupled closely with SUD treatment are needed. Earlier or more complete treatment for bipolar disorder and depression may prevent nurse suicide. Prevention of chronic pain from work-related musculoskeletal injuries (eg, ergonomically correct care of patients) is essential and could be classified as a suicide prevention strategy. Further efforts at overcoming stigma so that nurses seek early and comprehensive treatment for mental health issues is needed. Educators can prepare nurses by emphasizing the need to recognize and treat individual mental health issues and the risk of substance use. Overall, evidence-based screening and risk detection scaled at

a national level has the opportunity to improve the health of the workforce and prevent death.

## References

Aasland, O. G., Hem, E., Haldorsen, T., & Ekeberg, Ø. (2011). Mortality among Norwegian doctors 1960-2000. *BMC Public Health, 11*, 173. https://doi.org/10.1186/1471-2458-11-173

Bettinardi-Angres, K., Pickett, J., & Patrick, D. (2012). Substance use disorders and accessing alternative-to-discipline programs. *Journal of Nursing Regulation, 3*(2), 16–23. https://doi.org/10.1016/S2155-8256(15)30214-3

Bird, S., Klein, E., & Loper, E. (2009). *Natural language processing with Python: analyzing text with the natural language toolkit.* O'Reilly Media, Inc.

Blei, D. M., Ng, A. Y., & Jordan, M. I. (2003). Latent dirichlet allocation. *Journal of Machine Learning Research, 3*(Jan), 993–1022.

Bostwick, J. M., Pabbati, C., Geske, J. R., & McKean, A. J. (2016). Suicide attempt as a risk factor for completed suicide: even more lethal than we knew. *American Journal of Psychiatry, 173*(11), 1094–1100.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2014). What can "thematic analysis" offer health and wellbeing researchers? *International Journal of Qualitative Studies on Health and Well-being, 9.* https://doi.org/ 10.3402/qhw.v9.26152

Cañadas-De la Fuente, G. A., Vargas, C., San Luis, C., García, I., Cañadas, G. R., & De la Fuente, E. (2015). Risk factors and prevalence of burnout syndrome in the nursing profession. *International Journal of Nursing Studies, 52*(1), 240–249. https://doi.org/10.1016/j.ijnurstu.2014.07.001

Centers for Disease Control and Prevention. (2019, October 13). *National Violent Death Reporting System.* https://www.cdc.gov/violenceprevention/datasources/nvdrs/index.html

Centers for Disease Control and Prevention. (2021, January 28). The social-ecological model: A framework for prevention. https://www.cdc.gov/violenceprevention/publichealthissue/social-ecologicalmodel.html

Cheung, T., Lee, P. H., & Yip, P. S. F. (2016). Suicidality among Hong Kong nurses: Prevalence and correlates. *Journal of Advanced Nursing, 72*(4), 836–848. https://doi.org/10.1111/jan.12869

Chipas, A., Cordrey, D., Floyd, D., Grubbs, L., Miller, S., & Tyre, B. (2012). Stress: Perceptions, manifestations, and coping mechanisms of student registered nurse anesthetists. *AANA Journal, 80*(4 Suppl.), S49–S55.

Choflet, A., Davidson, J. E., Ye, G., Lee, K., Parras, M., Barnes, A., & Zisook, S. (In press). Substance use issues in nurse suicide. *International Journal of Nursing.*

Covell, C. L., Sands, S. R., Ingraham, K., Lavoie-Tremblay, M., Price, S. L., Reichert, C., & Bourgeault, I. L. (2020). Mapping the peer-reviewed literature on accommodating nurses' return to work after leaves of absence for mental health issues: A scoping review. *Human Resources for Health, 18*(1), 36.

