

# Inpatient suicide: epidemiology, risks, and evidence-based strategies

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## Editorial

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## Introduction

As of 2014, there were over 170 000 residents in inpatient and other 24-hour residential treatment beds on any given night, an average of over 53.6 patients per 100 000 population. In 2018, the National Mental Health Services Survey estimated that the mean population rate for beds in mental hospitals in the United States was 39.0 per 100 000, with a median of 31.4.

Safety is paramount in the inpatient psychiatric settings since the criterion for admission is primarily based on acuity, severity, and danger to self or others.<sup>1</sup> Therefore, it is both a standard of care and a key measure of quality and safety per The Joint Commission (TJC) guidelines.

Suicide is the 11th major cause of death in the United States, of which inpatient suicides comprise a relatively small, yet clinically significant fraction, accounting for approximately 1500 cases annually. Furthermore, it accounts for the second most common sentinel event (SE), accounting for nearly 12% of all SEs.<sup>2</sup> Nearly one-third of deaths by suicide occur while the patient is on 15-minute observations.<sup>3</sup> These data raise many scientific doubts including its association with separate risk factors, as suggested by some studies.<sup>4,5</sup> There is marked variability in the use of universal screening tools, structured risk assessments, and clinical practices that also inspire further scientific inquiries.<sup>4</sup> The inconsistent use of risk assessment tools, ambiguity about protective observations, and flaws in the structural designs were thought to be plausible explanations for the increased risk for inpatient suicides.<sup>6</sup>

However, empirical evidence about specific risk factors for the inpatient population, and preventive and mitigation strategies are sparse, scattered, and on many critical issues not available.

## Identifying individuals at risk

The rate of death by suicide among inpatients has been estimated much higher ie 600 to 800 suicides per 100 000 patient-years, which is nearly 50 to 72 times greater than the general population.<sup>7,8</sup> Therefore, methods of identifying high-risk patients were based on several reported factors like being away without leave at any time during the index admission, akathisia/extrapyramidal side effects at the time of suicide, and family history of suicide.<sup>1,9-11</sup> Dong et al<sup>11</sup> highlighted that most inpatient deaths by suicide occurred at a time when the patient was considered at no or low risk for suicide. The risk for death by suicide peaks immediately after admission or discharge. The first week of inpatient care is considered critical, and as much as 77% of deaths by suicide have been reported during this phase.<sup>8,11-13</sup> A systematic review suggested a higher probability of death by suicide in inpatients with schizophrenia when on leave compared with patients with affective disorder. Furthermore, since agreed leaves were usually given later on during the admission, patients with affective disorders have a greater risk earlier in the hospitalization. Since the emergence of these data, the practice of leave during inpatient stays has been discontinued. Furthermore, death-by-suicide rates have also been correlated with admission numbers, and previous suicidal behaviors could indicate future risk for suicide.<sup>14</sup> These risk factors are highly correlated but do not have a cumulative effect on suicide risk, with studies reporting less than 2% predictive value for identifying high-risk individuals.<sup>10</sup>

Overall, no group of psychiatric patients could be considered at lower suicide risk. Variations in findings have been observed for association with age, gender, marital status, employment, and educational qualifications.<sup>14</sup> Furthermore, data on association with religion, ethnicity, living alone, and forensic history are inconclusive.<sup>14</sup> This could be due to the differential presence of different groups in the samples, and therefore a separate evaluation of different groups could provide a clearer conclusion.<sup>14</sup> Although assessment of inpatient suicide risk can include several false positives, it is, therefore, crucial to avoid exclusion of individuals not at high risk.

