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**The Association Between Insurance Status and Prolonged ED Length of Stay
for Deliberate Self-Harm and Suicide Attempt Admissions**

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2016

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Abstract

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By Amy Shim

Suicide is a serious public health problem and continues to take a devastating toll as one of the top ten leading causes of death in the United States. Additionally, non-suicidal self-injury (NSSI) has shown to be a robust risk factor to a future suicide attempt. An emergency department (ED) visit for NSSI or suicide attempts serves as a critical opportunity to survive and provide the necessary pathway to recovery. Despite the high short-term risk of a repeat suicide attempt, there is little known on the quality of ED care in addressing NSSI or suicide attempt admissions as well as how nonclinical factors like insurance status might impact care. This study examined whether ED care provision patterns, measured by prolonged LOS (length of stay) greater than or equal to 24 hours, were influenced by payer ability among this patient population. This four-state analysis (Arizona, Florida, New Jersey, New York) was conducted using the 2014 Healthcare Cost and Utilization Project (HCUP) State Emergency Department Databases (SEDD) and the 2014 American Hospital Association (AHA) Annual Survey. After controlling for individual and hospital covariates, Medicare and privately insured patients had a significantly lower likelihood of prolonged LOS (20% and 16%, respectively; $p < .01$) compared to uninsured patients. For patients with a home discharge, Medicare patients had a 23% lower likelihood than uninsured patients. There are evident disparities in ED care by insurance status, even when factors affecting LOS are controlled. Further policies should work to standardize the ED care management of NSSI and suicide attempts, paying particular focus to improving the timeliness of care provisions regardless of payer ability.

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Chapter 1: Introduction

Introduction

Intentional self-injury, regardless of one's intent to die, has a significant public health burden in the United States. Between 2006 and 2014, patients admitted to EDs for suicide ideation increased significantly by 414.6%.¹ Despite a similar surge found with suicide attempt admissions, post-discharge follow-up has failed for as high as 70% of patients.² Therefore, EDs must take an assertive role in the patient's care plan recovery. Research has evidenced the value of providing brief suicide interventions in the ED setting to prevent future self-harm, particularly benefiting those immediately released into the community.³ Though ED quality measures, including the length of stay, have not been directly studied with this population, there is a substantial body of research suggesting that health insurance status may impact the overall quality of care patients receive.⁴ Ensuring standardized care among this patient population is critical, especially because this population faces a high short-term suicide risk following their discharge. Deliberate self-harm, defined as intentional self-injury without the intent to die, is an important consideration to suicide because the intent to die has the capacity to change over one's life course. A 2011 survey analyzing the association between deliberate self-harm and suicide attempts found that almost 50% of adults in the United States with a history of deliberate self-harm reported having a suicide attempt.⁵

Given the complexities of deliberate self-harm and suicide attempts, as well as the tremendous cost burden and emotional distress on patients, their families, and society as a whole,⁶ there is a strong rationale to understand ED LOS among this patient population. This study will seek to understand how insurance status may impact the overall length of stay for suicide attempt or deliberate self-harm ED admissions, and ultimately draw insight on access to

care issues and opportunities for improvement in ED suicide care management. The outcome measure of interest is the proportion of ED encounters with a prolonged length of stay of greater than or equal to 24 hours. Emergency department claims data from the 2014 State Emergency Department Database (SEDD) were analyzed for the states Arizona, Florida, New York, and New Jersey. Results from this study will inform any disparities in care provisions based on insurance status, particularly to a high-risk population that is not well-studied in the ED literature. This research will also reinforce the importance of standardizing suicide care management and discharge decisions across EDs and strengthening capacities and resources in safety-net EDs to ensure best practices are met.

Background

It is estimated that about 85% of firearm suicide attempts occurring at home result in death before successfully reaching the ED.⁷ Given the life-threatening nature of a suicide attempt, the ED serves as a window of opportunity for survival among patients in crisis. While the ED mainly serves to stabilize and diagnose patients facing urgent and life-threatening health conditions, patients admitted for a suicide attempt or deliberate self-harm generally undergo additional procedures before their discharge destination is determined. Once the patient is stabilized and has the capacity to make healthcare decisions, the provider will administer a suicide risk assessment. This evaluation is used to ultimately inform the patient's discharge destination (i.e., home discharge, inpatient admission, or a transfer to another facility). The patient is also provided additional resources and health care contacts and may be consulted for safety planning and temporary lethal means restriction.

While the components of an ED visit for a suicide attempt are clearly defined, evidence suggests that the quality of care that is ultimately provided to patients may rely on several

factors, including the level of resources and staffing capacity in the ED setting and the number of psychiatric inpatient beds available.^{8,9} Furthermore, several contextual limitations further constrain best practice for ED suicide care management. Such limitations include the lack of or insufficient training among ED practitioners, the limited number of behavioral health professionals available, and the tendency to treat physical injuries rather than address underlying behavioral health conditions.^{9,10}

Despite these gaps in emergency care settings, attempts to measure this population's quality of care have been limited. Among the various ways of measuring the quality of care in an ED setting, the median length of stay has been commonly used to understand the degree of hospital capacity. A longer length of stay can inform several gaps in the ED environment, including limited personnel or resources available in a timely manner, unavailable inpatient beds, and ED overcrowding. The overall length of stay can vary drastically based on the patient attributes and characteristics. For example, research shows that psychiatric patients admitted to the ED generally have a longer length of stay and higher ED boarding rates before being admitted in an inpatient setting. A well-cited national study using the 2008 National Hospital Ambulatory Medical Care Survey (NHAMCS) demonstrated this disparity. The study found that the general ED boarding rate was 11.5%, while psychiatric patients faced an average rate of 21.5%. Additionally, psychiatric patients also faced longer boarding times, which averaged to be about 2.78 hours more than non-psychiatric patients.¹¹ Though psychiatric patients do not fully capture the circumstances of those having a suicide attempt, there is some validity in studying this population because suicide is strongly associated with having a psychiatric condition.¹²

Statement of Need

A majority of suicide literature offers consistent findings on the risk factors, protective factors, and circumstances that precede a suicide event.¹² Another prominent area of suicide research examines long-term patient outcomes for suicide survivors, focusing on the importance of follow-up care and preventing another attempt.^{13,14} However, there is little known about the critical period during an ED admission for an intentional self-injury and the quality of services being rendered. This literature gap is emphasized in a recent review of suicide risk assessments conducted in the ED setting,¹⁵ which acknowledges the poorly understood quality outcomes among patients admitted for suicide ideation. While ED length of stay is a commonly reported quality measure across hospitals, this measure has not yet been studied in the suicide literature. Research on psychiatric patients in the ED has evidenced various sources of disparities in length of stay. Some studies suggest that uninsured status is another nonclinical indicator of prolonged length of stay among psychiatric patients.^{16,17} It is evident that structural differences and resource constraints, particularly in safety-net hospitals, can impact medical support and mental health risk assessment timeliness.¹⁸ Given these potential barriers to ensuring standardized care coordination in an ED setting, there is a strong need to evaluate whether such disparities also hold specifically for deliberate self-harm or suicide attempt admissions.

Proposed Solution

Patients admitted to the ED for a suicide attempt are subject to varying treatment capacities based on the hospital's available resources and staffing. Although ED length of stay should be a direct reflection of clinical factors and hospital-level resources, research suggests that other factors, including health insurance status, may have a critical role in influencing the length of stay. Though the subset of patients admitted for a suicide attempt has not been directly studied, available evidence on patients with a psychiatric emergency indicates higher lengths of

stay than non-psychiatric patients. However, it is important to note that intentionality behind a self-injury adds further complexities to how psychiatric patients are treated in the ED setting. Minimizing any structural barriers from receiving care that should be standardized based on the patient's needs and the hospital's capacity is crucial for a positive patient experience and a timely provision of health services. By controlling for individual, hospital, and state characteristics, this study will analyze the inherent differences that insurance status can pose on a patient's ED length of stay when admitted for a suicide attempt. Such findings may motivate further reasons to standardize the suicide risk assessment process across EDs and ensure safety-net providers are well-equipped to address suicide in an ED care setting. Given the emergent nature of suicide attempts and deliberate self-harm, further investigation is necessary to refine support and coordination for patient care as well as hospital utilization in under-resourced areas.