Darbro, N. (2011). Model guidelines for alternative programs and discipline monitoring programs. *Journal of Nursing Regulation, 2*(1), 42–49. https://doi.org/10.1016/S2155-8256(15)30301-X

Davidson, J., Zisook, S., Kirby, B., DeMichele, G., & Norcross, W. (2018). Suicide prevention: A Healer Education and Referral (HEAR) program for nurses. *The Journal of Nursing Administration, 48*(2), 85–92. https://doi.org/10.1097/NNA.0000000000000582

Davidson, J. E., Accardi, R., Sanchez, C., Zisook, S., & Hoffman, L. A. (2020). Sustainability and outcomes of a suicide prevention program for nurses. *Worldviews on Evidence-Based Nursing, 17*(1), 24–31. https://doi.org/10.1111/wvn.12418

Davidson, J. E., Proudfoot, J., Lee, K., Terterian, G., & Zisook, S. (2020). A Longitudinal analysis of nurse suicide in the United States (2005–2016) with recommendations for action. *Worldviews on Evidence-Based Nursing, 17*(1), 6–15. https://doi.org/10.1111/wvn.12419

Davidson, J. E., Ye, G., Deskins, F., Rizzo, H., Moutier, C., & Zisook, S. (2020). Exploring nurse suicide by firearms: A mixed-method longitudinal (2003–2017) analysis of death investigations. *Nursing Forum*. https://doi.org/10.1111/nuf.12536

Depression and substance abuse: The danger of being strong for far too long. (2018, October 10). *American Nurse Today*. https://www.americannursetoday.com/blog/the-danger-of-being-strong-far-too-long

Foli, K. J., Reddick, B., Zhang, L., & Krcelich, K. (2020). Substance use in registered nurses: "I heard about a nurse who . . .". *Journal of the American Psychiatric Nurses Association, 26*(1), 65–76. https://doi.org/10.1177/1078390319886369

Goldenberg, M., Miotto, K., Skipper, G. E., & Sanford, J. (2020). Outcomes of physicians with substance use disorders in state physician health programs: A narrative review. *Journal of Psychoactive Drugs, 52*(3), 195–202. https://doi.org/10.1080/02791072.2020.1734696

Guetterman, T. C., Chang, T., DeJonckheere, M., Basu, T., Scruggs, E., & Vydiswaran, V. G. V. (2018). Augmenting qualitative text analysis with natural language processing: Methodological study. *Journal of Medical Internet Research, 20*(6), e231. https://doi.org/10.2196/jmir.9702

Harkavy-Friedman, J. (2020). *Research Methods in Suicidology*. 2020 Workshop Series for Early Career Researchers, New York.

Hawton, K. (2015). Suicide in doctors while under fitness to practise investigation. *BMJ, 350*, h813. https://doi.org/10.1136/bmj.h813

Hawton, K., Agerbo, E., Simkin, S., Platt, B., & Mellanby, R. J. (2011). Risk of suicide in medical and related occupational groups: A national study based on Danish case population-based registers. *Journal of Affective Disorders, 134*(1-3), 320–326. https://doi.org/10.1016/j.jad.2011.05.044

Hawton, K., Simkin, S., Rue, J., Haw, C., Barbour, F., Clements, A., Sakarovitch, C., & Deeks, J. (2002). Suicide in female nurses in England and Wales. *Psychological Medicine, 32*(2), 239–250.

Hem, E., Haldorsen, T., Aasland, O. G., Tyssen, R., Vaglum, P., & Ekeberg, O. (2005). Suicide rates according to education with a particular focus on physicians in Norway 1960–2000. *Psychological Medicine, 35*(6), 873–880.

Hor, K., & Taylor, M. (2010). Suicide and schizophrenia: A systematic review of rates and risk factors. *Journal of Psychopharmacology, 24*(4 Suppl.), 81–90. https://doi.org/10.1177/1359786810385490

Jun, J., Tucker, S., & Melnyk, B. M. (2020). Clinician mental health and well-being during global healthcare crises: Evidence learned from prior epidemics for COVID-19 pandemic. *Worldviews on Evidence-Based Nursing, 17*(3), 182–184. https://doi.org/10.1111/wvn.12439

Kölves, K., & De Leo, D. (2013). Suicide in medical doctors and nurses: an analysis of the Queensland Suicide Register. *The Journal of Nervous and Mental Disease, 201*(11), 987–990. https://doi.org/10.1097/nmd.0000000000000047

Kostro, K., Lerman, J. B., & Attia, E. (2014). The current status of suicide and self-injury in eating disorders: A narrative review. *Journal of Eating Disorders, 2*(1), 19.

