

Establishment of a Comprehensive Inpatient Suicide Prevention Network by Using Health Care Failure Mode and Effect Analysis

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Inpatient suicide is a common sentinel event. However, evidence supporting effective inpatient suicide prevention measures is currently lacking. In this project, health care failure mode and effect analysis was used in a general hospital quality improvement process to identify suicide risk and reduce inpatient suicide behavior.

Interventions were designed to improve steps in the process with the highest risk of failure, resulting in significantly higher consultation rates and reduction of attempted suicide.

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Suicide is complex and heterogeneous in nature and is affected by a multitude of biopsychosocial factors. In our clinical work, major general medical illness and loss of good health status were found to be remarkable risk factors for suicide among general hospital inpatients. Inpatient suicide is a common sentinel event worldwide and is among the five most commonly reported causes of patient safety-related adverse events in the United States (1).

Tishler and Reiss (2) reviewed relevant reports to determine the rates and methods of inpatient suicide as well as its risk factors. It is relatively rare for patients to attempt suicide in medical or surgical settings; those who do so frequently employ highly lethal suicide methods (hanging and jumping) and are commonly overwhelmed by their acute or chronic medical illnesses. However, little information regarding suicides among general hospital inpatients is currently available, and there is limited evidence focusing on health care system approaches for suicide prevention. In this preliminary study, we developed a successful hospital-based and integrated suicide prevention program by assembling a multidisciplinary team and applying health care failure mode and effect analysis (HFMEA) to improve processes related to suicide risk identification and intervention.

The Setting

In Taiwan, the suicide mortality rate was 7.4 per 100,000 in 1990 and rose to 15.3 per 100,000 in 2013. Suicide is the ninth most common cause of death, representing about 4,000 deaths per year for a population of 23 million (3).

E-Da Hospital is a general hospital with 1,170 beds that was accredited by the Joint Commission International in 2008, 2011, 2014, and 2018. It is located in northern Kaohsiung City in Taiwan and is affiliated with a medical college that is part of I-Shou University. E-Da Hospital opened in 2004 and became a medical center in 2017, providing medical resources for the region.

The first incident of inpatient suicide at the hospital was the suicide of a cancer patient in the oncology ward in 2008. This index case was the only death by suicide from 2008 to 2012, yet in the same period, 21 inpatients attempted suicide and survived. In 2010, the Department of Psychiatry started to screen inpatients with cancer routinely by using the Taiwanese Depression Questionnaire (TDQ). The TDQ was chosen because over half of suicides are by people with a mood disorder, especially a depressive disorder.

In a previous study, we described our strategy for routine depression screening, assessment, and intervention for cancer inpatients at E-Da Hospital (4), noting that the estimated prevalence of major depressive disorder among our

HIGHLIGHTS

- Collaborations among staff, stakeholders, and various specialties are crucial to comprehensive inpatient suicide prevention in a general hospital.
- HFMEA is a strategy that may be useful in hospital settings for prevention of suicide behavior and other behavioral health sentinel events.

patients with cancer was 21.5%. TDQ is an 18-item, culturally specific, and self-rated instrument commonly used in Taiwan (5). One item (“I have negative thinking, even a death wish”) is related to suicidal ideation. In previous studies, a TDQ cutoff value of ≥ 19 had reasonably good psychometric properties. However, we decided to lower the cutoff value to ≥ 12 to avoid overlooking at-risk inpatients with false negative results. However, the rates of further psychiatric consultation for patients with positive results were too low, making it difficult to collect accurate data about demographic characteristics and further follow-up was rare. Hence, we recruited a full-time suicide prevention social worker in 2012 to standardize the routine, collect associated data, and perform case management. In 2012, based on data from sentinel reviews of inpatient suicide, we also revised the hospital policy on regulation of inpatient suicide prevention to extend screening to four types of at-risk inpatients: patients with cancer, patients with HIV infection, patients receiving hospice services, and patients ages 65 or older.

To improve inpatient suicide prevention in line with the policy, a formal health care quality improvement program was implemented by using HFMEA and with the support and permission of hospital management. The program met criteria for exemption from ethics review according to hospital policy. The HFMEA was performed between January and December 2013. All recommended improvement strategies and actions were also implemented that year.