## Screening

Suicide risk assessment is a continual process, and its utility primarily rests on 4 principles: therapeutic relationship, communication and collaboration, documentation of the assessment process, and cultural awareness, with special considerations for given care settings, life span, and traumatic life experiences.<sup>15</sup> Screening inpatients at a higher suicide risk relies on evaluating

underlying factors, such as risk factors, protective factors, and warning signs. Several inpatient suicide risk assessment screening tools and prediction models have been developed, with strengths and limitations. Overall, the sensitivity or Area Under The Curve (AUC) for most tools is nearly 80% or 0.7, respectively, highlighting fair or better risk discrimination in patients; however, their clinical use is limited by the frequency of false positives, suggesting the need for further wide-scale studies to refine these methods. The Columbia-Suicide Severity Rating Scale is a commonly used suicide screening tool that has shown good reliability and sensitivity.<sup>16</sup> Although a UK advisory body and the National Institute for Health and Care Excellence recommended that “assessment tools and scales designed to give a crude indication of the level of risk (eg, high or low) of suicide” should not be used.

### Prevention strategies

Suicide prevention strategies could be divided into 3 core components: (1) improving detection and awareness; (2) improving response refinement and standardization; and (3) improving patient-focused care. Table 1 summarizes risk factors and prevention strategies.

### Improving detection and awareness

Suicide-risk detection should be improvised by decreasing the variability in risk screening protocol by incorporating screening questionnaires that take less time and effort for the patient. Suicide screening should also be developed specifically for the inpatient population, for example, suicidal risks for inpatients with autism spectrum disorder are less studied; therefore, identifying those individuals with unknown risks is critical.<sup>17</sup> The use of suicide risk assessments is now been recommended for all inpatients by TJC.<sup>12</sup> The staff training from all disciplines is encouraged to educate about newer evidence related to suicide risk. The poster campaigns and mandatory lectures and training have proved beneficial in identifying and responding to high-risk patients.<sup>18-20</sup>

### Standardizing safety protocols and suicide-proof architecture

Hospital safety measures and designs, as well as the availability of resources, should be regularly monitored. Since hanging is the most common method of suicide attempt and completion in inpatient units, lanyards and anchor points should be removed.<sup>3,21</sup> The Mental Health Environment of Care Checklist (MHEOCC) could be followed in the hospital setting as these have been successfully

**Table 1.** Summary of Studies Evaluating the Risk of Inpatient Suicides and Prevention Strategies

Study	Type	Sample size	Controls/number of patients/admissions	Patient population	Risk factors
Agerbo <sup>4</sup>	Population-based cohort study	2727	Patients: 96 369 Admissions: 256 619	Psychiatric disorders	Higher suicide risk in former psychiatric patients with higher income and educational achievement; patients who are married or fully employed; experiencing loss of job, income, or marriage.
Powell et al <sup>29</sup>	Case-control study	97 inpatients	90 inpatients	General patients	No significant effect of being male, educated, employed, living alone, or married. Risk was associated with younger age and more or previous hospital admissions.
Listabarth et al <sup>30</sup>	Data analysis from 12 countries	Inpatient suicide rate: 5.67	N/A	Psychiatric inpatient	Higher suicide rates in females during treatment as well as for 12 mo post discharge
Dahale et al <sup>12</sup>	Retrospective study	13 inpatients	Admissions: 132 249	Psychiatric inpatient	Higher suicide rates in males, having affective disorders and schizophrenia, young age, urban background, high economic status
Dong et al <sup>11</sup>	Case-control study	92 inpatients	92 inpatients	General patients	No significant effect of employment, living alone, marriage, and more or previous admissions
Read et al <sup>31</sup>	Case-control study	27 inpatients	86 inpatients	General patients	No significant effect of younger age, male gender, ethnic minority, employment.