Kroth, P. J., Morioka-Douglas, N., Veres, S., Babbott, S., Poplau, S., Qeadan, F., Parshall, C., Corrigan, K., & Linzer, M. (2019). Association of electronic health record design and use factors with clinician stress and burnout. *JAMA Network Open, 2*(8), e199609–e199609. https://doi.org/ doi:10.1001/jamanetworkopen.2019.9609

Kunyk, D. (2015). Substance use disorders among registered nurses: Prevalence, risks and perceptions in a disciplinary jurisdiction. *Journal of Nursing Management, 23*(1), 54–64. https://doi.org/10.1111/jonm.12081

Kunyk, D., Inness, M., Reisdorfer, E., Morris, H., & Chambers, T. (2016). Help seeking by health professionals for addiction: A mixed studies review. *International Journal of Nursing Studies, 60*, 200–215. https://doi.org/10.1016/j.ijnurstu.2016.05.001

Large, M., Corderoy, A., & McHugh, C. (2020). Is suicidal behaviour a stronger predictor of later suicide than suicidal ideation? A systematic review and meta-analysis. *Australian & New Zealand Journal of Psychiatry*, https://doi.org/10.1177/0004867420931161

Mann, J. J., & Rizk, M. M. (2020, Oct 1). A brain-centric model of suicidal behavior. *The American Journal of Psychiatry, 177*(10), 902–916. https://doi.org/10.1176/appi.ajp.2020.20081224

McGirr, A., Paris, J., Lesage, A., Renaud, J., & Turecki, G. (2009). An examination of DSM-IV borderline personality disorder symptoms and risk for death by suicide: A psychological autopsy study. *The Canadian Journal of Psychiatry, 54*(2), 87–92. https://doi.org/10.1177/070674370905400206

Melnyk, B. M., Kelly, S. A., Stephens, J., Dhakal, K., McGovern, C., Tucker, S., Hoying, J., McRae, K., Ault, S., & Spurlock, E. (2020). Interventions to improve mental health, well-being, physical health, and lifestyle behaviors in physicians and nurses: A systematic review. *American Journal of Health Promotion, 34*(8), 929–941. https://doi.org/10.1177/0890117120920451

Melnyk, B. M., Orsolini, L., Tan, A., Arslanian-Engoren, C., D'Eramo Melkus, G., Dunbar-Jacob, J., Rice, V. H., Millan, A., Dunbar, S. B., Braun, L. T., Wilbur, J., Chyun, D. A., Gawlik, K, & Lewis, L. M. (2018). A national study links nurses' physical and mental health to medical errors and perceived worksite wellness. *Journal of Occupational and Environmental Medicine, 60*(2), 126–131. https://doi.org/10.1097/JOM.0000000000001198

Monroe, T., & Kenaga, H. (2011). Don't ask don't tell: Substance abuse and addiction among nurses. *Journal of Clinical Nursing, 20*(3-4), 504-509. https://doi.org/10.1111/j.1365-2702.2010.03518.x

Monroe, T. B., Kenaga, H., Dietrich, M. S., Carter, M. A., & Cowan, R. L. (2013). The prevalence of employed nurses identified or enrolled in substance use monitoring programs. *Nursing Research, 62*(1), 10–15. https://doi.org/10.1097/NNR.0b013e31826ba3ca

Monroe, T., Vandoren, M., Smith, M. L., Cole, M. J., & Kenaga, H. (2011). Nurses recovering from substance use disorders: A review of policies and position statements. *The Journal of Nursing Administration, 41*(10), 415–421. https://doi.org/10.1097/NNA.0b013e31822edd5f

Moss, M., Good, V. S., Gozal, D., Kleinpell, R., & Sessler, C. N. (2016). An official critical care societies collaborative statement: Burnout syndrome in critical care healthcare professionals: A call for action. *Critical Care Medicine, 44*(7), 1414-1421. https://doi.org/10.1097/ccm.0000000000001885

Moutier, C., & Harkavy-Friedman, J. (2004). *Interacting Risk and Protective Model for Understanding Suicide*. American Foundation for Suicide Prevention.

