

CARING FOR VETERANS AFTER A SUICIDE ATTEMPT:

A DESCRIPTION OF BEHAVIORAL HEALTH

TREATMENT DELIVERY

By

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To Troy, my amazing husband and number one fan

and

To the men and women who have served, and those who serve them

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TABLE OF CONTENTS

	Page
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	x
Chapter	
I. INTRODUCTION	1
US veterans and suicide	2
Significance to healthcare	2
The role of the healthcare system	4
II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK	6
Definitions	8
Suicide behavior	9
Prevention frameworks	10
Conceptualizations of suicide risk	13
Patient characteristics	15
Utilization of healthcare services	31
Organizational factors and suicide behavior	33
Preventive treatment	33
Treatment essentials	37
Conceptual model and analytical framework	40
III. METHODS	46
Research aims and design	46
Description of research setting	47
Sample	48
Nature and size of sample	48
Criteria for sample selection	49
Methods for subject recruitment	49
Strategies to ensure human subjects protection	49
Description of data sources	50
Suicide Prevention Application Network (SPAN)	50
VA national databases: Patient treatment files and outpatient care files	53
VA local databases	55
Decision Support System (DSS)	55

Data elements.....	56
Identification of index suicide event and hospitalization.....	56
Patient characteristics.....	57
Healthcare utilization.....	64
Analysis strategy.....	71
Preparation.....	71
Analysis by aims.....	72
Determining the sample for analysis.....	74
IV. RESULTS.....	77
Data Reduction.....	77
Participants.....	79
Demographic characteristics.....	81
Clinical characteristics.....	82
Prior utilization patterns.....	84
Index hospitalization factors.....	85
Aim one results.....	86
Duration, timing, and intensity of behavioral health appointments.....	88
Providers of behavioral health treatments.....	90
Timing and intensity of treatment by type, modality, and setting.....	90
Aim two results.....	103
V. DISCUSSION.....	108
Participants.....	108
Sample characteristics.....	108
Aim one findings.....	111
Comparison with other studies.....	111
Aim two findings.....	118
Comparison with other studies.....	118
Recommendations for future research.....	120
Leveraging health information technology.....	120
VISN-level comparisons of healthcare delivery and suicide behavior outcomes.....	120
Investigate potential differences in healthcare delivery to PTSD and SUD patients.....	121
Establish methods for evaluating quality of behavioral health appointments.....	121
Clinical recommendations.....	122
Implications for research methods and tools.....	123
Limitations.....	125
Conclusion.....	127
Appendix	
A. DOCUMENTATION OF ACTIVATING THE CATEGORY II PATIENT RECORD FLAG: HIGH RISK OF SUICIDE.....	128
B. VARIABLE DEFINITIONS.....	130
C. BEHAVIORAL HEALTH ENCOUNTER STOP CODES AND CORRESPONDING VARIABLE CATEGORIES.....	138

D. ELIXHAUSER COMORBIDITY DIAGNOSES AND CATEGORIES (N = 791)	141
E. VA MH-12 PRIMARY PSYCHIATRIC DIAGNOSES AND CATEGORIES (N = 506)	146
REFERENCES	149

LIST OF TABLES

Table	Page
2.1 Universal, Selective, and Indicated Interventions for Suicide Prevention.....	12
3.1 VA-MH12 Psychiatric Diagnostic Categories and Corresponding ICD-9-CM Codes	62
3.2 Risk Adjustment Categories and ICD-9-CM Codes for Medical Comorbidities	63
3.3 Risk Adjustment Categories and ICD-9-CM Codes for Medical Comorbidities Associated with an Increased Risk of Suicide.....	64
3.4 Comparison of Kane’s Treatment Constructs with Continuity of Care Measures	70
4.1 Original and Reduced Variables for Patient Demographic Characteristics (N = 504).....	78
4.2 Description of Patient Characteristics for VA and Non-VA Hospital Admissions for a Suicide Attempt	80
4.3 Description of Demographic Characteristics for Patients Hospitalized at VA for a Suicide Attempt	82
4.4 Description of the Clinical Characteristics for Patients Hospitalized at VA for a Suicide Attempt	84
4.5 Description of Healthcare Utilization prior to the Index Hospitalization.....	85
4.6 Description of Factors Related to the Index Hospitalization	86
4.7 Comparison of Appointments Attended in the First Seven and the First Thirty Days after Hospital Discharge.....	89
4.8 Proportion of Patients who Attended Behavioral Health Appointments in the First Seven and First Thirty Days after Hospital Discharge	89
4.9 Comparison of the Number of Treating Providers, per Patient, in the First Seven and First Thirty Days after Discharge.....	90
4.10 Comparison of Time to First Appointment, by Treatment Type	92
4.11 Frequency of Patients who Attended a Behavioral Health Appointment within Seven and 180 Days of Discharge, by Treatment Type	93
4.12 Frequency of Patients who Attended a Behavioral Health Appointment within Thirty and 180 Days of Discharge, by Treatment Type	93

4.13	Description of the Number of Appointments Completed in the First Seven days after Hospital Discharge, by Treatment Type	94
4.14	Comparison of the Number of Appointments Completed in the First Seven Days after Hospital Discharge, by Treatment Type	94
4.15	Comparison of the Number of Appointments Completed in the First Thirty Days after Hospital Discharge, by Treatment Type	95
4.16	Comparison of Time to First Appointment, by Treatment Modality.....	96
4.17	Frequency of Patients who Attended a Behavioral Health Appointment within Seven and 180 Days of Discharge, by Treatment Modality.....	97
4.18	Frequency of Patients who Attended a Behavioral Health Appointment within Thirty and 180 Days of Discharge, by Treatment Modality.....	97
4.19	Description of the Number of Appointments Completed in the First Seven days after Hospital Discharge, by Treatment Modality.....	98
4.20	Comparison of the Number of Appointments Completed in the First Seven Days after Hospital Discharge, by Treatment Modality.....	98
4.21	Comparison of the Number of Appointments Completed in the First Thirty Days after Hospital Discharge, by Treatment Modality.....	99
4.22	Comparison of Time to First Appointment, by Treatment Setting.....	100
4.23	Frequency of Patients who Attended a Behavioral Health Appointment within Seven and 180 Days of Discharge, by Treatment Setting	100
4.24	Frequency of Patients who Attended a Behavioral Health Appointment within Thirty and 180 Days of Discharge, by Treatment Setting	101
4.25	Description of the Number of Appointments Completed in the First Seven days after Hospital Discharge, by Treatment Setting.....	101
4.26	Comparison of the Number of Appointments Completed in the First Seven Days after Hospital Discharge, by Treatment Setting	102
4.27	Comparison of the Number of Appointments Completed in the First Thirty Days after Hospital Discharge, by Treatment Setting	102
4.28	Associations Between Patient Demographic Characteristics and the Time to First Completed Post-Discharge Behavioral Health Appointment (N = 496)	104
4.29	Associations Between Patient Clinical Characteristics and the Time to First Completed Post-Discharge Behavioral Health Appointment (N = 496)	105
4.30	Associations Between Prior Healthcare Utilization and the Time to First Completed Post-Discharge Behavioral Health Appointment (N = 496)	106

4.31	Associations between Factors Related to Hospitalization and the Median Time to First Completed Post-Discharge Behavioral Health Appointment (N = 496)	106
5.1	Percentages of VA Patient Characteristics	110

LIST OF FIGURES

Figure	Page
1 Conceptual Model for the Treatment and Prevention of Recurrent Suicide Behavior	41
2 Andersen’s Model of Health Behavior, Adapted for the Management of Suicide Behavior	43
3 Description of cases included in and excluded from the final analytic sample	76
A1 Sample alert for the Category II Patient Record Flag: High Risk of Suicide.	128
A2 Sample narrative that accompanies activation of the Category II Patient Record Flag: High Risk of Suicide	129