Methods

This study was conducted using two datasets. ED encounters from the HCUP 2014 State Emergency Department Database were linked using hospital identifiers to access hospital-level information through the AHA Annual Survey. The following four states were selected based on data accessibility, robust sample size, and variable availability: Arizona, Florida, New Jersey, and New York. A logistic regression model was used to analyze the relationship between insurance status on the dichotomous outcome, prolonged length of stay (≥ 24 hours). A sensitivity analysis was conducted on the subset of patients discharged home. There is a substantial body of literature accounting for the higher length of stay among patients admitted inpatient or transferred to another facility. Adult (ages 18-64) admissions with any suicide attempt or deliberate self-harm, enumerated by ICD-9-CM external cause of injury codes E950 through E958, were included for analysis. Records with missing or unknown discharge status or any

other key variables included in the model were excluded. Additionally, to examine the length of stay, any observation with a disposition of "died in hospital" or "against medical advice" was excluded from the analysis.

Objectives

This study's primary goal is to understand the impact of insurance status on ED length of stay among patients admitted for deliberate self-harm or suicide attempts. Across all ED admissions, uninsured patients face longer lengths of stays compared to their counterparts. Among psychiatric ED patients, publicly insured patients face longer lengths of stays than privately insured. Therefore, I hypothesize that uninsured status is associated with a higher ED LOS than other insurance categories after controlling individual and hospital covariates. The secondary goal is to characterize the impact of insurance status on ED LOS for the subset of those with a home discharge. By focusing on patients discharged home directly from the ED, the length of stay will no longer account for any additional time associated with ED boarding. I hypothesize that among patients with a home discharge, those who are uninsured will face longer LOS compared to their counterparts.

Research Contribution

There are limited findings in the mental health literature looking at the attributes of insurance status and how it can impact psychiatric patients' length of stay. Additionally, the quality of care provided to patients admitted for a suicide attempt is not well-scrutinized in the literature. One Massachusetts study that observed mental health patients in EDs identified a positive link between uninsurance and longer ED length of stay, providing insight into barriers related to quality access to care.¹⁶ However, this was limited to ten EDs, which lacks generalizability.¹⁶ Additionally, providing specific contexts to mental health patients admitted

explicitly for a suicide attempt would consider the unique nature of suicide events, which may circumstantially differ from general mental health ED visits.

To my knowledge, there is no prior research examining the impact of insurance status on ED length of stay among those admitted for a suicide attempt or deliberate self-harm. This study can potentially address two critical areas for improving ED care. First, it will rationalize the importance of offering standardized and targeted services when patients are admitted for intentional self-injury, regardless of their intent to die. Second, this research will validate the need for enhanced hospital network system capacities so that best practices in suicide risk triage can be upheld at their highest standard.

Chapter 2: Background and Literature Review

Background

Among all intentional and unintentional injuries, suicide ranks as the top cause of injury mortality, with annual mortality rates that surpass that of motor vehicle accidents, poisoning, falls, and homicide between year 2000 to 2009.¹⁹ Suicide, defined as a death from a self-inflicted injurious act with the intent to die, is a complex public health problem that intersects many risk factors.²⁰ Suicide and suicide attempt rates vary drastically by demographic characteristics, including age, race/ethnicity, and gender.²¹ It is also clearly evidenced that predisposing factors, including but not limited to psychiatric or substance use disorders, chronic disease, lack of social support, access to lethal means, and traumatic life circumstances, contribute to a suicide attempt.^{12,22} Within suicide literature, it is important to acknowledge the difference between nonfatal suicide attempts and those that result in death. Between 2008 and 2011, there was estimated to be one death for every 31 suicide attempts reported among adults within a given year.²³ Although females are 1.4 times more likely to attempt suicide than males; males are 3.6

times more likely to die by suicide, partly due to the lethality of methods they tend to use, including firearms.^{21,24,25} As evidenced in the literature, firearms as a suicide mechanism are the most commonly used suicide method and the most fatal.^{21,26,27} In terms of treatment, psychotherapy, including cognitive-behavioral therapy,²⁸ and pharmacotherapy²⁹⁻³¹ have shown efficacy in reducing suicidal ideation, behavior, and overall suicide risk.³²

Deliberate Self-Harm and Suicide

From a clinical standpoint, the differentiation between a suicide attempt and intentional self-injury is critical to address the patient's needs adequately. As opposed to a suicide attempt, intentional self-injury, also referred to as deliberate self-harm, is not necessarily conducted with the intent to die. The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)³³ differentiates deliberate self-harm from other forms of self-injury by referring to it as non-suicidal self-injury (NSSI). Common forms of NSSI include cutting, banging, or burning, which all involve the deliberate destruction of one's own body tissue without the intent to die.³⁴ NSSI are most commonly observed among adolescent and young adult populations, especially those who have a psychiatric disorder.³⁵ Since NSSI is characterized without having the intent to die, injuries are usually characterized to be less lethal than suicide attempts. However, despite these differences, the importance of deliberate self-harm is mainly due to the risk it poses to a future suicide attempt. A nominal research study found that NSSI had a robust association to suicide attempts across four study samples, a relationship demonstrated to be stronger than other known risk factors including borderline personality disorder, depression, impulsivity, and anxiety.³⁶ Similar to this research finding, another study has evidenced that almost half of sampled adults in the United States with a suicide attempt also had history of deliberate self-harm in the past.⁵

Suicide ideation and suicide attempts are also different in nature. Suicidal ideation is defined as the contemplation of killing oneself, which may include having a plan in place.²² This is important to distinguish because most patients with suicidal ideation do not go on to have a suicide attempt.²² Though major depression is common among individuals with suicidal ideation, it does not hold a significant relationship with those who have a suicide attempt.²² However, it is well-evidenced in the suicide literature that mental health disorders are strong predictors of a suicide attempt.^{37,38} In fact, a systematic review of psychological autopsy studies found that about 90% of suicide deaths had a common mental disorder.³⁹ In addition to the suicide risk that mental health conditions pose, certain conditions have more substantial implications on the nature of the attempt than others. In comparison to mood disorders, a nationally representative survey found that anxiety, impulse-control, and substance use disorders were more likely to exhibit impulsivity in attempts.³⁷ Furthermore, individuals using violent methods of suicide had higher proportions of psychosis than those using deliberate self-poisoning.⁴⁰

The use of violent means can have implications on the severity and survival likelihood of the attempt. Though the overall prevalence of mental health disorders is similar in rural and urban areas,⁴¹ it is important to note that rural residents suffer from lower mental health service utilization, lack of sufficient mental health providers, and specific mental health conditions like substance use disorders.⁴² Therefore, mental health disorders' detrimental effect is more pronounced in rural areas, particularly in respect to suicide, as untreated mental illnesses can be a strong indicator of a suicide attempt.^{42,43} However, when assessing what makes a suicide attempt fatal, it is critical to examine factors external to the individual's clinical or biological disposition. Injury severity, proximity to care, and timeliness to care are important considerations when assessing one's ability to survive a suicide attempt.

In terms of provider responsiveness to patients at risk for a suicide attempt, mental health and primary care settings are likely to be the common disciplines that encounter and treat such populations. However, it is estimated that nearly a third of those who kill themselves visit a physician in the week before they die, and more than half do so in the month before dying from suicide.²⁴ Psychiatric disorders are present in at least 90% of suicide victims but untreated in more than 80% of these individuals at the time of death.⁴⁴ Though suicide prevention efforts are essential, resources must also be allocated for appropriate treatment and discharge planning to establish mental health parity in this context.