Mumba, M. N. (2018). Employment implications of nurses going through peer assistance programs for substance use disorders. *Archives of Psychiatric Nursing, 32*(4), 561–567. https://doi.org/10.1016/j.apnu.2018.03.001

National Academy of Medicine. (n.d.). *Action collaborative on clinician well-being and resilience*. https://nam.edu/action-collaborative-on-clinician-well-being-and-resilience-network-organizations/

National Council of State Boards of Nursing. (2011). *Substance use disorder in nursing: A resource manual and guidelines for alternative and disciplinary monitoring programs*. https://www.ncsbn.org/770.htm

Norcross, W. A., Moutier, C., Tiamson-Kassab, M., Jong, P., Davidson, J. E., Lee, K. C., Newton, I. G., Downs, N. S., & Zisook, S. (2018). Update on the UC San Diego Healer Education Assessment and Referral (HEAR) Program. *Journal of Medical Regulation, 104*(2), 17–26. https://doi.org/10.30770/2572-1852-104.2.17

Patrician, P. A., Peterson, C., & McGuinness, T. M. (2020). Original research: Suicide among RNs: An analysis of 2015 data from the National Violent Death Reporting System. *American Journal of Nursing, 120*(10), 24–28. https://doi.org/10.1097/01. NAJ.0000718624.25806.3f

Rehurek, R., & Sojka, P. (2010). Software framework for topic modelling with large corpora. *Proceedings of the LREC 2010 Workshop on New Challenges for NLP Frameworks, Valletta, Malta.*

Ross, C. A., Jakubec, S. L., Berry, N. S., & Smye, V. (2020). The business of managing nurses' substance-use problems. *Nursing Inquiry, 27*(1), e12324. https://doi.org/10.1111/nin.12324

Russell, K. (2020). Components of nurse substance use disorder monitoring programs. *Journal of Nursing Regulation, 11*(2), 20-27. https://doi.org/10.1016/S2155-8256(20)30106-X

Shanafelt, T., Trockel, M., Ripp, J., Murphy, M. L., Sandborg, C., & Bohman, B. (2019). Building a program on well-being: Key design considerations to meet the unique needs of each organization. *Academic Medicine, 94*(2), 156–161. https://doi.org/10.1097/ acm.0000000000002415

Shanafelt, T. D., Hasan, O., Dyrbye, L. N., Sinsky, C., Satele, D., Sloan, J., & West, C. P. (2015). Changes in burnout and satisfaction with work-life balance in physicians and the general US working population between 2011 and 2014. *Mayo Clinic Proceedings*, 90(12), 1600–1613. https://doi.org/10.1016/j.mayocp.2015.08.023.

Sievert, C., & Sherley, K. E. (2014, June 27). LDAvis: A method for visualizing and interpreting topics. *Proceedings of the Workshop on Interactive Language Learning, Visualization, and Interfaces, Baltimore, Maryland.*

Smiley, R., & Reneau, K. (2020). Outcomes of substance use disorder monitoring programs for nurses. *Journal of Nursing Regulation, 11*(2), 28–35. https://doi.org/10.1016/S2155-8256(20)30107-1

Smith, J. A. (Ed.). (2015). *Qualitative psychology: A practical guide to research methods*. Sage Publishing.