LIST OF ABBREVIATIONS

AITC: Austin Information Technology Center
BDI: Beck Depression Inventory
BIRLS: Beneficiary Identification Record Locator System
CBOC: Community Based Outpatient Clinic
CPT: Current Procedural Terminology
DoD: Department of Defense
DSM-IV-TR: Diagnostic and Statistical Manual of Mental Disorders, 4th edition, Text-Revision
DSS: Decision Support System
ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification
NDS: National Data Systems
NPCD: National Patient Care Database
OIF/OEF: Operation Enduring Freedom/Operation Iraqi Freedom
OMB: Office of Management and Budget
OPC: Outpatient Care Files
Psy-CMS: Psychiatric Case Mix System
PTF: Patient Treatment Files
PTSD: Post Traumatic Stress Disorder
SAS: Statistical Analysis System
SPAN: Suicide Prevention Application Network
SPC: Suicide Prevention Coordinator
SUD: Substance Use Disorder
TBI: Traumatic Brain Injury
VA: Veterans Affairs
VIReC: Veterans Affairs Information Resource Center
VHA: Veterans Health Administration
VistA: Veterans Health Information Systems and Technology Architecture

CHAPTER I

INTRODUCTION

Suicide is a devastating phenomenon, with a reach that extends beyond the individual victim. Each year in the United States, approximately 30,000 people take their own lives. The rate of suicide in the United States is increasing. In 2007, suicide was the 11th leading cause of death; in 2008 and 2009, suicide was the 10th leading cause of death (when adjusted for age). In 2009, 36,909 suicides were reported, as a rate of 12.0/100,000. This is an increase from 2007, when the rate was 11.5 (per 100,000). Suicide was the 3rd leading cause of death in young people, ages 10-24, after accidents and homicide (first and second leading causes of death for young people in 2008, respectively). The American Association of Suicidology estimates that for every completed suicide, 25 others have attempted suicide (McIntosh, 2012). These acts of self-directed violence have lasting emotional and economic effects on individuals, families, and communities.

Fatal and non-fatal injuries resulting from self-directed violence incur direct expenditures in healthcare and law enforcement systems. Hospitalizations resulting from self-inflicted violence lasted an average of four days and cost, in total, approximately \$1.1 billion in 2005 (Russo, Owens, & Hambrick, 2008). The indirect costs of these injuries arise from lost productivity and inability to continue with activities of daily life. These indirect costs eventually contribute to slower economic development and increased socioeconomic inequality. In the United States, the estimated cost due to lost income alone was \$11.8 billion dollars in 1998 (Goldsmith, Pellmar, Kleinman, & Bunney, 2002). Other indirect costs are derived from reduced productivity of loved ones' grieving a suicide, and the lost or reduced productivity of people suffering from suicidality. Additionally, the cost of delivering emergency intervention and non-emergency treatment for suicidality is ultimately borne by workers and taxpayers.

US Veterans and Suicide

Recent studies demonstrate a higher rate of suicide among veterans who are enrolled in Veterans Health Administration (VHA) services, than in (1) the general population (Blow, et al., 2012), and (2) in veterans who do not receive care in VHA (I. R. Katz, McCarthy, Ignacio, & Kemp, 2012). Concern about suicide among veterans is magnified by the anticipated increase in the numbers of veterans enrolling in VA services (Congressional Budget Office, October 2010), especially among younger veterans (I. R. Katz, et al., 2012). These patterns emphasize the crucial role of the VHA in managing suicide prevention interventions for veterans receiving care at VHA facilities.

Costs related to suicide prevention efforts at the VHA include funding for research, staffing, and maintenance of the suicide prevention hotline. For Fiscal Year 2008, spending was projected to include: \$970,000 to establish the suicide prevention hotline; \$1.97 million for the Center of Excellence in Canandaigua, New York; \$2.20 million for the Mental Illness Research, Education and Clinical Center in Denver, Colorado; \$90,000 for the Serious Mental Illness Research, Education and Clinical Center for monitoring of suicide rates and risk factors; and \$14.32 million for Suicide Prevention Coordinators (Sundaraman, V., & Lister, 2008).

Significance to Healthcare

A non-fatal suicide attempt is one of the strongest clinical predictors of suicide. Observed suicide rates for attempters are on average, approximately 40 times greater than expected rates; in some cases, suicide risk was more than 100 times greater than expected (Harris, et al., 2007). Until recently, healthcare systems have not been able to readily identify patients with a history of a prior suicide attempt. Since 2008, the VHA's enhanced suicide behavior surveillance system can better identify VHA patients who have attempted suicide. With this monitoring system in

place, the VHA has the ability to target this population for enhanced service delivery of specific interventions.

In addition to the risk imparted by a prior attempt, there is also an association between completed suicide and contact with a healthcare system. An unsettling proportion of those who commit suicide have had recent contact with a healthcare provider. This pattern is detectable in civilian and veteran populations. VHA investigators (Denneson, et al., 2010) examined the health care contacts in the year prior of 112 veterans who completed suicide between 2000-2005. Findings revealed that 61 (54%) of these Veterans were seen by a VHA health care provider in the 30 days prior to death. This association challenges healthcare organizations to enhance their efforts in identifying and managing suicide risk in all healthcare settings.

The transition from inpatient to outpatient care is a particularly vulnerable time for civilians and veterans who receive inpatient psychiatric care. High rates of suicide are associated with recent hospital discharge, regardless of the reason for admission. One study (Appleby, et al., 1999) examined survey data from more than 2,000 suicides by patients who had made contact with mental health services in the year before their death. Approximately 25% of these deaths occurred within three months of discharge from a psychiatric hospital, and almost half of those deaths occurred within the first week of discharge. A case-control study found that of the suicides that occurred after psychiatric hospital discharge in Hong Kong from 1996-1999 (n = 73), 80% occurred within the first year after discharge (Yim, et al., 2004).

In a retrospective case control study, comparing 238 patients dying by suicide within three months of discharge, matched on date of discharge to living controls (Hunt, et al., 2009), 102 (43%) suicides occurred within the first month of discharge from a psychiatric inpatient unit. The first week and the first day after discharge were particularly high-risk periods. These findings are consistent in veteran populations; for veterans diagnosed with depression, elevated rates of suicide are associated with the 12-week period after psychiatric discharge (Valenstein, et al., 2009). Considering the compounded suicide risk for patients who experience a suicide attempt

and who are recently discharged from psychiatric hospitalization, the study of care delivery surrounding psychiatric hospitalization is crucial.

The Role of the Healthcare System

Successes in reducing suicide rates within healthcare agencies can be attributed to system wide changes in care delivery. In 2001, the Division of Behavioral Health Services of the Henry Ford Health System conducted a complete redesign of their depression care delivery (Coffey, 2007). The key goal of this initiative was to eliminate suicide. This initiative reported a 75% reduction in suicide rates after four years. This was, in part, accomplished by delivering a consistent standard of care across a broad population, regardless of prior suicide behavior.

In recent years, VHA has recognized the importance of systematically providing an enhanced level of care for veterans admitted to inpatient psychiatric care for a suicide attempt. The implementation of these enhanced services emphasizes the delivery of a safety planning intervention during hospitalization and the arrangement of intensive post-discharge psychiatric care (I. Katz, 2012). However, directives regarding these enhanced services do not include recommendations for care coordination between inpatient and outpatient settings. Additionally, there is little guidance on the content of psychiatric care appointments, the recommended expertise of the provider conducting the appointment, or the appropriate setting for the appointments.

To inform future recommendations for care for this vulnerable population, further study was needed to more fully capture the care processes proximal to suicide events. This study described aspects of the acute inpatient and outpatient care delivered to veterans hospitalized for a suicide attempt. It also described aspects of inpatient and outpatient care coordination and the potential impact on the delivery of treatment after hospital discharge. This study aimed to (1) describe, for patients who did and did not experience a suicide re-attempt in

six months after the index attempt, the setting, provider, type, timing, duration and intensity of behavioral health care to veterans recently hospitalized for a suicide attempt and (2) describe associations between factors related to patient characteristics, prior health utilization, index admission and the timing of post-discharge behavioral health care.