Emergency Department Admission

Emergency medical systems (EMS) serve as a linkage point for injured patients seeking timely access to emergency care. EMS personnel generally have the final say on where patients are triaged after a suicide attempt. Patients with non-penetrating suicide attempts like self-poisoning are triaged to a non-trauma emergency department. However, penetrating or blunt injuries, including suicide by firearms or falling from a height, qualify as a trauma event, which require medical specialists to best treat their injury. Patients are routed to either the nearest or highest trauma center based on the trauma type and severity for such events.⁴⁵ Trauma centers, ranked from Level I to IV by the most resourced in physician staffing and care specialties, are verified annually by the American College of Surgeons. Rural areas particularly have fewer trauma centers available, making trauma care access and appropriate emergency triage heavily geography-driven.⁴⁶⁻⁴⁹ Therefore, it may be likely for trauma patients to be first stabilized at a nearby level III or level IV trauma center and then be transferred to a higher trauma level for necessary care.

Emergency departments play a critical role for patients admitted for a suicide attempt. Generally, the primary role of EDs is to provide initial diagnostics and treatments for time-sensitive, urgent health conditions. However, its role as a safety-net provider has welcomed a surge in the nonurgent use of EDs.⁵⁰ ED utilization among patients with mental health issues are disproportionately higher than their counterparts.⁵¹ Additionally, ED use has significantly increased over the years since the Affordable Care Act (ACA) and mental health parity laws.⁵¹ Given the emergent nature of suicide admissions, the ED is the patient's first contact point within the healthcare system, so there is an opportunity for interventions to prevent future self-harm. ED providers play a crucial role in the survival of the self-injury, patient stabilization, and proper consultation for continued follow-up after discharge.

Given the nature of their visit, patients with intentional self-harm, especially those with suicidal intent, require sensitive, empathetic care.⁵² However, research has shown that ED providers are often not sufficiently trained to treat behavioral health emergencies, including suicide events.^{9,10} Additionally, health professionals report emotional, logistical, and communicational burdens when handling a suicide attempt.⁵³ It has also been studied that high levels of work stress can negatively influence suicide admissions.⁵⁴ With such considerations, ED providers may be prone to treat the suicide attempt as a physical injury, while the attempt's mental health aspect is inadequately addressed. These barriers can vary the quality of ED care for such patients, which can be concerning for the patient's overall recovery.

Standard of Care for Patients with a Suicide Attempt

Establishing a follow-up plan and ensuring continuity of care is especially important for patients admitted to the ED for a suicide attempt. Evidence suggests that most patients with a suicide attempt fail to make their first appointment or sustain follow-up care in a short-term

period, with rates as high as 70 percent.^{2,55} In a study conducted in England, about 47% of patients conducted another attempt before the patient's first follow-up appointment.⁵⁶ Given the significantly high loss to follow-up among many patients surviving a nonfatal suicide attempt, the ED may be the last form of health care contact with the patient. Therefore, patients must receive optimal ED care and receive appropriate follow-up to an inpatient admission or outpatient transfer if necessary.

The patient's ED discharge destination is based on the ED suicide risk assessment, which considers the patient's mental health history, social environment, substance use, and ideas surrounding suicide intent and planning.⁵⁷ This is primarily administered by a mental health specialist like psychiatrists after the patient is stabilized and has the cognitive capacity to make health decisions. If psychiatrists are not available on-site, the ED can remotely conduct telepsychiatry, or the provider can administer the Suicide Assessment Five-step Evaluation and Triage (SAFE-T) tool⁵⁸, which is a comprehensive assessment that determines a patient's overall suicide risk. It comprises five sections, including identifying risk factors, identifying protective factors, suicide inquiry, risk assessment and possible interventions, and patient care plan documentation.⁵⁸ The patient's care plan includes any treatment plans and thorough information on the patient's next steps for follow-up care. It also includes a personalized safety plan to prevent future self-harm.³ The patient may also be given lethal means counseling if the patient has access to lethal means like firearms or toxic medications in his or her home.

Based on the assessed suicide risk, there are various avenues that a patient can be discharged, including a home discharge, inpatient admission, or a transfer to a mental health facility (e.g., psychiatric hospital). However, the ability to transfer to another facility also relies on the timeliness and availability of necessary services (e.g., psychiatric bed availability,

staffing) and other structural factors. A pivotal study found that about 43-53% of patients admitted to the ED for a suicide attempt failed to receive a mental health assessment, with up to 47-63% of this cohort being discharged home.⁵⁹ This exemplifies a clear gap in ED management of suicide admissions and a lack of consistency in administering a mental health assessment.

Length of Stay

Length of stay (LOS), defined as the period between a patient arriving at the hospital and when they are discharged, is a widely used performance metric to assess a hospital's quality of care. Since 2012, the Centers for Medicare and Medicaid Services (CMS) has required hospitals to annually report the median ED length of stay as a quality measure. According to a systematic review that observed 55 different ED performance measures, ED length of stay and more granular ED time intervals were the most frequently recommended ED performance measures.⁶⁰ Across all patients admitted to the ED, discharge destination, older age (≥ 50 years old), chronic conditions, and low functional status have been associated with an extended length of stay.⁶¹ Regarding emergency departments, a shorter length of stay is deemed more favorable, as fewer resources are expended to administer necessary care. Longer boarding times are associated with increased morbidity and mortality, higher costs, and patient dissatisfaction.^{11,62} Meeting this benchmark is crucial for mental health patients, given that a prolonged length of stay can be a distressing experience for patients in crisis or those suffering from psychiatric or mental health disorders. ED boarding, which describes the process of keeping patients in the ED until an inpatient bed is available, is a strong contributor to the overall length of stay.^{11,62}

For this research, the nature of a suicide event has relevance to both psychiatric and trauma admissions. This is because a substantial majority of patients admitted for a suicide attempt have underlying mental health conditions. The evidence is clear that psychiatric patients

experience longer ED LOS compared to their counterparts due to reasons like special needs (e.g., use of restraints, time to reaching sobriety, diagnostic imaging needs), unavailable psychiatric beds, and delays in receiving a psychiatric evaluation.^{63,64} A national study found that between 2001 and 2006, mental health ED visits resulting in a transfer or home discharge had significantly higher LOS than non-mental health visits.⁶⁵ This study also did not find a significant difference in LOS between mental health and non-mental health patients among those with inpatient admission.

One key determinant of ED LOS for psychiatric patients is their discharge destination, which broadly ranges from a home discharge, inpatient admission, or a transfer to another inpatient or outpatient facility.¹⁵ A transfer to another hospital is associated with an ED stay ≥ 24 hours among psychiatric patients admitted to the ED.⁶³ It has also been evidenced that ED boarding disproportionately affects psychiatric patients,⁶⁶ with findings suggesting that mental health patients face 3.2 times longer wait time for an inpatient bed than those without a mental health-related admission.¹¹

Though length of stay has been commonly used as an appropriate quality measure, there have been debates regarding this outcome measure's use case for traumatic injuries. A highly cited piece in the trauma literature has stressed the importance of accounting for nonclinical attributes that significantly influence the length of stay, including discharge destination, insurance status, and social support.⁶⁷ Another study on trauma events suggests that up to one-third of the length of stay may be attributable to such nonclinical factors.⁶⁸ Such evidence makes it necessary to contextualize this quality measure to environmental influences as well.

Insurance Status and Length of Stay

Insurance status, usually based on the patient's primary payer for medical services received, has substantial implications on health services utilization⁶⁹ and its quality.^{70,71} Evidence shows that Medicaid or uninsured patients generally face barriers to quality care. This payer mix is highly concentrated in some geographic regions, burdening the healthcare workforce system to meet their demands.⁷² Along with hospital-level differences, insurance status directly impacts hospital reimbursement, which may inform the amount of resources allocated to treat a given patient.