Table 1. Continued

Study	Type	Sample size	Controls/number of patients/admissions	Patient population	Risk factors
Winkler et al <sup>32</sup>	Case-control study	402	137 290 inpatients	Psychiatric patients during and after discharge	High risk associated with being male, multiple hospitalizations, as well as diagnosis of anxiety, affective, or personality disorder.
Roy and Draper <sup>33</sup>	Case-control study	37 inpatients	37 inpatients	General patients	No significant effect of employment or marriage. Higher risk was associated with living alone.
Shah and Ganesvaran <sup>34</sup>	Case-control study	60 inpatients	60 inpatients	General patients	No significant effect of young age and male gender.
Sharma et al <sup>9</sup>	Case-control study	44 inpatients	44 inpatients	General patients	No significant effect of education, employment, living alone, or marriage.
Spiebl et al <sup>35</sup>	Case-control study	30 inpatients	21 062 inpatients	General patients	High risk associated with education, employment, and more or longer previous admissions.
Hunt et al <sup>36</sup>	Case-control study	222 inpatients	222 inpatients	General patients	No significant effect of young age, living alone, marriage, and more or previous admissions. High risk associated with being male and employed.
Qin and Nordentoft <sup>13</sup>	Case-control study	1461 inpatients	1165 inpatients	General patients	Suicide risk associated with more or previous hospital admissions.
<i>Inpatients with psychotic disorders</i>					
Roy and Draper <sup>33</sup>	Case-control study	28 inpatients	13 inpatients	Inpatients with schizophrenia	No significant association with employment, marriage, and more or previous admissions. High suicide risk associated with living alone.
Shah and Ganesvaran <sup>37</sup>	Case-control study	62 inpatients	62 inpatients	Inpatients with schizophrenia	No significant association with younger and male gender.
Lehle <sup>38</sup>	Case-control study	46 inpatients	46 inpatients	Inpatients with depression	High suicide risk associated with older age, employment, acute disease, and beginning of the inpatient treatment.
Stebiaj et al <sup>39</sup>	Case-control study	Affective psychosis: 23 inpatients Schizophrenia: 36	Affective psychosis: 23 inpatients Schizophrenia: 36	Inpatients with affective psychosis or schizophrenia	High suicide risk associated with depression, lack of insight, past suicidal behavior, and poor relationships with family members.
Krupinski et al <sup>40</sup>	Case-control study	19 inpatients with schizophrenia	5333 inpatients with schizophrenia	Inpatients with schizophrenia	Younger age: no significant difference. Male: no significant difference.
Timonen et al <sup>41</sup>	Prospectively collected database study	Unskilled or unemployed: 80 Retired: 223	Unskilled or unemployed: 188 Retired: 371	Any psychiatric disorder	Highest risk in unskilled or unemployed and retired individuals.

Table 1. Continued

Study	Type	Sample size	Controls/number of patients/admissions	Patient population	Risk factors
Haglund <i>et al</i> <sup>42</sup>	Cohort study	Suicides: 3695	Discharges: 2 883 088	Inpatients with different psychiatric illnesses, immediately after discharge	Higher suicide risk in patients with recent suicidal behavior especially for schizophrenia as well as other nonorganic psychosis. Highest overall risk of suicide post discharge in patients suffering from depression. This was specially applicable to male patients with reactions to crisis or depression.
Inpatient suicide prevention strategies					
Study		Number of patients/admissions/suicides		Patient population	Prevention factors
Agerbo <i>et al</i> <sup>4</sup>		Patients: 96 369 Admissions: 256 619 Suicides: 2727		Psychiatric inpatients	Longer hospital stay and readmission could prevent suicide.
Dahale <i>et al</i> <sup>12</sup>		Admissions: 132 249 Suicides: 13		Psychiatric inpatients	Regular review of hospital safety measures and design, encouraging the stay of relatives with inpatients, and trying to avoid authorized leave during the hospital stay in patients with high suicidal risk and regular suicidal risk assessments can possibly be some of the strategies to reduce the suicidal risk.
Mills <i>et al</i> <sup>3</sup>		Reported suicides: 243		Mental health units in VA hospitals	Identify hazards and include a decision tree to determine which hazards to remove.
Watts <i>et al</i> <sup>22</sup>		Rate of suicide: 2.64 suicides per 100 000 admissions		Inpatient mental health units in all Department of Veterans Affairs (VHA) hospitals	Implementing MHEOCC.
Watts <i>et al</i> <sup>23</sup>		Rate of suicide: 4.2 suicides per 100 000 admissions Suicides: 29		Inpatients in VA hospitals	Implementing MHEOCC.
Changchien <i>et al</i> <sup>24</sup>		Not mentioned		Inpatients	Monitoring inpatient safety and environment; psychiatric consultation; adequate patient follow-up. HFMEA could be useful.
Horowitz <i>et al</i> <sup>17</sup>		Admissions: 107		Inpatients with autism spectrum disorder	Development of appropriate screening methods.
Modestin <i>et al</i> <sup>43</sup>		Admissions: 94		Chart review of inpatients	Pharmacological intervention with clozapine for at least 6 wk.
Ballard <i>et al</i> <sup>44</sup>		Admissions: 133		Inpatients	Pharmacological intervention with ketamine.
Ghahramanlou-Holloway <i>et al</i> <sup>25</sup>		Admissions: 24		Inpatients with recent suicide crisis	PACT sessions.
LaCroix <i>et al</i> <sup>26</sup>		Admissions: 36		Inpatients with recent suicidal attempt	PACT sessions.
Ellis <i>et al</i> <sup>27</sup>		Admissions: 52		Psychiatric inpatients with suicidality in some form within weeks	CAMS-based therapy.
Mills <i>et al</i> <sup>45</sup>		Rate of suicide: 0.07 per 100 000 admissions		Medical-surgical wards and ICUs in the VHA	Improved communication between providers and services.