CHAPTER II

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

For centuries, many have speculated about the causes of suicide. Theories attempting to explain suicide are prevalent in the areas of philosophy, theology, sociology, anthropology, psychology and medicine. Many questions have been posed about the cause of suicide, yet satisfactory answers remain elusive. To date, there is no robust theory explaining the cause of suicide behavior. In the absence of such a theory, it is not possible to reliably predict suicide behavior. Without a theory for predicting suicide, it is all the more difficult to prevent suicide.

Despite absence of a predictive theory of suicide behavior, models exist that describe concepts associated with suicide and prevention. Several psychological models describe associations between individual-level cognitive (Johnson, Gooding, & Wood, 2010; Wenzel & Beck, 2008), psychodynamic (Huprich, 2004; Rudd, 2004) or interpersonal (Van Orden, et al., 2010) processes and the potential for suicide behavior. Epidemiological models describe associations between population demographic variables and suicide behavior (Eve K. Moscicki, 1997; E. K. Moscicki, 2001). Observational studies have retrospectively and prospectively described associations among demographics, modifiable risk factors, and suicide behavior (Haney, et al., 2012; NICE & National Institute for Health and Clinical Excellence, 2011). From this knowledge, demographic (fixed) and modifiable risk factors for suicide have been identified, as discussed in greater detail in later sections of this chapter.

Conceptual models for suicide prevention combine existing public health prevention models with variables associated with suicide (Maris, Berman, & Silverman, 2000; Silverman & Felner, 1995). Such concepts describe prevention efforts targeting individuals, selected populations defined by common risk factors, or broad populations defined by geography. These concepts inform the delivery of prevention interventions to populations, based on observable risk

factors (i.e. demographics, military experience, substance use disorder, psychiatric illness, psychiatric hospitalization). However, a history of a prior attempt (arguably the strongest predictor of suicide) might only be observed within a specific time window and in select settings (e.g. a suicide attempt might only be observed by the healthcare system treating the suicide behavior, therefore the delivery of prevention interventions for this segment of the population is sensitive to the timing of delivery). Therefore, the participation of healthcare systems in detecting suicide behaviors is vital to targeting this population for further prevention interventions.

Prior investigations have independently demonstrated that a history of recent discharge from a psychiatric hospital or a history of prior suicide behaviors are associated with increased likelihood of future suicide behavior. About one in five people who receive treatment for self-harm in an emergency department will harm themselves again in the following year. Following an act of self-harm, the rate of suicide increases between 50-100 times the rate of suicide in the general population (NICE & National Institute for Health and Clinical Excellence, 2011). The proportion of patients who will fatally repeat self-harm behavior ranges from 1.6% in the first year, to 3.4% in nine years (D. Owens, Horrocks, & House, 2002). Any suicide prevention model describing the delivery of treatments should consider the compounded risk associated with discharge from psychiatric hospitalization for those who were admitted for a suicide behavior.

The development of a suicide prevention model should incorporate concepts related to healthcare service delivery. Such concepts impart the relationship among outcomes (e.g. future suicide behavior) and aspects of treatment that go beyond the typical dichotomy of treatment delivery. Kane's conceptualization of treatment incorporates variables related to the dosing of treatment, the provider delivering the treatment, and the organizational characteristics of the treatment setting (Kane, 2006). However, concepts related to the coordination of treatment delivery are not included in Kane's model. The importance of these concepts, which are potentially related to the delivery of treatment for suicide behavior, will be discussed in later sections.

Investigations of protective treatments for suicide behavior suggest that delivering such treatments reduces the risk of future suicide behavior (Hawton, et al., 1998; Mann, et al., 2005; O'Neil, et al., 2012). These treatments have targeted groups with suicide risk factors, including prior suicide behavior. Although this evidence base has its limitations (e.g. small sample sizes, selection bias), it is the only area of suicide research that has applied rigorous methods, including randomized controlled trials, to determine causality.

Definitions

This section describes the concepts underpinning the present study. Where possible, these definitions are selected from sources associated with the Veterans Health Administration, or relevant to the care of veteran populations. Because the outcome of interest in the present inquiry is the repetition of a suicide attempt, evidence for risks associated with repetition of suicide behavior is discussed in considerable detail. In instances where evidence associated with repetition of suicide behavior is lacking, I will describe evidence for risks associated with fatal suicide behavior. The following concepts and evidence that shape the proposed inquiry include:

1. Suicide Behavior
2. Prevention
3. Conceptualizations of risk factors for suicidal SDV
 - a. Patient-level risk factors
 - b. Organizational risk factors
4. Preventive Treatments
 - a. Medications
 - b. Procedures
 - c. Education/Counseling
 - d. Coordination

5. Treatment Factors: organizational concepts that contribute to variation in outcomes
 - a. Provider Characteristics
 - b. Setting Characteristics
 - c. Dose of treatment: Timing, intensity and duration
 - d. Continuity Measures

The following pages describe each.

Suicide Behavior

The field of Suicidology has long struggled with the lack of universally recognized definitions for suicide (Goldsmith, et al., 2002). The use of consistent nomenclature for suicide is necessary to support accurate epidemiological analysis, research methodology and evidence-based suicide assessment and treatment. The VHA has recently adopted a Self-Directed Violence Classification System in order to standardize the language uses to describe suicide, suicide attempts, and other forms of self-directed violence (Brenner, Breshears, et al., 2011; Silverman, Berman, Sanddal, O'Carroll P, & Joiner, 2007a, 2007b). Suicidal Self-Directed Violence (SDV) is “behavior that is self-directed and deliberately results in injury or the potential for injury to oneself. There is evidence, whether implicit or explicit, of suicidal intent” (Brenner, Breshears, et al., 2011). Modifiers of the term “self-directed violence” convey fatality, the presence or absence of an injury, and whether the behavior was interrupted by self or other. The term self-directed violence does not include cognitions related to suicide, such as suicidal ideations or formulations of suicide plans.

Limitations associated with the use of SDV as an outcome variable are associated with reliability of data sources that provide SDV information. Self-report of past SDV can contribute to bias for estimates of the frequency and severity of past behavior (NICE & National Institute for Health and Clinical Excellence, 2011; Silverman, et al., 2007a). The accuracy of objective measures of SDV relies upon provider assessment and documentation, which is variable (Haney, 2012). The implementation of the VHA Suicide Prevention program and the standardization of

nomenclature within the VHA, have the potential to reduce variation in determinations of SDV. Selected methods for establishing the intent of self-directed violence will be discussed in Chapter Three.

Prevention Frameworks

One intrinsic challenge in preventing suicide is the limited understanding of what causes suicide. As discussed in the previous section, the myriad factors and interactions that contribute to the risk for suicide build a complex case for the potential causes of suicide. Debate continues about whether suicide is a symptom of an underlying disease process, such as major depressive disorder, or is a discreet behavior independent of a detectable disorder. In spite of this lack of clarity, there appears to be a consensus that there are warning signs that, if observed, predict an imminent suicide threat. Additionally, there is evidence that individuals who die by suicide have had recent contact with a healthcare professional. Therefore, the healthcare system is an ideal venue for initiating suicide prevention interventions, upon detection of warning signs and/or suicide risk factors.

The following pages will describe concepts and models related to prevention. Traditionally, prevention models have described the delivery of interventions to the point of disease onset. After disease onset, further interventions are referred to as “treatment”. In discussing suicide prevention, the onset of suicide is terminal. Therefore, many activities aimed at decreasing the risk of suicide fall under the term “prevention”. The concept of “treatment”, and its implications for suicide prevention efforts in healthcare systems, will be described in later sections.

Public Health Model of Prevention. The Public Health Model is comprised of Primary, Secondary, and Tertiary levels prevention. Primary prevention focuses on entire populations to reduce the incidence of new cases of a disorder. Secondary prevention targets persons showing early signs of a disorder, with the goal of reducing the intensity, severity, and duration of these problems. Tertiary prevention focuses on individuals who are already displaying a serious

disorder. The Public Health Model conceptualize the trajectory of disease as a linear process, where disorders move sequentially from onset through clinical syndrome (Silverman & Felner, 1995).