The relationship between insurance status and ED length of stay has been well-studied in the literature. It is widely acknowledged that patients with mental health conditions face a longer ED length of stay than their counterparts.¹⁷ Therefore, the focus is on this quality outcome for a subset of mental health patients. One study looking at mental health admissions in ten EDs in Massachusetts found that uninsured or Medicaid patients had significantly higher LOS, with two times the risk of staying in the ED for at least 24 hours compared to privately insured patients.¹⁶ Another study using CMS data revealed that Medicaid patients admitted to the ED for deliberate self-harm were less likely to receive a mental health assessment than those who were privately insured, as well as more likely to have a home discharge than privately insured patients.⁷³ Though this relationship is not defined for uninsured patients, uninsured patients may face similar care decision trajectories to that of Medicaid patients, given their similar attributes in low socioeconomic status and general health services utilization compared to other insured groups.⁷²

There is also reason to believe that suicide attempts, mostly trauma events, may hold relevance to the trauma literature. In terms of this relationship in the trauma literature, a recent single-center study found that insured patients had a hospital LOS that was 12% longer than uninsured patients.⁷⁴ Despite these findings, the study notes that the relationship between

hospital length of stay and insurance status warrants further investigation. This research area has shown conflicting findings, where previous studies have shown either no significant relationship or higher hospital LOS among uninsured patients.⁷⁴ Given the complexities of a suicide attempt, which brings overlap between trauma care and mental health disciplines, further research should be conducted on defining the ED LOS among patients with a suicide attempt.

Current Literature

Despite the growing body of evidence regarding prolonged ED stay among patients admitted for a mental health issue or a psychiatric condition,^{40,16,17,66} little is known about the subset of patients admitted for a suicide attempt. Though a previous study found uninsured mental health patients faced longer ED length of stay, this was limited to ten EDs in a given state, which lacks generalizability.¹⁶ Also, this may not be fully applicable to the suicide attempt population, as there are additional criteria that need to be met before their discharge. This deserves further examination, as an ED admission for a suicide attempt requires a thorough risk assessment and full cooperation from the patient in crisis. ED encounters for suicide may also have relevance to trauma care provisions. As discussed previously, length of stay in the trauma literature may have different implications, and there are recommendations that nonclinical factors should be considered when assessing this quality measure.⁶⁷ Given that this is valid for suicide events, which often qualify as a trauma injury, this research finding informs this study's premise, which will examine the relationship of insurance status on the length of stay among suicide patients. Studying this relationship for specifically NSSI and suicide attempt admissions is to assess whether patients presenting to the ED with high-risk cases are subject to differing care provisions based on their insurance status.

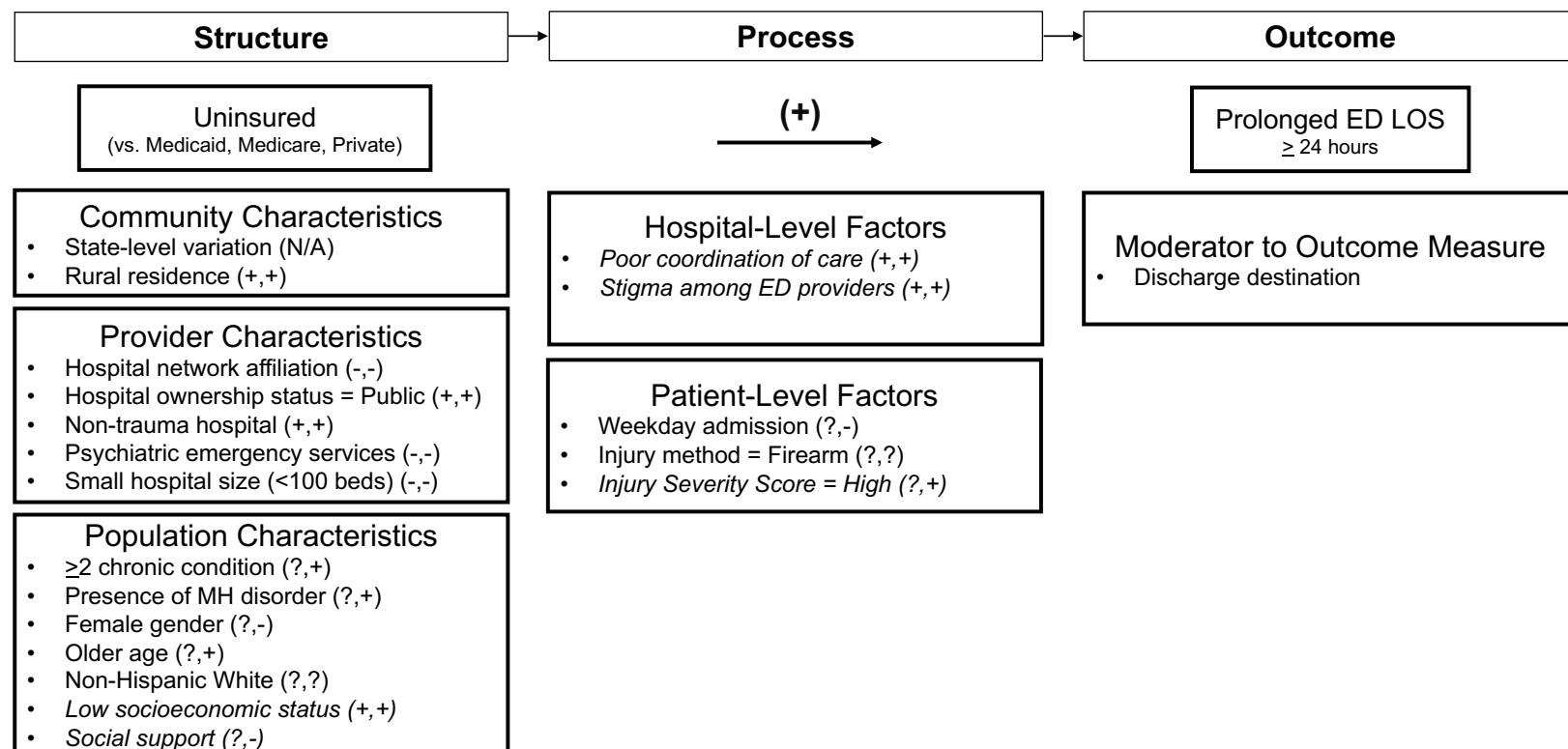
To my knowledge, there is no prior research studying the relationship between insurance status and ED length of stay for deliberate self-harm or suicide attempt admissions. This is critical to examine because such patients, especially those with the intent to die, must receive proper clinical assessment before discharge. Their treatment duration should not be motivated by financial reimbursement factors. This study aims to understand criteria of care that underlies suicide and deliberate self-harm care management while also contextualizing state and local differences.

Chapter 3: Methods

Conceptual Framework

Figure 1

Conceptual Framework using the Donabedian's Quality of Care Model⁷⁵



Note. Unmeasured constructs in this study are italicized.

The Donabedian quality of care model⁷⁵ was used to inform the research question's conceptual framework and is shown in Figure 1. This model has been widely referenced in the literature evaluating health quality and has shown validity in mental health and trauma care settings.^{76,77} The model identifies three components used to evaluate healthcare quality: structure, process, and outcome. Structure informs the makeup of the entire health care system, which comprises the population, the providers, and the community. Process informs the various components associated with the delivery of healthcare services, occurring specifically in a healthcare environment. The third component, outcome, is the quality measure that is being studied. In this study, the outcome of interest is prolonged ED length of stay.

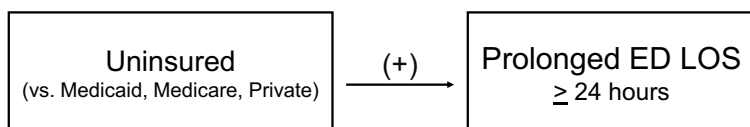
Hypotheses

Hypothesis 1

As shown in Figure 2, the focal relationship for this study examines insurance status categories with prolonged LOS. For patients admitted to the ED for deliberate self-harm, it is hypothesized that uninsured patients are positively associated with a prolonged LOS after controlling for individual and contextual confounders. Given the available evidence on Medicaid psychiatric patients experiencing disproportionately higher ED LOS than those privately insured, I anticipate that uninsured patients will also face prolonged LOS at a higher rate.

Figure 2

Hypothesis 1 diagram



Hypothesis 1a

Among patients with a home discharge, I hypothesize that uninsured patients are positively associated with a prolonged LOS after controlling for individual and contextual confounders. This controls for any ED boarding that may occur before patient being transferred to another hospital or facility. Prior research has evidenced that discharge destination has a substantial impact on LOS among psychiatric patients,^{16,17,63} so this will examine the strength of the focal relationship when focusing the analysis on those with a home discharge.