HFMEA Procedure

HFMEA is a formal process of quality improvement with five specific steps. Step 1 is to define the topic. Our primary focus—inpatient suicide prevention—was based on the hypothesis that increased suicide risk screening and subsequent safety interventions and psychiatric consultation would prevent or reduce hospital suicides. Step 2 is to assemble the team. At E-Da Hospital, the composition of the multidisciplinary team included a psychiatrist, a nursing supervisor and head nurse, members of information technology (IT) and facility maintenance, and a full-time social worker, who collaborated to conduct step-by-step assessments and to develop improvement strategies under the supervision of a hospital advisor. We included personnel from the aforementioned specialties to evaluate the possible interactions between inpatients and software, hardware, environment, and staff in the health care environment. Team meetings were held weekly, and any feedback or comments regarding the agenda were discussed and recorded.

The goal of step 3 is to graphically describe the process. First, it was necessary to develop a flow diagram of the inpatient suicide prevention process and subprocesses. The process steps were designed on the basis of our clinical experience and were modified and reapproved in step 4, a hazard analysis of possible “failure modes,” or places where things could go wrong. In step 4, through a process of team consensus, we also determined the severity and probability

of each failure mode, assigning a hazard score by multiplying the severity score (a 4-point measure of the potential subjective effect, from 1, no harm, to 4, severe harm) and the probability score (a 4-point measure of the likelihood of occurrence, from 1, rare, to 4, frequent). A hazard score of 8 or higher was considered sufficiently significant for further analysis of the potential cause and improvement strategies. Furthermore, a decision tree analysis helped us include other failure modes with a lower hazard score but high criticality and high detectability (6), bringing the total number of failure modes identified to nine. We listed the failure modes and their causes to guide our action steps.

Step 5 involves identifying action and outcome measures. The team brainstormed methods to identify possible improvement strategies for each failure mode. Additional specific actions were assigned to individual HFMEA team members with various specialties and expertise. To evaluate the effectiveness of our HFMEA, we set up two outcome measures: psychiatric consultation provided to at least 70% of at-risk patients and an inpatient suicide rate of zero. Furthermore, we conducted a chi-square analysis on the basis of a contingency table to compare the annual psychiatric consultation rates before, during, and after the HFMEA. The analysis was performed by using SPSS, version 19.0, for Windows.

Findings and Recommended Actions

The inpatient suicide prevention process was divided into five main phases: admission, screening, consultation and liaison with the department of psychiatry, referral for psychiatric treatment, and follow-up (see figure in the online supplement). For each phase, modes of failure were examined, and the hazard analysis was used to determine whether recommended actions were necessary. Thirteen potential causes of the nine failure modes were identified (see online supplement). Below, we describe recommended actions for each of the nine failure modes, some of which are grouped together.

Screening unfinished. To address incomplete screening and its potential causes, we implemented an integrated electronic medical system. The IT crew added a required field regarding “TDQ scoring” in the nursing evaluation entry. With the new system, nurses complete a screening procedure within 24 hours of admission of a new patient in one or more of the four risk categories described above and use the required field to record the results.

Data not analyzed correctly. We visited every medical and surgical ward to educate nursing staff to recognize the necessity for inpatient suicide prevention and to use the TDQ correctly. New staff training and continuing education regarding inpatient suicide were arranged annually. All hospital staff were invited and empowered to be gatekeepers of inpatient suicide prevention.

Process not performed according to TDQ results and results not presented during duty shifts. Because all HFMEA team members recognized the importance of recording TDQ truthfully and informing the in-charge and on-duty physicians about the patient's suicide risk, we updated the computerized physician order entry (CPOE) procedure to reduce misses and errors. If a nurse recorded a TDQ score of more than 12, it would elicit an alert indicating that a psychiatric consultation was recommended. This message was automatically inserted into the CPOE of the in-charge and on-duty physicians.

Inpatient safety and environment not monitored. We transferred at-risk patients to rooms near the nursing stations and ensured that patients were monitored during duty shift changes. Room inspections were performed to ensure inpatient safety and limit access to tools that could assist in a suicide attempt (e.g., curtain rope). Education was offered to caregivers and family members who continually visited the patients. If an immediate suicide risk remained, a transfer to the acute psychiatric ward for further intense treatment was recommended, once the patient's physical condition stabilized.