When discussing “prevention”, the public health model is the framework that has been traditionally employed. Recently, there has been a shift away from this language when discussing prevention in mental health. As it pertains to the prevention of mental disorders, the conceptual shift away from the Public Health Model was noted in the IOM report on a program of research in this area (Mrazek & Haggerty, 1994). Henceforth, prevention efforts in mental health have been described according to the operational model of prevention.

Operational Model. The US National Strategy for Suicide Prevention (US Department of Health and Human Services, 2001) employs an Operational Model for Prevention to guide recommendations for interventions. This Operational Model for Prevention (Gordon, 1983), shifts from the “primary, secondary, & tertiary” language of the traditional public health model, and instead describes the level of intervention as “universal, selected and targeted/indicated”.

1. Universal: Most generally applicable type of intervention, designed to affect everyone in a defined population.
2. Selective: recommended for subgroups of the population distinguished by obvious characteristics (e.g. demographics), which impart an increased risk for the condition
3. Indicated: these measures or interventions encompass activities that are only advisable for persons who, upon examination, are found to possess a risk factor, condition or abnormality that identifies them at sufficiently high risk to warrant the preventive intervention.

Table 2.1 outlines Universal, Selected, and Indicated interventions, and was adapted from the US National Strategy for Suicide Prevention (US Department of Health and Human Services, 2001).

Table 2.1

Universal, Selective, and Indicated Interventions for Suicide Prevention

	Biopsychosocial	Environmental	Sociocultural
Universal	Depression screening in primary care practice	Safe storage of firearms and ammunition	Teach conflict resolution skills to elementary school children
		Package drugs in blister packs	Promote programs that improve early parent-child relationships
Selective	Improve screening and treatment for depression of the elderly in primary care	Reduce access to the means for self-harm in jails and prisons	Develop programs to reduce despair and provide opportunities for high risk populations, such as Native American Youth
Indicated	Implement Cognitive Behavioral Therapy (CBT) immediately after patients have been evaluated in an emergency department after a suicide attempt	Teach caregivers to remove firearms and old medicines from the home before hospitalized patients are discharged	Develop and promote honorable pathways for military personnel to receive treatment for mental and substance use disorders and return to full duty without prejudice

Antecedent Conditions Model. A third model, the Antecedent Conditions Model (ACM) was developed to address the lack of an adequate prevention model to account for the complexity of suicidal behavior (Silverman & Maris, 1995). While this model is less developed than the Public Health Model or the Operational Model, it will be mentioned briefly, since the ACM is specific to suicidal behavior.

In the ACM, the focus of prevention efforts is on the mechanisms and processes that lead to the expression of the disorder, not the disorder itself. This focus departs from the classic medical-public health paradigm, which approaches prevention by targeting specific conditions that interact with specifiable individual vulnerabilities. The ACM assumes that there are two distinct sets of conditions that are antecedent to the expression of suicidal behaviors—predisposing conditions and precipitating conditions. Predisposing conditions are distal to the suicidal behavior but are necessary to place an individual at higher risk. Precipitating conditions

are more proximal to the suicidal behavior, but will not lead to the expression of suicidal behavior in the absence of the predisposing condition.

This model asserts that there are two loci for intervention: a societal, community approach that diminished predisposing conditions for the entire population, and targeted interventions for those who have already been identified as having experienced predisposing conditions. Targeted interventions would attempt to eliminate or ameliorate those precipitating conditions that are proximally or temporally related to the manifestation of the behavior.

The ACM is not well represented in the suicide prevention health policy literature. Due to the divergence from traditional language and definitions typically used in prevention frameworks, a novel framework incorporating this model for prevention would likely face challenges in widespread adoption. The Operational model of prevention is generally well accepted in the field of Suicidology, and is consistent with the language used in the US National Strategy for Suicide Prevention (US Department of Health and Human Services, 2001). Therefore, the Operational model will be incorporated into the proposed conceptual model that guided this study.

Conceptualizations of Suicide Risk

Risk and protective factors are typically categorized as biopsychosocial, environmental, and sociocultural in nature (Goldsmith, et al., 2002; Ramchand, Acosta, Burns, Jaycox, & Pernin, 2011; US Department of Health and Human Services, 2001). Although these categories are somewhat arbitrary, they serve to guide discussion of appropriate prevention interventions. In the following paragraphs, I emphasize risk factors that are most frequently encountered on the individual level, and will focus on those that are most amenable to modification from within the healthcare system.

Conceptual models describing suicide risk present various dichotomies to describe stratification of risk factors: the stress-diathesis model, an epidemiological model, and a model describing risk as fixed or modifiable. The stress-diathesis model of suicide risk proposes two types of risk factors: a predisposition (diathesis) for suicide (e.g. impulsive-aggressive lifetime

traits), and the future onset of an event, experience, or psychological state (stress), including the development of psychiatric disorders (Mann, 1998; Mann, Waternaux, Haas, & Malone, 1999). An epidemiological model of risk temporally stratifies risk factors as “distal” or “proximal”, relative to the suicide behavior. Distal risk factors, similar to diathesis, represent an underlying vulnerability towards suicide, which may occur on the individual and environmental levels. Proximal risk factors are more immediately antecedent to the suicide behavior, and can act as precipitants (E. K. Moscicki, 2001). On their own, proximal (stress) and distal (diathesis) risk factors are necessary but not sufficient to result in suicide behavior. However, it is the cumulative effect of both factors that creates the sufficient conditions for suicide.

For the healthcare provider who is treating the patient who recently attempted suicide, it may be more meaningful to determine which contributing risk factors are the most amenable to treatment. Therefore, dichotomizing risk according to “fixed” and “modifiable” factors is likely to be more useful for informing the development of individual treatment plans. Fixed risk factors for suicide behavior are characterized by historical or genetic attributes and include demographics, personal historical events, and prior patterns of healthcare utilization. These factors are not amenable to change, however their identification through screening procedures may inform future interventions to mitigate suicide risk. Other fixed risk factors are not as obvious, but may be useful in screening processes to establish risk for suicide. These risk factors are informed by past behaviors, such as a history of self-harm, or by healthcare utilization patterns, such as a history of psychiatric admissions or prior outpatient mental health treatment.

In contrast to fixed risk factors, modifiable risk factors are characterized by a state of illness or circumstance that is potentially amenable to intervention. These factors include psychiatric illness, physical illness, substance use, geography, dysfunctional family environment, psychological characteristics such as hopelessness, impulsivity, aggression, or perceived burdensomeness, and stressful life events such as loss of employment, financial crisis, relational loss, or suicide of a known other. Unfortunately, the scope of resources provided by most

healthcare facilities limits the ability to modify many of these risk factors. For example, a healthcare provider may be aware of a patient's recent job loss, but the provider has limited or no ability to directly affect this circumstance. Risk factors characterized by medical illness, psychiatric conditions, substance use, and psychological states are amenable to modification through interventions typically delivered in healthcare settings. Potential interventions will be discussed in later sections.

In the following paragraphs, I present a review of selected suicide risk factors, especially those associated with recurring suicidal SDV. Additionally, risk factors that relate specifically to veteran populations are reviewed.

Patient Characteristics

The patient-level variables of interest are the biopsychosocial characteristics most commonly associated with suicide behavior. Many studies have been conducted in determining the risk factors associated with fatal and non-fatal suicide behavior in civilian, military and veteran populations (Haney, et al., 2012). Fewer studies distinguish factors associated with a first episode of non-fatal suicide behavior from those factors associated with repetition of non-fatal suicide behavior. The following sections will describe these patient characteristics and their associations with fatal and non-fatal repetition of a suicide attempt.