Outcome of Interest

The primary outcome of interest is prolonged ED LOS, defined as a stay greater than or equal to 24 hours. Though various health organizations have recommended a median LOS of less than four hours for patients with a routine discharge, this is not generalizable for psychiatric patients, who generally face significantly longer ED LOS than non-psychiatric patients.¹¹ Based on existing research on the LOS of psychiatric patients,^{16,63} a 24-hour threshold was determined for analysis.

Dataset Description

A retrospective analysis of ED encounter data was used to assess whether insurance status impacts overall LOS for patients admitted for a suicide attempt or deliberate self-harm. This study was conducted using 2014 State Emergency Department Databases (SEDD) from the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP).⁷⁸ This dataset was chosen because it offered an extensive list of encounter- and hospital-level variables that facilitated the research question of interest. Injury surveillance systems are commonly censored or variable based on the given geographic region or state.⁷⁹ This dataset offers a robust number of data elements that satisfy essential controls necessary for this type of analysis. ED encounters from the SEDD were linked to the American Hospital

Association (AHA) Annual Survey of Hospitals for Fiscal Year 2014⁸⁰ to extract hospital-level covariates for the model. This comprehensive database collects hospital-reported information on organizational structure, beds and utilization, expenses, staffing, service offerings, trauma designation, and hospital affiliation.

SEDD is collected uniformly across states on an annual basis, and they represent 100% of the state records submitted to AHRQ. Generally, all hospital-affiliated EDs in each participating state are included. Still, the availability of certain variables can vary based on the data release guidelines from the respective state government data organization.⁸¹ Federal hospitals, long-term hospitals, psychiatric hospitals, treatment facilities, and hospital units within institutions (i.e., prisons) are excluded from this dataset.⁸¹ All relevant ED encounters that do not result in an inpatient admission are included for acute hospitals represented in the dataset. Since each unit of analysis is an ED encounter, the same patient may be represented more than once within the given year. SEDD offers uniform documentation of variables, which allowed for multistate analyses. For this study, the following four states were selected based on robust sample size and variable availability: Arizona, Florida, New Jersey, and New York.

SEDD was purchased through the HCUP Central Distributor, and the research was approved under the terms of the HCUP Data Use Agreement (DUA). The AHA Annual Survey of Hospital was accessed through the Wharton Research Data Services available through Emory University's Goizueta Business School. This research was approved by Emory Institutional Review Board (STUDY00001834).

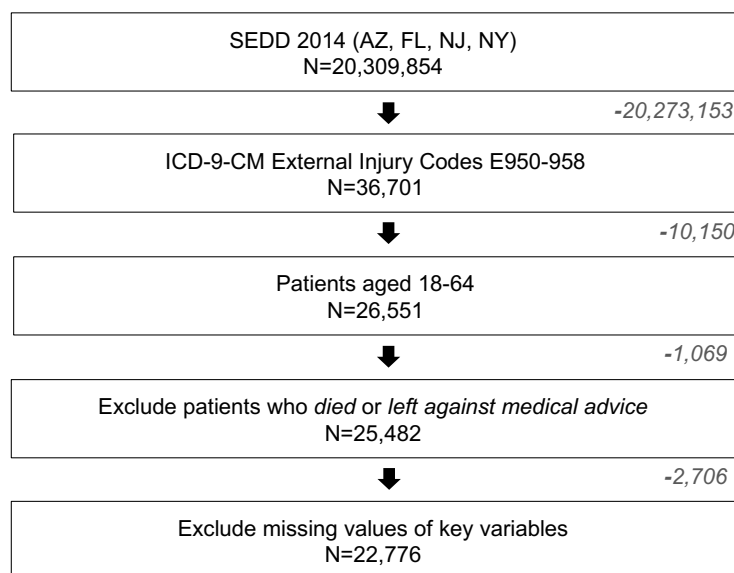
Analytic Sample

Given the nature of the dataset, the analytic sample excludes any encounters that result in an inpatient transfer within the same hospital. Additionally, the same patient can contribute more

than one observation to the dataset if they had more than one ED visit for deliberate self-harm in the given year. Figure 3 displays the sample derivation strategy used to reach the final analytic sample.

Figure 3

Sample Derivation Strategy



All adult encounters aged 18 to 64 admitted for intentional self-injury, derived from the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM E950-958) codes included for analysis. This population included not only suicide attempts but also deliberate self-harm events without an intent to die. Among the intentional self-injury codes, the code E-959 indicated late effects of a self-inflicted injury so was not considered for the purposes of this analysis. Records with a disposition status of "died in hospital" or "against medical advice" or missing any key variables were excluded from the analysis. This resulted in a final sample size of 22,776 encounters for analysis.

To ensure data validity, HCUP released a Methods Series in 2016 examining the match rate of ICD-9-CM diagnoses for an injury and the External Cause of Injury Code (E-Code).⁸²

The match rate indicates completeness in having the appropriate injury type assigned when a patient has an injury diagnosis. For Arizona, Florida, New Jersey, and New York, the percent of ED encounters for injury with an injury E-code in 2013 were 99.5, 97.8, 85.0, and 99.7%, respectively.⁸² Though these values pertain to the year 2013, the percentages between 2001 and 2013 are generally increasing in completeness rates, so we can assume increased reliability over time.

Statistical Analysis

All data cleaning and statistical analyses were conducted using SAS version 9.4 (SAS Institute Inc., Cary, NC, USA). Categorical variables were analyzed by insurance category, and the Pearson chi-square tests were used to examine the association between categorical patient and hospital variables with insurance status. Multiple logistic regression was used to calculate adjusted odds ratios (aORs) of the likelihood of prolonged ED length of stay (≥ 24 hours) between insurance categories. Uninsurance was used as the reference category for all odds ratio comparisons. A sensitivity analysis was conducted on the subset of patients with a home discharge, avoiding any boarding that may add to the length of stay.

This model was intended to control for individual, hospital, and state differences, including age, gender, race/ethnicity, injury method, presence of comorbidities, presence of psychiatric disorders, rural residence, trauma center designation, hospital ownership, hospital size, hospital network affiliation, presence of psychiatric ED services, discharge destination, and state identifiers. However, after analyzing the data, three variables derived from the AHA Annual Survey (trauma center designation, hospital network affiliation, and psychiatric ED services) were not analyzed due to 20% missingness in the dataset. Additionally, the injury

mechanism was recoded into low or high lethality due to several mechanisms only contributing to 0.28-2.29% of the observations.

Measurements

Insurance status, defined as the primary expected payer for any ED medical services or procedures encountered, was the independent variable of interest. If more than one payer is recorded, only the first-listed payer was considered. Categories included Medicaid, Medicare, private, uninsured, and other. Private insurance included Blue Cross, commercial payers, and private HMOs and PPOs. Uninsured status included encounters reporting either self-pay or no charge.

Discharge destination describes the patient's disposition status upon leaving the ED. This measure dictates whether the patient was released home or transferred to another hospital or facility (e.g., psychiatric hospital). Given the nature of the dataset, ED encounters with an inpatient admission were not studied for analysis.

Patient-level characteristics including gender, age, race/ethnicity, rural residence, multimorbidity, presence of mental disorder(s), and injury method lethality were controlled in the analysis. Gender was a dichotomous variable indicating male or female categories. Age was a categorical variable informed by the following groupings: 18-24, 25-34, 35-44, 45-54, and 55-64. Race/ethnicity was a categorical variable with four categories: Non-Hispanic White, Non-Hispanic Black, Hispanic, and Other/Missing. The category "Other" included any multiracial groups and those that do not belong to the explicit race/ethnicity categories. Rural residence was a binary measure defined based on the National Center for Health Statistics (NCHS) Urban-Rural Classification Code, which uses six levels based on county of residence. Each classification relies on the population size and location within or proximity to a metropolitan

statistical area (MSA). Large central, large fringe, medium, and small metropolitan areas located within an MSA were collapsed as an urban region. Areas deemed by the NCHS as micropolitan and noncore were combined into a single category defined as a rural region.