Abbreviation: CAMS, collaborative assessment and management of suicidality; HFMEA, health care failure mode and effective analysis; MHEOCC, Mental Health Environment of Care Checklist; PACT, post-admission cognitive therapy; VA, Veterans Affairs.

implemented in some studies, resulting in decreased suicide rate from 2.64 to 0.087/100 000 admissions, and 4.2 to 0.74/100 000 admissions in another study.<sup>22,23</sup> Similarly, the health care failure mode and effective analysis can help establish a comprehensive inpatient suicide prevention network.<sup>24</sup> Once a patient is identified as a suicide risk, the process of transferring to the MH unit should be streamlined without prolonged waiting. This must include effective functioning of these facilities on all days, throughout the year, including weekends and holidays. A reduction in waiting time in the Emergency Room and faster patient transition from a sub-optimal environment to an appropriate MH facility would also be recommended.

### Patient-focused care

The role of patient-centric care and understanding the perspectives of the patient and the caregiver is another key strategy in mitigating suicide risk. This also includes educating them about the treatment process and encouraging shared decision-making. Communication and/or coordination between the at-risk patients and their care providers is paramount to alleviating suicide risk.<sup>12</sup> Psychiatric consultation should be encouraged and set up with appropriate follow-up care is considered an established standard of practice. Increasing length of hospital stay and readmission have shown promising results in preventing suicide risk in psychiatric inpatients.<sup>4</sup> Pharmacological interventions like clozapine administration for 6 weeks have been shown to decrease the rate of suicidal behaviors from 28% (pre-clozapine) to 3% during the administration period, followed by 18% in the post-clozapine period. Psychological interventions such as post-admission cognitive therapy or collaborative assessment and management of suicidality have proved beneficial in reducing depression, hopelessness, and suicidal ideation in most cases.<sup>25-27</sup> The use of lithium in treatment-resistant affective illness is an evidence-based treatment modality to reduce the risk of suicide.<sup>28</sup>

### Conclusion

One death by suicide is too many, and such an event while undergoing inpatient treatment raises many critical questions. Among many challenges, and a lack of strong empirical support, several measures could be included in clinical practice. First, studies suggest no group of patients considered at low risk but recommend using protective observations during the entire stay, more specific close observations, and precautions for an acutely suicidal patient. The protective observation intervals must change randomly, ideally less than 15 minutes to make the time interval less predictable. The first week of the inpatient stay has reported the highest deaths by suicide. Secondly, an emphasis on a specifically tailored treatment plan focused on the individual needs of the patients by trained, informed, and educated mental health professionals. Lastly, a systematic process in developing a suicide-proof architecture of the mental health facilities. The use of risk assessment tools is helpful; however, merely relying on high- and low-risk scores is been discouraged and must be complemented with evidence-based treatment.

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