Age. Age is an important factor in establishing risk for fatal and non-fatal SDV. In 2009, United States suicide rates for ages 15-24 were slightly lower than the national rate (10.1 vs. 12.0 per 100,000). However, suicide was the third leading cause of death for ages 15-24, and the 10th leading cause of death in the US the general population. Additionally, those aged 15-24 demonstrated a higher attempt to completion ratio compared to the general population. For every suicide death for those aged 15-24, an estimated 100-200 suicide attempts were reported. Conversely, for every suicide death in the general population, there are an estimated 25 attempts (McIntosh, 2012).

Studies examining rates of suicide in veteran and non-veteran populations have found age differences in fatal suicide behavior when comparing veterans to the general population, and when comparing non-VHA utilizing veterans to those who use VHA healthcare services. In the sixteen states that participate in the National Violent Death Reporting System, veterans demonstrated varying rates of fatal suicide behavior and VHA utilization patterns according to age. The proportion of male veterans (under the age of 30) who utilized VHA healthcare increased significantly from 2005-2008. This growth is not observed in older veteran populations (30 years and older). Male veterans under the age of 30, who utilized VHA services, demonstrated decreasing rates of suicide over time (between 2005-2008) compared to non-utilizers. This trend is not noted in any other age group among male veterans. In fact, for male veterans aged 30-64 and >65, suicide rates are higher for utilizers, compared to non-utilizer male veterans in corresponding age groups (I. R. Katz, et al., 2012). In a preliminary report of suicide attempts in veteran populations, repeated suicide attempts occur most frequently, at a rate of approximately 16%, in groups aged 50-59 years (Kemp & Bossarte, 2012).

The evidence supporting the association between age and risk for repeated suicide behavior is mixed. Several studies report “youth” as a risk factor for repetition. However, variation in age categorization precludes comparison across these studies. Some studies did not find differences in risk for suicide behavior repetition among age groups in adjusted (for lengths of follow up time) (Chen, et al., 2010) and unadjusted analyses (Wang & Mortensen, 2006). Differences in age among males were detected in a study examining the number of suicide behavior repetitions. Males with four or more repetitions of suicide behavior were more likely to be aged 25-34 and less likely to be aged 55 or older. There were no significant differences in age for females, among suicide behavior repetition groups (Haw, Bergen, Casey, & Hawton, 2007). In a study examining self-poisoning re-admissions within two years of an initial self-poisoning attempt, older patients (> 65 years) were less likely to be re-admitted for self-poisoning compared to patients aged 15-24 years (Payne, Oliver, Bain, Elders, & Bateman, 2009).

Gender. In the United States, there are differences in suicidal behavior between men and women. Rates of suicide for men are consistently three to four times higher compared to suicide rates for women; this gender difference was also observed within white, nonwhite, and black racial groups. In 2009 there were 3.7 male deaths by suicide for each female death by suicide (McIntosh, 2012). In veteran populations that utilize VHA services, the overall suicide rate is higher compared to the general population, but the gender differences are comparable. Suicide rates among male VHA users the annual rates of suicide ranged from 36.4 to 43.1 suicides per 100,000 person years (from 2000-2007). In females these rates, over the same time period, ranged from 9.8-13.7 per 100,000 person-years (Blow, et al., 2012).

In a study evaluating the risk of suicide related to a history of repeated suicide behavior (N = 11,583), both males and females demonstrated an increased risk for suicide, when compared to non-repeaters (Zahl & Hawton, 2004). This association appears stronger for females, RR = 3.5, CI = 2.3-5.3, compared to males, RR = 1.8, CI = 1.3-2.4. When comparing multiple repeaters (more than two suicide behavior episodes after the index episode) and single repeaters (one episode after the index episode), differences in risk for suicide were found for females, $\chi^2 = 5.98$, $p = .015$, but not for males, $\chi^2 = 0.56$, $p = .456$. There were no significant differences between males and females in the proportion of patients with prior suicide behavior (n = 1043, 23% males; n = 1661, 24% females) or in the proportion that repeated SDV during the follow-up period (n = 1073, 23% males; n = 1593, 23% females).

Two studies (Chen, et al., 2010; Scoliers, Portzky, van Heeringen, & Audenaert, 2009) reported females were at a higher risk for repetition. They were pooled, resulting in an adjusted relative risk of 1.96, CI = 1.22-3.15 (NICE & National Institute for Health and Clinical Excellence, 2011). Adjusted factors included age (both studies) method of suicide behavior (Chen, et al., 2010), depression, anxiety, and education (Scoliers, et al., 2009). Contrary to this finding, another study evaluating the risk of suicide behavior repetition found that females were *less* likely to repeat suicide behavior compared to males, HR = 0.80, CI = not reported, $p < .050$

(Christiansen & Jensen, 2007). In contrast, a pooled unadjusted odds ratio of four studies (Chandrasekaran & Gnanaselane, 2008; Johnsson, Öjehagen, & Träskman-Bendz, 1996; Krarup, Nielsen, Rask, & Petersen, 1991; D Owens, Dennis, Read, & Davis, 1994), revealed inconclusive findings related to gender and the likelihood of suicide behavior repetition, unadjusted OR =1.01, CI = 0.50-2.04 (NICE & National Institute for Health and Clinical Excellence, 2011).

There is consistent evidence for gender differences in suicide rates in the US general and veteran populations. The evidence for gender differences when considering suicide behavior repetition is less conclusive. A preliminary report of twelve-month repeat suicide attempt among veterans describes the rate of repetition among males is approximately 14%, while females experienced a repetition rates of approximately 15% (Kemp & Bossarte, 2012).

Race and ethnicity. Reported statistics on suicide rates in the United States indicate differences among racial and ethnic groups and suicide deaths. Whites and Native-Americans demonstrated the highest rates (13.5 and 12.3 per 100,000, respectively), compared to Asian/Pacific Islanders (6.3), Hispanics (5.3), Non-whites (5.8) and Blacks (5.1/100,000) (McIntosh, 2012).

Studies have reported a relationship between race and fatal suicide behavior in veterans. Two studies investigated the incidence of suicides in patients registered in the VA's National Registry for Depression. Caucasian race was consistently associated with a higher risk for suicide, compared to other groups (Ilgen, et al., 2009; Zivin, et al., 2007). Non-Hispanic ethnicity was also associated with a higher risk of suicide (rate per 100,000 person years = 86.80 vs. Hispanic = 46.28) (Zivin, et al., 2007). Race appears to affect the impact of other risk factors for suicide. For example, Ilgen, et al., (2009) found that the impact of prior psychiatric hospitalization increased suicide risk only for non-African American men with a substance use disorder. In the same study, African-American men with a substance use disorder, no other variables distinguished those who died by suicide and those who did not.

The association between race/ethnicity and repetition of suicide behavior has not been evaluated in veteran populations. Given the differences observed in fatal suicide behavior, consideration of race and ethnicity is imperative to the study of suicide behavior repetition.

Marital status. Marital status is a reflection of availability of support to an individual. Higher rates of suicide have consistently been observed in divorced people, while the relationship between single status, widowhood, and suicide yields mixed findings (Roskar, et al., 2011). A change in marital status reflects a disruptive and stressful life event. The stress related to the transition into marriage is arguably comparable to the stress of transitioning out of marriage, be it through separation, divorce, or widowhood. This transition, and its relationship to suicide risk was examined in a recent study (Roskar, et al., 2011). A marital status change in the past five years was noted in 11% of the suicide victims (172/1614) compared to 6% of controls (257/4617), a statistically significant difference, $\chi^2(1) = 47.55, p < .001$. Becoming widowed, $\chi^2(1) = 31.14, p < .001$, or divorced, $\chi^2(1) = 14.03, p < .001$, was more common in the suicide group, compared to controls. There were no differences in the incidence of getting married between groups, $\chi^2(1) = 2.34, p = .126$, however, within the married group, the risk for suicide increased as age increased. A similar trend was seen in the divorced group, suggesting that these transitions later in life impart a greater risk for suicide. This study did not investigate the relationship between marital transitions and the risk of suicide behavior repetition.