Squires, A., & Dorsen, C. (2018). Qualitative research in nursing and health professions regulation. *Journal of Nursing Regulation, 9*(3), 15–26. https://doi.org/10.1016/S2155-8256(18)30150-9

Stone, D., Holland, K., Bartholow, B., Crosby, A., Davis, S., & Wilkins, N. (2017). *Preventing suicide: A technical package of policies, programs, and practices*. Centers for Disease Control and Prevention. https:// www.cdc.gov/violenceprevention/pdf/suicidetechnicalpackage.pdf

Syed, S., & Spruit, M. (2017). Full-text or abstract? Examining topic coherence scores using latent dirichlet allocation. *2017 IEEE International conference on data science and advanced analytics (DSAA)*, 165–174.

Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care, 19*(6), 349–357. https://doi.org/10.1093/intqhc/ mzm042

Too, L. S., Spittal, M. J., Bugeja, L., Reifels, L., Butterworth, P., & Pirkis, J. (2019). The association between mental disorders and suicide: A systematic review and meta-analysis of record linkage studies. *Journal of Affective Disorders, 259*, 302–313. https://doi.org/10.1016/j. jad.2019.08.054

Turecki, G., Brent, D. A., Gunnell, D., O'Connor, R. C., Oquendo, M. A., Pirkis, J., & Stanley, B. H. (2019). Suicide and suicide risk. *Nature Reviews Disease Primers, 5*(1), 74. https://doi.org/10.1038/ s41572-019-0121-0

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & Health Sciences, 15*(3), 398–405. https://doi. org/10.1111/nhs.12048

Watson, K., & Fellmeth, J. D. (2018). Medical Board of California. *California Regulatory Law Reporter, 23*(2), 41–75.

West, E. A. (2016). Conceptualizing the relationships between organizational cultures, nurse leaders and the nurse practice environments: A historical perspective. *International Archives of Nursing and Health Care, 2*(2), 042.

World Health Organization. (2019, September 2). Suicide. https://www. who.int/news-room/fact-sheets/detail/suicide

Worley, J. (2017). Nurses with substance use disorders: Where we are and what needs to be done. *Journal of Psychosocial Nursing and Mental Health Services, 55*(12), 11–14.

Ye, G. Y., Davidson, J. E., Kim, K., & Zisook, S. (2020). Physician death by suicide in the United States: 2012-2016. *Journal of Psychiatric Research*, *134*, 158-165. 10.1016/j.jpsychires.2020.12.064

Yoshimasu, K., Kiyohara, C., Miyashita, K.; Stress Research Group of the Japanese Society for Hygiend. (2008). Suicidal risk factors and completed suicide: Meta-analyses based on psychological autopsy studies. *Environmental Health and Preventive Medicine, 13*(5), 243–256.

Zeng, H. J., Zhou, G. Y., Yan, H. H., Yang, X. H., & Jin, H. M. (2018). Chinese nurses are at high risk for suicide: A review of nurses suicide in China 2007–2016. *Archives of Psychiatric Nursing, 32*(6), 896–900. https://doi.org/ 10.1016/j.apnu.2018.07.005

---

**Judy E. Davidson, DNP, RN, MCCM, FAAN,** is a Nurse Scientist, University of California San Diego Health, and a Research Scientist, School of Medicine, Department of Psychiatry, University of California San Diego. **Gordon Ye** is a Researcher, Department of Psychiatry, School of Medicine, University of California San Diego. **Melissa C. Parra, BSN, RN,** is a Graduate Student, School of Nursing, Azusa (California) Pacific University. **Amanda Choflet, DNP, RN, OCN,** is an Assistant Professor, School of Nursing, San Diego State University. **Kelly Lee, PharmD,** is a Professor, Skaggs School of Pharmacy, University of California San Diego. **Arianna Barnes, MSN, RN, CCRN, SCRN, PHN,** is a Doctoral Student, Johns Hopkins School of Nursing, Baltimore, Maryland, and an ICU Nurse, Mission Hospital Mission Viejo, California. **Jill Harkavy-Friedman, PhD,** is the Vice President of Research for the American Foundation for Suicide Prevention, New York, New York. **Sidney Zisook, MD,** is a Distinguished Faculty Member, Department of Psychiatry, University of California San Diego School of Medicine.

*Conflicts of Interest: None*