Chronic conditions were captured using the HCUP Chronic Condition Indicator (CCI)⁸³, which provides the total count of ICD-9-CM diagnosis codes that qualify as a chronic condition. The CCI uses AHRQ's definition of a chronic condition, defined as a condition that lasts at least one year and meets at least one of the following: 1) placing limitations on self-care, independence, and socialization; 2) reliance on medical equipment, products, and services.⁸³ Given the importance of capturing multiple comorbidities, which can further complicate one's stay, the count variable was converted into two categories: 0 or 1 chronic condition, or ≥ 2 chronic conditions. Psychiatric disorders were differentiated into four clinically meaningful categories to acknowledge each disorder type's varying implications on suicide lethality and intent. The categories were determined using the Mental Health Substance Abuse Clinical Classification Software (CCS-MHSA), which groups mental disorders based on the Diagnostic and Statistics Manual of Mental Disorders, Fourth Edition (DSM-IV).⁸⁴ The following categories were selected based on prior research evidencing a strong association with suicide intentionality and lethality: anxiety disorder, mood disorder, substance-use disorder, and schizophrenia/other psychotic disorders.^{12,37,39} Each variable was dichotomous to indicate whether or not the ED encounter had any of the disorders listed. Injury method(s) determined by ICD-9-CM codes E950-E958 were used to determine injury method lethality. As informed by existing literature,²⁷ injuries that involved cut/pierce, poisoning, or other/unspecified were defined as low lethality. Firearm, drowning, falling, fire, burn, motor vehicle crash (MVC), transportation, natural

environment, suffocation, hanging, strangulation, or any multi-injury were categorized as high lethality.

Hospital characteristics included ownership status and hospital size. Hospital ownership was separated into three categories: governmental but nonfederal (public), private non-profit, and private for-profit hospitals. Hospital size was determined based on bed capacity with the following categories: <100 beds (small), 100-499 beds (medium), and \geq 500 beds (large).

Chapter 4: Results

Based on the inclusion and exclusion criteria, a total of 22,776 ED encounters were included for analysis. Demographic characteristics by insurance status are reported in Table 1.

Table 1

Demographic Characteristics of ED Admissions by Insurance Status

Characteristic	Uninsured (n=5,921)	Medicare (n=2,403)	Medicaid (n=7,527)	Private (n=5,683)	<i>p</i>
State					< .0001
Arizona	894 (15.10)	644 (26.80)	2,597 (34.50)	1,503 (26.45)	
Florida	3,781 (63.86)	857 (35.66)	1,886 (25.06)	1,858 (32.69)	
New Jersey	340 (5.74)	159 (6.62)	366 (4.86)	652 (11.47)	
New York	906 (15.30)	743 (30.92)	2,678 (35.58)	1,670 (29.39)	
Sex					< .0001
Male	3,262 (55.09)	1,040 (43.28)	3,228 (42.89)	2,243 (39.47)	
Female	2,659 (44.91)	1,363 (56.72)	4,299 (57.11)	3,440 (60.53)	
Age, years					< .0001
18-24	1,673 (28.26)	122 (5.08)	2,241 (29.77)	2,350 (41.35)	
25-34	1,970 (33.27)	527 (21.93)	2,295 (30.49)	1,179 (20.75)	
35-44	1,139 (19.24)	572 (23.80)	1,477 (19.62)	890 (15.66)	
45-54	833 (14.07)	716 (29.80)	1,105 (14.68)	835 (14.69)	
55-64	306 (5.17)	466 (19.39)	409 (5.43)	429 (7.55)	
Race/Ethnicity					< .0001
White	3,845 (64.94)	1,890 (78.65)	4,585 (60.91)	4,273 (75.19)	
Black	817 (13.80)	208 (8.66)	1,069 (14.20)	447 (7.87)	

Hispanic	883 (14.91)	216 (8.99)	1,260 (16.74)	612 (10.77)	
Other/Missing	376 (6.35)	89 (3.70)	613 (8.14)	351 (6.18)	
Rural					< .0001
Yes	342 (5.78)	201 (8.36)	664 (8.82)	413 (7.27)	
No	5,311 (89.70)	2,176 (90.55)	6,722 (89.31)	5,249 (92.36)	
Unknown	268 (4.53)	26 (1.08)	141 (1.87)	21 (0.37)	
Multimorbidity ^a					< .0001
No	2,884 (48.71)	715 (29.75)	3,237 (43.01)	2,689 (47.32)	
Yes	3,037 (51.29)	1,688 (70.25)	4,290 (56.99)	2,994 (52.68)	
Mental disorder ^b					
Anxiety	196 (3.31)	60 (2.50)	346 (4.60)	253 (4.45)	< .0001
Mood	2,726 (46.04)	1,371 (57.05)	3,721 (49.44)	3,048 (53.63)	< .0001
Substance-use	1,499 (25.32)	535 (22.26)	1,884 (25.03)	1,162 (20.45)	< .0001
Schizophrenia ^c	244 (4.12)	330 (13.73)	592 (7.87)	150 (2.64)	< .0001
Injury lethality					.0001
Low	5,209 (87.98)	2,128 (88.56)	6,732 (89.44)	4,938 (86.89)	
High	712 (12.02)	275 (11.44)	795 (10.56)	745 (13.11)	
Weekend admission	1,701 (28.73)	659 (27.42)	2,151 (28.58)	1,771 (31.16)	.0010

Note. "Other" insurance category ($n=1242$) was excluded from the Pearson Chi-Square test.

^aBased on the HCUP Chronic Condition Indicator (CCI). ^bBased on the Mental Health Substance Abuse Clinical Classification Software (CCS-MHSA). ^cIncluded schizophrenia and other psychotic disorders as informed by CCS-MHSA

All demographic characteristics studied under Table 1 were statistically significant by insurance status. Across the four states, insurance categories ranged from 9.5-11.7% for Medicare, 21.0-44.0% for Medicaid, 20.7-42.4% for private insurance, and 14.3-42.1% for uninsured encounters. Florida had the highest deviance from the other four states in terms of the proportion of patients uninsured with a rate of 42.1%. It contributed to 63.9% of the total uninsured in the analytic sample. Overall, Florida contributes about 63% of the total uninsured patients, as opposed to only 5.7% from New Jersey. Across all encounters, 50.3% of visits were discharged to home, while the remaining 49.7% of visits were transferred to another facility. Medicare ED visits had the highest proportion of transfers (51.2%), while uninsured, Medicaid

and privately insured patients had 46.9, 45.7, and 49.7% of transfers, respectively. Overall, Medicaid and uninsured patients had higher home discharge rates, 54.3% and 53.1%, respectively.

Hospital-level characteristics by insurance categories are reported in Table 2. A total of 425 unique hospitals were represented in the analytic sample; among these, 62 were from Arizona, 182 were from Florida, 40 were from New Jersey, and 141 were from New York.

Table 2

Hospital Characteristics (N=425) Expressed at the ED Encounter Level by Insurance Status

Characteristic	Uninsured (n=5,921)	Medicare (n=2,403)	Medicaid (n=7,527)	Private (n=5,683)	<i>p</i>
Hospital ownership					< .0001
Public	841 (14.20)	271 (11.28)	821 (10.91)	541 (9.52)	
Private, non-profit	3,408 (57.56)	1,647 (68.54)	5,390 (71.61)	4,120 (72.50)	
Private, for-profit	1,672 (28.24)	485 (20.18)	1,316 (17.48)	1,022 (17.98)	
Hospital size					< .0001
Small	410 (6.92)	208 (8.45)	701 (9.31)	475 (8.36)	
Medium	3,449 (58.25)	1,497 (62.30)	4,483 (59.56)	3,730 (65.53)	
Large	2,062 (34.83)	703 (29.26)	2,343 (31.13)	1,478 (26.01)	

Note. "Other" insurance category (n=1242) was excluded from the Pearson Chi-Square test.