Pooled unadjusted odds ratios of four studies (Bille-Brahe & Jessen, 1994; Chandrasekaran & Gnanaselane, 2008; Johnsson, et al., 1996; D Owens, et al., 1994) were not conclusive in determining the association between single/unmarried status and risk for repetition of suicide behavior. Among approximately 1700 participants, the unadjusted odds ratio was not statistically significant, OR = 1.36, CI = 0.85-2.16 (NICE & National Institute for Health and Clinical Excellence, 2011). In two individual studies, the risk of repeated suicide behavior was reported to be higher among unmarried participants, however these findings were unadjusted, limiting conclusiveness of these associations (Dieserud, Roysamb, Braverman, Dalgard, &

Ekeberg, 2003; Kapur, et al., 2006). Another suggests that living alone on day of index suicide behavior increases the risk for repetition, $HR = 1.4, p < .001$) in an unadjusted analysis (Christiansen & Jensen, 2007). In a separate study, investigators adjusted for prior self-harm history, psychiatric treatment, employment status and ethnicity and reported an odds ratio of 1.39, $CI = 1.09-1.76$, indicating a higher risk of repeated suicide behavior for unmarried individuals (Johnston, Cooper, Webb, & Kapur, 2006). It is unclear whether these studies differentiated between “unmarried”, “divorced” and “separated”. It remains unclear whether the association between unmarried status and suicide behavior repetition is due to the protective effects of marriage, or the risks associated with interpersonal difficulties that preclude a sustained marriage.

The association between marital status and any kind of suicide behavior has not been widely studied in veteran populations. Due to findings related to the association between unmarried status and the likelihood of suicide behavior repetition, this association should be explored in veteran populations. Differentiating between “never married”, “divorced” and “separated” may elucidate independent risks associated with each of these relational states.

Geographic distance from VHA facility. Distance from a VHA facility has not been evaluated as a risk factor for suicide behavior repetition, but has been investigated in relation to fatal suicides. For veterans who utilize VHA services, suicide rates are higher in those with a rural residence (38.8 vs. 31.4/100,000). Firearm deaths are more common in rural suicides: 77% of rural suicide deaths occur via firearm, compared to 62% of urban suicide deaths (McCarthy, et al., 2012). Greater geographical distance between one’s residence and VHA facility is associated with higher suicide rates, even after adjusting for socio-demographic characteristics, including diagnosis (Desai, Dausey, & Rosenheck, 2005). These investigations suggest that rurality and distance from VHA facilities potentially affect access to resources that are protective against suicide. The association between suicide behavior repetition and geographic distance from VHA service should be more fully investigated in veteran populations.

Service-connected disability rating. Service-connected disabilities are injuries or illnesses that were incurred or aggravated during military service. Eligibility is determined through an examination process, during which a rating from 10-100%, in increments of 10%, is applied to the disability. This rating describes the extent to which the injury or illness is attributable to military service. Veterans with service-connected disabilities receive monthly monetary compensation, and enjoy enhanced access to healthcare services. Veterans who are 50% or more disabled from service-connected conditions (i.e. 50% or more “service connected”) receive priority in scheduling of hospital or outpatient medical appointments. Service-connected veterans are exempt from copay requirements for inpatient and outpatient primary and specialty services, including treatment for non-service connected conditions. Veterans who are 50% or more service connected, or who receive treatment for service-connected conditions do not pay copays on medications. Veterans who are 30% or more service-connected or receive treatment for service-connected conditions are eligible to receive reimbursement for travel costs (41.5 cents per mile) when traveling to receive VA-approved medical care (Department of Veterans Affairs, 2011).

Service connected veterans who receive treatment at VHA facilities receive incentives to participate in healthcare. Many of these incentives start at or above the 50% rating. Therefore, any investigation involving veterans’ healthcare utilization should examine differences between veterans with no service connection, with 10% to 40% service connection, and with 50% to 100% service connection. Studies that have investigated suicide in the veteran population have examined the effect of service connection ratings. Desai et al. (2005) found that veterans with service-connected disabilities demonstrated lower rates of suicide ($< 50\% = 39.51$; $> 50\% = 31.58/10,000$ person years) compared to veterans without service-connected disabilities ($45.34/10,000$ person years) $\chi^2(2) = 10.96, p < .005$). Similarly, in a study of depressed veterans and suicide mortality, veterans with a service-connected disability were less likely to die by

suicide, compared to those without a service-connected disability, adjusted for age and PTSD diagnosis, HR = 0.87, CI = 0.78-0.97 (Zivin, et al., 2007).

Psychiatric conditions. There is compelling information that persons with a variety of psychiatric symptoms are more likely to demonstrate suicide behavior than those without these symptoms. However, this does not confirm that any person demonstrating suicide behavior has a mental disorder. In fact, the largest majority of persons with psychiatric disorders, even depression, will never demonstrate suicidal ideations or behavior in their lifetimes (Maris, et al., 2000). Most persons who are at risk for suicide behavior do not choose suicide actively, but instead are under the influence of disturbances of thought, feelings, and behavior. It is these influences that are amenable to intervention. The following sections will describe several psychiatric conditions, which are amenable to treatment, and are thus considered “modifiable” risk factors for suicide behavior.

Depressive symptoms. Depressive symptoms are associated with an increased risk for repetition of suicide behavior. These symptoms are defined by the Diagnostic and Statistical Manual of Mental Disorders, 4th edition, Text-Revision (DSM-IV-TR) and include: depressed mood, diminished interest, weight loss, sleep disturbance, psychomotor agitation or retardation, fatigue, inappropriate guilt/worthlessness, impaired concentration, recurrent thoughts of death. When five or more of these symptoms are present, and they persist for longer than two weeks and cause significant distress and impairment in functioning, a Major Depressive Episode may be diagnosed by a healthcare provider (American Psychiatric Association, 2000). In the absence of a clinical diagnosis, these symptoms can be ascertained by psychometric tests, such as the Beck Depression Inventory (BDI) mentioned below. The BDI has been validated in psychiatric ($\alpha = 0.86$) and non-psychiatric populations ($\alpha = 0.81$) to discriminate among subtypes of depression, and to differentiate depressive symptoms from anxiety symptoms (Beck, Steer, & Carbin, 1988).

In a pooled analysis (NICE & National Institute for Health and Clinical Excellence, 2011) of two studies examining repetition of non-fatal suicide behavior (Colman, Newman,

Schopflocher, Bland, & Dyck, 2004; Dieserud, et al., 2003) the likelihood of repetition for patients with depressive symptoms, adjusted for history of prior self-harm, age, and gender, was double that of patients without depressive symptoms, OR = 2.19; CI = 1.25-3.81. Depressive symptoms were ascertained by the BDI (Dieserud, et al., 2003) or by self-reports of a lifetime diagnosis of depression (Colman, et al., 2004). In each of these studies, the repetition rate during the follow up was 25% after one to two years (Colman, et al., 2004) and 16% after 18 months (Dieserud, et al., 2003).

In a study of patients experiencing first time suicide behavior and predictors of repetition (Chandrasekaran & Gnanaselane, 2008), a diagnosis of major depressive disorder was associated with repetition in the two years following the initial suicide behavior, OR = 3.41, CI = 1.76-6.26. Diagnoses were ascertained using the Mini International Neuropsychiatric Interview, using DSM-IV criteria. In the first year after the initial attempt, 14% of the sample had repeated the SDV; another 9% of the sample demonstrated repetition in the second year of observation.

Personality disorder. Disordered personality is defined as “an enduring pattern of inner experience and behavior that deviates markedly from expectations of the individual’s culture” (American Psychiatric Association, 2000). This pattern is manifested in the ways of perceiving and interpreting self, other people, and events; the range, intensity, lability and appropriateness of emotional response; interpersonal functioning, or impulse control. The pattern is stable, and of long duration, traceable to adolescence or young adulthood. Subjective distress and/or socio-occupational functional impairment are key characteristics of personality disorders. Diagnosis of personality disorders falls within ten different subtypes, however most studies group the subtypes together under one diagnostic category.