Psychiatric consultation not requested or left unfinished. After in-charge physicians received an alert, they could decide not to consult a psychiatrist because of incompatible opinions regarding the patient's suicide risk or possibly neglect to request a consultation because of the stigmatization of mental illness. Furthermore, the patients or their families could refuse referral. Therefore, we designed a mandatory field—"Why no consultation?"—that appeared before physicians closed the message window in the CPOE. The results were collected and sent to the social worker on a monthly basis for analysis and evaluation. The most common answer was, "This patient is not appropriate for psychiatric consultation after evaluation." We also attempted to engage with specific physicians who exhibited a rigid or passive attitude toward suicide prevention. When the in-charge team decided to request a consultation, a formal consultation liaison record with a thorough evaluation and recommendations was entered into our integrated medical system. All psychiatrists who provided consultation services were required to select whether the patient was at high or low risk of suicide. If the patient was at high risk, the psychiatrist would offer suggestions—which included default options such as transfer to a psychiatric service, requirement of 24-hour family accompaniment, or transfer to a bed near the nursing station—by clicking the options in the CPOE before a formal consultation form was completed.

Follow-up not administered and case not concluded. Even if the screening process ran smoothly, we still required a mental health professional to follow up with patients at long-term risk and to perform psychosocial intervention. Therefore, the E-Da suicide prevention center was established as a special administrative unit, and a full-time clinical psychologist was recruited to assist the social worker. Routine

inpatient suicide prevention case management was performed by our full-time staffs, even after discharge. Case managers negotiated not only with psychiatrists but also with other medical staff. A 24-hour helpline, which connected to managers, was offered to inpatients and staff at the hospital.

Postimplementation Outcomes

In 2013, during the HFMEA implementation phase, the rate of psychiatric consultations increased to 65.6%. After HFMEA, the rates were 76.7% and 79.2% in 2014 and 2015, respectively. Consultation rates in 2013 and 2014 were significantly higher than in 2012 (27.4%) ($p < 0.001$) (see figure in the online supplement). Overall, over 1,500 inpatients received the screening in 2013, and 821 screened positive. Medication treatment was suggested for more than 80% of inpatients who received consultation ($N = 296$). In the period before HFMEA (2008 to 2012), there were 21 attempted suicides, an average crude incidence rate of 168 suicide attempts per 100,000 admissions. In contrast, only three inpatients attempted suicide from 2013 to 2017, and none of the attempts were fatal, an incidence rate of 24 per 100,000 admissions. Since the program was implemented, there have been no suicides at the hospital.

Discussion and Conclusions

HFMEA has been applied to several medical specialties to improve medication errors (7); it is a useful procedure to proactively detect possible modes of failure and improve quality and patient safety in hospitals. To the best of our knowledge, this project is the first to investigate application of the HFMEA and associated improvement strategies to general hospital inpatient suicide prevention. Furthermore, this hospital-based integrated suicide prevention program was accredited with the Symbol of National Quality of Taiwan in 2014. This award certifies and encourages the advancement of Taiwan's medical services and is funded by the Institute for Biotechnology and Medicine Industry.

Our study had some limitations. First, although TDQ is a useful screening tool for depressive disorders, it is not designed to recognize other major psychiatric disorders that also contribute to suicide. It was therefore necessary to train our staff to recognize inpatients with a history of major psychiatric difficulty and low TDQ scores. Second, our screening focused mainly on four groups of inpatients. The next step would be to extend the range of screening to include other possible at-risk inpatients (such as inpatients with neurological disorders or severe pain).

In conclusion, our study identified a systematic, collaborative interdisciplinary intervention to improve inpatient suicide prevention in a general hospital. The system was effective in promoting the importance of suicide prevention to health professionals and inpatients and in reducing suicidal attempts. The HFMEA is a strategy that may be useful in hospital settings for prevention of suicidal behavior and other behavioral health sentinel events.

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Submissions Invited for Social Determinants of Mental Health Column

A new column in *Psychiatric Services*, Social Determinants of Mental Health, edited by Ruth S. Shim, M.D., M.P.H., and Michael T. Compton, M.D., M.P.H., aims to focus on clinical and policy issues as they relate to social justice in psychiatry and the social determinants of mental health, with a specific focus on mental health disparities and evidence-based strategies to improve mental health equity across population groups. Initiatives taking place in hospitals, clinics, health systems, and insurance plans will be emphasized. Ways in which clinicians and mental health services can address (screen for, evaluate, and ameliorate) social determinants of mental health will be highlighted. Manuscripts that emphasize specific social determinants of mental health, including discrimination, adverse early life experiences, poverty, social exclusion, low employment status, and low educational attainment, to name a few—and particularly how these determinants connect to mental health outcomes and can be addressed by mental health services—are particularly welcome. Papers, limited to 2,400 words, may be submitted online to the Social Determinants column via ScholarOne Manuscripts at mc.manuscriptcentral.com/appi-ps.