In terms of hospital ownership status, there were 2,714 (11.9%) encounters admitted to public hospitals, 15,333 (67.3%) from private non-profit hospitals, and 4,729 (20.8%) from private for-profit hospitals. 1,940 (8.5%) of encounters were admitted in small hospitals (<100 beds), 13,856 (60.8%) of encounters in medium hospitals (100-499 beds), and 6,980 (30.7%) in large hospitals (\geq 500 beds). 4,221 encounters (18.5%) were associated with a hospital that did not report the presence of psychiatric emergency services or whether they were a trauma center. For the remaining 18,555 observations, 4,221 (22.7%) were non-trauma EDs, and 14,334 (77.3%) were trauma centers. Additionally, among the 18,555 encounters reporting the presence of psychiatric emergency services, 12,561 (67.7%) encounters were admitted to a hospital with

psychiatric emergency services, while 5,994 (32.3%) were admitted to hospitals that did not. Lastly, 8,858 (38.9%) of encounters were from hospitals affiliated with a network, 8,496 (37.3%) were those from unaffiliated hospitals, and 5,422 (23.8%) were unknown.

Table 3*Patient Discharge Designation and Length of Stay (LOS) by Primary Payer*

	Uninsured (n=5,921)	Medicare (n=2,403)	Medicaid (n=7,527)	Private (n=5,683)	
	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	<i>p</i>
Discharge status					< .0001
Home	3,145 (53.12)	1,173 (48.81)	4,087 (54.30)	2,861 (50.34)	
ST hospital	789 (13.33)	380 (15.81)	940 (12.49)	812 (14.29)	
Other facility	1,987 (33.56)	850 (35.37)	2,500 (33.21)	2,010 (35.37)	
Length of stay					
Mean (SD)	14.55 (16.6)	16.32 (22.3)	15.12 (19.8)	13.84 (16.4)	
Median (IQR)	9 (5,18)	9 (5,19)	9 (4,18)	9 (4,17)	
Prolonged LOS	1,020 (17.23)	437 (18.19)	1,292 (17.16)	894 (15.73)	.0271

Note. ST=Short-term, SD=standard deviation, IQR=interquartile range, LOS=length of stay.

"Other" insurance category ($n=1,242$) was excluded from the Pearson Chi-Square test.

Table 3 displays summary statistics of discharge destination and ED LOS by the primary payer. The overall median length of stay was 9 hours ($IQR = 4-18$), and the overall mean was 14.6 hours ($SD = 18.3$). Patients with Medicare as their primary payer had the highest average length of stay of 16.32 hours ($SD = 22.3$). Uninsured and Medicaid patients were similar, with an average LOS of 14.55 and 15.12 hours, respectively. Privately insured patients had the lowest average LOS of 13.84 hours ($SD = 16.4$). For the outcome measure of interest, prolonged LOS, 17.23% of uninsured visits had a stay greater than or equal to 24 hours, compared with 18.19%, 17.23%, and 15.73% for those under Medicare, Medicaid, and privately insured, respectively. These proportion differences were statistically significant ($p = .0271$).

Table 4*Logistic Regression Results for Prolonged ED LOS (≥ 24 Hours)*

Variable	Model 1	Model 2	Model 3
	All (N=22,776)	All (N=22,776)	Home discharge (n=12,107)
	OR	aOR	aOR
Insurance status (ref: uninsured)			
Medicare	1.068	0.801***	0.771**
Medicaid	0.996	0.907*	0.947
Private	0.897**	0.835***	0.868
Other	0.665***	0.795**	0.672***
Race/Ethnicity (ref: NH White)			
NH Black		1.101	1.401***
Hispanic		1.140**	1.501***
Other/Missing		1.247***	1.805***
Female		1.111***	1.152**
Multimorbidity		1.652***	1.887***
Injury method severity (ref: High)		1.230***	1.336***
Anxiety disorder		1.603***	1.528***
Substance use disorder		1.409***	1.692***
Mood disorder		1.714***	2.069***
Schizophrenia/other psychotic disorder		1.406***	1.435***
Rural (ref: Rural)			
Urban		1.113	0.969
Unknown/Missing		1.509***	1.270
Age (ref: 55-64)			
18-24		0.643***	0.464***
25-34		0.712***	0.563***
35-44		0.793***	0.630***
45-54		0.947	0.851
Weekend admission		1.240***	1.106
State (ref: New York)			
Arizona		1.879***	1.356***
Florida		1.206***	1.555***
New Jersey		1.916***	0.894
Hospital Ownership (ref: Public)			
Private for-profit		1.130	1.369***

Private non-profit	0.928	0.970
Bed size (ref: Small)		
Large	1.739***	2.159***
Medium	1.512***	1.773***
Discharge destination (ref: Home)		
Short-term hospital	1.335***	
Other facility	2.109***	

Note. Ref=reference category, OR= odds ratio, aOR=adjusted odds ratio. Odds ratios were calculated based on comparison category vs. reference category

* $p < .10$. ** $p < .05$. *** $p < .01$.

Table 4 displays logistic regression model results for prolonged LOS. The first model was a bivariate logistic regression of the focal relationship, insurance status, and prolonged LOS. Privately insured encounters had about a 10% lower likelihood of having a prolonged LOS compared to uninsured encounters ($p < .05$). Medicare had higher odds of prolonged LOS compared to uninsured, but this was not statistically significant.

The second model was a logistic regression while accounting for covariates known to affect LOS: age, gender, race/ethnicity, rural/urban residence, multimorbidity, psychiatric disorders (anxiety, substance use, mood, schizophrenia/other psychotic disorders), injury method severity, weekend admission, discharge destination, hospital ownership, hospital size, and state. All adjusted odds ratio estimates comparing insurance status to uninsured patients were statistically significant after accounting for covariates in the model. Privately insured patients had a 16.5% lower likelihood of spending 24 hours or more in the ED than uninsured patients ($p = .001$). Patients discharged to a short-term hospital were 1.34 times more likely to have an ED stay greater than 24 hours than patients with a home discharge ($p < .001$). Patients discharged to other facilities, which predominately were psychiatric hospitals, were 2.11 times more likely to have a prolonged LOS than those with home discharge ($p < .001$). Patients indicating anxiety

disorder, substance use disorder, mood disorder, or schizophrenia/other psychotic disorders all had higher odds for prolonged LOS, with odds ranging from 1.4 to 1.7 ($p < .001$). Patients with a weekend admission were 1.24 times more likely to have a prolonged LOS.

The third logistic regression was only for patients with a home discharge ($n = 12107$). After accounting for the same covariates in the previous model, the difference between insurance status groups was no longer statistically significant except for Medicare vs. uninsured. Among patients discharged to home, Medicare patients ($n = 1173$) had a 22.9% lower likelihood of a prolonged LOS than uninsured patients ($p = .02$).

Chapter 5: Discussion

Summary

The descriptive statistics of patient characteristics varied significantly by insurance status, confirming the use case of payer status for capturing patient-level differences. Medicare patients were the most likely to be transferred to another facility. One plausible reason for this is because patients under 65 years of age qualifying for Medicare may have underlying disabilities that require further specialized medical attention or escalation after proper stabilization is administered.

Study findings were consistent with an existing discussion surrounding prolonged LOS among psychiatric patients.¹⁶ The first hypothesis of uninsured patients having higher odds of a prolonged ED LOS was confirmed, with all insurance group comparisons being statistically significant ($p < .10$). Among patients with a home discharge, uninsured patients still maintained higher odds of prolonged LOS compared to Medicare patients ($p < .05$). Though private and Medicaid insured comparisons to uninsurance were not statistically significant, adjusted ORs were both under 1, indicating the directionality that uninsured patients generally have higher

odds for prolonged LOS. Analyzing only patients with a home discharge revealed several insights into the focal relationship. First, discharge destination is an essential factor to consider when considering insurance status, which is consistent with findings from a previous study analyzing deliberate self-harm in the ED.⁷³ Second, after accounting for all patient and hospital-level factors within the model, uninsured patients are generally expected to have higher stays in the ED.