In a study of suicide behavior repetition, personality disorder was more common in both males and females who repeated suicide behavior during the study period. In a multivariate model, personality disorder increased likelihood of repetition in females with one to three repetitions during the observation period, OR = 1.90, CI = 1.24-2.91, and with four or more

repetitions, OR = 2.90, CI = 1.44-5.87 after adjusting for prior suicide behavior, current psychiatric treatment, alcohol misuse, and being a victim of violence (Haw, et al., 2007).

Psychosis. Psychosis is vaguely and broadly conceptualized, without a widely accepted definition. The DSM-IV-TR cites multiple definitions: “hallucinations and delusions, with or without insight; a mental impairment that grossly interferes with the capacity to meet ordinary demands in life; a gross impairment in reality testing; or, as cited in the diagnostic criteria for schizophrenia: hallucinations, delusions, disorganized speech, grossly disorganized behavior, or catatonic behavior (American Psychiatric Association, 2000; Sadock & Sadock, 2005). Symptoms of psychosis, in combination with other symptom clusters, may result in a diagnosis of schizophrenia. Psychosis may also accompany other disorders, such as mood disorders. The presence of psychosis in mood disorders imparts a more severe case of the underlying disorder.

In two separate studies, a lifetime history of schizophrenia, and symptoms of psychosis were associated with an increased risk of repetition of suicide behavior. Coleman, et al., (2004) reported that a lifetime history of schizophrenia had an unadjusted odds ratio of 4.24, CI = 2.3-.79) for repetition of suicide behavior. After adjusting for prior history of self-harm, depression, age, gender and physical health problems, the adjusted odds ratio became 3.43, CI = 1.77-6.66. Symptoms of psychosis, namely hallucinations, were associated with an increased risk for repetition of suicide behavior, unadjusted HR = 1.82, CI = 1.56-2.14 (Kapur, et al., 2006).

Posttraumatic stress disorder and other anxiety disorders. The development of post-traumatic stress disorder (PTSD), one type of anxiety disorder, occurs within three symptom domains: re-experiencing a traumatic event (characterized by threat of death, or actual or threatened harm to physical integrity); avoiding stimuli associated with the trauma, and experiencing symptoms of increased autonomic arousal, such as enhanced startle response (American Psychiatric Association, 2000). PTSD is of particular interest in veteran populations, due to the potential exposure to trauma during combat operations.

There are no studies examining the association between PTSD and repetition of suicide behavior in veteran populations. However, in a study of suicide attempters (N = 874) treated at the University Hospital of Ghent, 29% of these patients repeated suicide behavior within five years. Repetition was associated with anxiety symptoms (as well as depression, more psychiatric symptoms, and young age), though did not specify any anxiety-related diagnosis (Scoliers, et al., 2009).

PTSD is the most frequently diagnosed mental disorder among Operation Enduring Freedom/Operation Iraqi Freedom, OIF/OEF veterans seeking healthcare at VA facilities (Jakupcak, et al., 2009). PTSD has been identified as a risk factor, when compared to veterans without PTSD, for suicide attempts, adjusted OR = 2.8, CI = 1.5-5.1) (Brenner, Betthausen, et al., 2011), and suicidal ideations among OIF/OEF veterans, adjusted OR = 4.45, CI = 2.58-7.67 (Jakupcak, et al., 2009). PTSD is a risk factor for suicide among Vietnam veterans compared to the general population, SMR = 6.74, CI = 4.40-9.87 (Kang & Bullman, 2009). Contradictory findings were reported by Desai, et al., (2005); this study, which was comprised solely of veterans who had received VHA psychiatric inpatient care from 1994 to 1998 (N = 121,933), found that suicide rates were lower among patients with PTSD, when compared to patients without PTSD (suicide rate per 10,000 person years= 29.20 vs. 44.54 respectively). Another contradictory finding was reported by investigators studying depressed veterans (N = 807,694) and the association between suicide rates and psychiatric comorbidities with depression. In this study, a diagnosis of depression and PTSD was associated with lower rate of suicide, especially in older veterans, compared to depressed veterans without PTSD, aged 18-44 years: HR = 0.80, CI = 0.58-1.01; aged 45-64 years: HR = 0.66, CI = 0.44-0.99 (Zivin, et al., 2007).

Substance use. The term “substance use” includes the states of substance dependence and substance abuse. Substance abuse is characterized by “a maladaptive pattern of substance use manifested by the recurrent and significant adverse consequences related to the repeated use of substances” (American Psychiatric Association, 2000). Substance dependence is characterized by

“a cluster of cognitive, behavioral, and physiological symptoms indicating that the individual continues substance use despite significant substance related problems” (American Psychiatric Association, 2000). According to the DSM-IV-TR, there are eleven designated classes of pharmacological agents that comprise “substances”: alcohol; amphetamines or similarly acting agents; caffeine; cannabis; cocaine; hallucinogens; inhalants; nicotine; opioids; phencyclidine (PCP) or similar agents; and a group that includes sedatives, hypnotics and anxiolytics.

Many studies do not differentiate between substance abuse and substance dependence. The terms “substance use”, “substance use disorder”, or “substance misuse” are used to refer to syndromes of abuse and dependence. At times, alcohol use was analyzed separately from other substance use. Arguably, in compressing all types of substance use, one loses the independent effects of one substance on the risk of suicidal SDV, compared to other substances.

For veterans with depression, the suicide rate for those with substance use disorders is higher compared to veterans without substance use (128.27 vs. 76.48 per 100,000 person years) (Ilgen, et al., 2009). One study investigated the incidence of self-reported suicide attempts during a follow up interview after receiving VA treatment for a substance use disorder (N = 8,807). Of these veterans, four percent (n = 314) reported a suicide attempt within 30 days of the follow-up interview. Veterans’ reports of a suicide attempt were associated with more days of alcohol problems, or more years of lifetime cocaine use; they were less likely to report a suicide attempt if they had participated in more days of a substance use treatment program. For these patients, a measure of psychiatric treatment received during the observation period was not associated with a suicide attempt (Ilgen, Harris, Moos, & Tiet, 2007).

Few studies have examined the impact of substance use on the repetition of suicide behavior. In a multi-center cohort study, investigators reported both unadjusted, HR = 1.49, CI = 1.34-1.66, and adjusted HR = 1.3, CI = 1.16-1.45, hazard ratios in describing the association between alcohol misuse and repetition of suicide behavior. Slight attenuation was observed after adjusting for history of prior self-harm, suicide intent, methods of self-harm, hallucinations,

current psychiatric treatment and unemployment. In this study, alcohol misuse was defined as “harmful use or consumed more than seven units daily” (Kapur, et al., 2006).

Illness severity and comorbidity. Objective measures of severity of psychiatric diagnoses have not proven effective in distinguishing between those at risk for fatal/non-fatal suicide behavior, and those who are not (Mann, 1998; Mann, et al., 1999). Objective measures of traits, such as impulsivity and aggression, and subjective measures of depression, are more reliable predictors (Mann, et al., 1999). However, the presence of impulsive and aggressive traits is not typically available from large administrative data sources.

Variation in illness severity and co-morbidity potentially contributes to variation in outcomes, independent of the associations under investigation. Therefore, adjustment for case mix is an essential component of any observational study, where random allocation may not be indicated or possible (Kane, 2006). The assessment of comorbidity and severity is essential to make comparisons among practitioners, practice settings, or hospital units. Many tools have been designed for accounting for variation in patient characteristics, especially variation attributable to diagnoses or disease severity. Selected indices of disease-related variables are designed for use with large administrative data sets, and will be discussed in the following paragraphs.