The regression results highlight that clinical decision making among patients admitted for deliberate self-harm is a complex process. Most covariates considered in the models were statistically significant ($p < .05$), indicating that many factors come into play when considering the patient's length of stay in the ED. Clinical covariates, including psychiatric disorders, older age (i.e., 55-64 years old), and high injury method severity, had a positive relationship with prolonged LOS. In light of this complexity, it is even more noteworthy that after adjusting for these factors, uninsurance was associated with a higher likelihood of prolonged LOS compared to other insurance categories. Additionally, compared to the simple bivariate regression modeling insurance status and prolonged LOS, adding covariates to the full regression model strengthened the relationship between insurance status and LOS. In the bivariate model, only privately insured encounters had a statistically significant difference of prolonged LOS compared to uninsured adults. After adding covariates, private and Medicare insured patients both had a lower likelihood of prolonged LOS compared to uninsured patients ($p < .01$).

In the third model studying only patients with a home discharge, ED boarding is no longer a contingent factor to the patient's length of stay. Regression results revealed that the difference between private and uninsured patients was no longer statistically significant ($p = .109$). This signals that patient discharge destination weakens the strength of the focal

relationship in this model, and therefore, insurance status may play a weaker role in determining LOS. This may be due to the fact that uninsured psychiatric patients face higher ED boarding times than privately insured patients, which becomes more pronounced in prolonged LOS analyses rather than those with a direct home discharge.⁸⁵

Limitations and Strengths

There are several limitations to this study. First, the dataset does not fully capture the total number of ED encounters related to deliberate self-harm, as patients admitted to an inpatient setting are excluded from the analysis. Therefore, self-harm with high acuity may not be adequately represented in this analytic sample. This was confirmed by the E-code distributions in the overall sample, which yielded a deficient proportion of firearm injuries. Additionally, there may be a differential bias in the sample of insured patients that are not admitted to an inpatient setting. As a result, the subset of ED encounters being analyzed may not represent the actual length of stay for insured and uninsured patients. Second, the extrapolation of findings is limited due to the arbitrary selection of four states based on what variables were available. However, certain hospital-level and regional characteristics like hospital size or rural residence are incorporated into the model, which allows for relative comparability among states. Third, several unmeasured variables, including injury severity score and presence of psychiatric emergency services, create bias in the overall analysis. However, specific covariates are included in the model that are highly correlated with injury severity level, including male gender and method of suicide. This will serve to partially mediate the missingness of certain variables. Fourth, there are limitations associated with what comprises of an intentional self-injury. However, according to the published HCUP Methods report, three of four states in this analysis report a diagnosis correlation of higher than 97%, while New Jersey reported 85% correlation.⁸²

This alludes to the robust nature of the dataset that was used. Additionally, each unit of analysis is the ED encounter, so patients are not tracked over time. Therefore, patients may have been considered more than once in a single analysis if they a) had a transfer to another hospital's ED or b) had another ED admission in 2014. However, since this is an analysis on LOS, the effect of this on the overall results is minimal.

Despite these limitations, there are several strengths to this study. First, this is the first study observing the relationship between insurance status and ED length of stay among deliberate self-harm admissions. Prior research has explored this relationship in broader patient settings, including in psychiatric and trauma care.^{16,61-64,67,74} Second, the dataset offers comprehensive administrative data on all hospitals reporting to AHRQ. This yields a strong representation of what comprises ED visits for a given state. Third, this study incorporates state- and hospital-level granularity for individual and contextual covariates to capture the complex circumstances surrounding deliberate self-harm. Lastly, the study was conducted using a robust methodology to account for between- and within-state variability.

Study Implications

This study suggests how the timeliness of ED care provisions may cast structural disparities based on payer status, with particular disadvantages among uninsured patients. Unlike most emergent visits that fit in the spectrum of physical ailments, deliberate self-harm admissions have unique needs that require further assessments after patient stabilization. Therefore, a prolonged stay in the ED for this patient population can indicate disparate treatment patterns of highly acute patients. The study results indicated the highest risk of prolonged LOS among uninsured patients, indicating that safety-net hospitals may be limited in their ability to provide adequate care and resources.

Best practices in ED settings would ensure nonclinical factors like payer ability do not disrupt the quality of care patients receive. Further efforts must be made to standardize suicide care management in the ED setting, especially among safety-net hospitals that disproportionately serve uninsured and underinsured populations. It is also important to recognize that patients admitted for a suicide attempt have a high short-term risk for having another attempt. EDs must ensure that care management and decision-making are evidence-based, and any risk factors are identified to minimize future revisits. Additionally, this study emphasizes the importance of protections for uninsured patients. The 1986 Emergency Medical Treatment and Active Labor Act (EMTALA) has been enforced in all ED settings and allows anyone with an emergency medical condition to be provided necessary care regardless of payer ability. These protections require admitted patients to be stabilized of the medical condition, which includes any acute psychiatric emergencies. However, for patients with deliberate self-harm, especially those with the intent to die, it is critical to ensure adequate care transitions to establish continuity of care after the patient is discharged. EMTALA may be expanded beyond the point of patient stabilization, especially for those at risk of deliberate self-harm. Lastly, although the presence of psychiatric emergency services was not studied, it is evident that having mental health professionals on staff can significantly improve sound clinical decision making. Having hospital-based psychiatric emergency services allows for timely care that minimizes ED boarding and improves overall psychiatric care.⁸⁶ However, among hospitals that do not have psychiatric expertise on-site, it is critical to amplify general emergency medicine personnel's workforce capacity through training and telepsychiatry alternatives⁸⁷ that fulfill these patients' unique needs.

Recommendations for Future Research

This study's preliminary findings suggest that insurance status may contribute to emergency department length of stay for patients admitted for intentional self-injury. Though this is the first study to analyze the relationship between payer ability and ED LOS among patients admitted for deliberate self-harm, further research can directly inform the subset of patients with suicide attempts. This study relied on ICD-9-CM coding, which prevented direct identification of suicide admissions. With the update to ICD-10-CM in October 2015, nonfatal suicide attempt admissions can easily be identified through a distinct code (T14.91) separate from deliberate self-harm. There are also opportunities to understand any time trends on ED suicide care management as data integrity and surveillance improves. Historically, the reporting of external cause of injury codes were not mandated, causing state-to-state variation in suicide coding completeness.⁸⁸ Further improvements in the quality of coding over time can be made to enhance the breadth and depth of emergency medicine research, particularly as it relates to suicide-related admissions. Another avenue for further research is to conduct sensitivity analyses on hospitals' types, including safety-net ED status or presence of psychiatric ED services. Such analyses will provide further rationale for strengthening psychiatry expertise in an ED setting. ED care provisions may also be characterized in qualitative respects to understand how clinicians' attitudes and patient experiences may also impact the overall length of stay. Lastly, further avenues must be explored for ensuring ED preparedness in suicide management, particularly among safety-net EDs that serve high proportions of uninsured and Medicaid patients.

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Appendix

Table A1

Hospital-level Characteristics (N=425) of ED Admissions Expressed at the Encounter Level

Characteristic	<i>n</i>	%
Hospital bed size		
<100 beds	1,940	8.52
100-499 beds	13,856	60.84
≥ 500 beds	6,980	30.65
Presence of psychiatric emergency services		
Yes	12,561	55.15
No	5,994	26.32
Unknown	4,221	18.53
Trauma status		
No, non-trauma	9,836	43.20
Yes	8,719	38.28
Level I	4,612	52.90
Level II	2,336	26.80
Level III	900	10.32
Level IV	522	5.99
Unknown	349	4.00
Missing	4,221	18.53
Hospital ownership status		
Public	2,714	11.92
Private, non-profit	15,333	67.32
Private, for-profit	4,729	20.76
Hospital designation ^a		
Community hospital	22,550	99.01
Critical access hospital	22,296	97.89
Rural hospital	2,172	9.54
Hospital network affiliation		
Yes	8,858	38.89
No	8,496	37.30
Unknown	5,422	23.81

^aCategories are not mutually exclusive