The Charlson and Elixhauser comorbidity indices are frequently used in studies with large administrative databases. Both of these methods use ICD-9-CM codes to determine the presence of selected comorbid medical and psychiatric conditions. The Charlson index (Charlson, Pompei, Ales, & MacKenzie, 1987) is a weighted index designed to classify comorbid conditions to identify risk of mortality in longitudinal studies. It was initially developed to determine relative risk of one-year mortality on a sample of patients diagnosed with breast cancer (N = 559). This tool has been applied to other clinical populations. The Elixhauser comorbidity index was validated with a broader clinical population, (all adult, nonmaternal inpatients from 438 acute care hospitals, N = 1,779,167) and explores multiple prognostic endpoints: mortality, hospital charges, and hospital length of stay (Elixhauser, Steiner, Harris, & Coffey, 1998). It is not clear

whether the Elixhauser index included psychiatric admissions in its validation.

There are limitations to the use of the Charlson and Elixhauser indices, which may preclude their use in an inquiry related to psychiatric populations. First, neither index was validated in a psychiatric population. The frame of reference for the comorbidity is the treatment of a primary *medical* condition. This approach would not capture the impact of medical comorbidities for patients whose primary diagnosis is psychiatric in nature. Compared to the Charlson index, which includes one psychiatric comorbidity (depression), the Elixhauser index broadens the scope of psychiatric co-morbidities to include depression, psychoses, alcohol and drug abuse.

Second, the prognostic endpoint for the Charlson index, one-year mortality, is not applicable to the proposed inquiry, or any inquiry related to suicide behavior. The methods used to identify the conditions listed in the Charlson index have not been applied to predict suicide mortality. The Elixhauser index demonstrates predictive validity for three prognostic endpoints: in-hospital mortality, hospital length of stay, and hospital charges. These endpoints are relevant to many models investigating hospital utilization outcomes. However, the validity of these endpoints remains questionable in a model related to psychiatric utilization.

In spite of these limitations, the association between physical illness and suicide behavior should be acknowledged. Certain physical illnesses are associated with an increased risk for self-directed violence. The impact of traumatic brain injury (TBI) is associated with an increased risk of suicidal SDV in civilian and military populations (Brenner, Betthausen, et al., 2011; Brenner, Ignacio, & Blow, 2011; Simpson & Tate, 2007). The presence of other medical conditions, such as multiple sclerosis, epilepsy, cancer, spinal cord injury, HIV/AIDS, peptic ulcer disease, autoimmune disorders, diabetes mellitus, kidney disease, and terminal illness confer an increased risk of suicide (Goldblatt, M. J. in (Maris, et al., 2000).

Only one study related to the risk associated with suicide behavior utilized the Charlson to adjust for comorbidities (Zivin, et al., 2007). In this study, the Charlson score was

dichotomized as zero or greater than/equal to one. There was no difference in suicide rates between these two groups. The sample was comprised of individuals receiving treatment for depression in the VHA system. The authors did not explain if they included the depression diagnosis in the Charlson index.

Although many investigations have sought to establish a risk model for fatal suicide behavior, our ability to predict this cause of mortality is poor (Haney, et al., 2012). On the other hand, it is feasible to anticipate healthcare utilization patterns in psychiatric populations. A psychiatric “case-mix” system (Psy-CMS) was developed to (1) characterize the disease burden of patients with mental health and substance use disorders and (2) predict healthcare utilization and costs (Sloan, et al., 2006). Predictive validity was established in VA patients with mental health and/or substance use diagnoses, with the aim of predicting three outcomes: cost, outpatient mental health and substance abuse encounters, and inpatient/residential mental health or substance use bed days of care. This model does not predict mortality. However, the methods for describing case mix are applicable to study of healthcare utilization of veterans with psychiatric conditions. This method is essential in any model describing potential associations between utilization of protective treatments and the delivery of treatment essentials for this population.

Prior suicide behavior. The strongest predictor of fatal and non-fatal suicide behavior, after a psychiatric hospitalization, is a history of recurrent suicide behavior (D. Owens, et al., 2002). This association may have an impact on the timing of fatal post-discharge suicide. One study found that among patients with a recent psychiatric discharge, patients with a history of suicide behavior were 13 times more likely to be associated with a fatal suicide outcome (vs. no suicide) in the first three months after discharge, OR = 13.8, CI = 3.6-52.8. Among those who completed suicide after discharge, those with a history of SDV were five times more likely to be associated with an early suicide outcome compared to late suicides (between three months up to 12 years), OR = 5.1, CI = 1.3-19.9 (McKenzie & Wurr, 2001). This suggests that patients with a

history of recurrent suicide behavior would benefit most from immediate and intense psychiatric aftercare.

The extent of historical suicide behavior should be considered when anticipating treatment for this population. Some evidence demonstrates that patients with a history of non-fatal suicide behavior respond differently to interventions compared to those who engaged in suicide behavior for the first time. Investigators found that patients with a history of recurrent suicide behavior were almost twice as likely to repeat self harm, compared to repeaters who did not receive the a crisis telephone consultation intervention, OR = 1.85, CI = 1.14-3.03. In the same study, a non-significant protective effect was noted in the “first timer” group, compared to other “first timers” who did not receive the intervention, OR = 0.64, CI = 0.34-1.22 (Evans, Morgan, Hayward, & Gunnell, 1999). This suggests that recurrent suicide behavior was not amenable to improvement, but that nascent suicide behavior had more potential to respond to the intervention.

In a pooled analysis of three studies (NICE & National Institute for Health and Clinical Excellence, 2011), with approximately 5000 participants, a history of previous self-harm was associated with a higher risk of repetition, OR = 2.7, CI = 2.13-3.42 (Colman, et al., 2004; Johnston, et al., 2006; McAuliffe, Corcoran, Hickey, & McLeavey, 2008). Attenuation of the association between prior suicide behavior and future repetition was found in two of these studies (Colman, et al., 2004; McAuliffe, et al., 2008). The pooled unadjusted odds ratio was 5.86, CI = 3.23-10.65. After adjusting for depression, age and gender, the adjusted odds ratio decreased to 3.81, CI = 1.98-7.35.

The repetition rate for self-harm during follow-up was as follows; 25% over one to two years, (Colman, et al., 2004), 11% in six months (Johnston, et al., 2006) and 30% in 12 months (McAuliffe, et al., 2008). The majority of participants in these studies had a prior history of self-harm: 66% (N = 507) (Colman, et al., 2004), 55% (N = 4743) (Johnston, et al., 2006), and 59% (N = 152) (McAuliffe, et al., 2008).

A multi-center cohort study (N = 9213) reports that prior SDV was associated with a two-fold risk in repetition for suicide behavior in the following 12 months (HR = 2.11, CI = 1.87-2.40; the multivariate model also contained employment status, suicidal intent, method of self harm, current psychiatric treatment, alcohol misuse and the presence of hallucinations. Fifty-one percent of the sample experienced a prior history of suicide behavior (Kapur, et al., 2006).

Utilization of Healthcare Services

Veterans who use VHA services demonstrate a higher suicide rate (suicide SMR ranged from 1.42-1.66 for VHA users) compared to the general US population (Blow, et al., 2012). Utilization of VHA services and risk for suicide vary by age. Among male veterans aged 30 years and older, an increased risk for suicide is associated with utilization of VHA services. Veterans under the age of 30 demonstrate a different pattern: suicide rates are lower among male VHA utilizers than among non-utilizers in this age group (I. R. Katz, et al., 2012).

The association between recent psychiatric hospitalization and fatal suicide behavior has been studied extensively. Several retrospective observational studies have identified cohorts of discharged psychiatric patients and used vital statistics records to identify their causes of death. These inquires demonstrate that that highest rates of suicide deaths occur immediately after psychiatric discharge (Appleby, et al., 1999; Hunt, et al., 2009). These findings have been replicated in studies of VA psychiatric discharges (Desai, et al., 2005; Valenstein, et al., 2009).

Fewer studies have investigated the risk of post-discharge suicide for patients admitted for non-fatal suicide behavior. Identification of fatal suicide behavior is challenged by limitations in reliable vital statistics information (i.e. confirmation of suicide as the cause of death). Detection of non-fatal suicide behavior is further complicated by the unknown proportion of people who repeat suicide behavior and do not present to the hospital. For those that do, there can be inadequate data collection in the hospital setting. In a meta-analysis of studies investigating fatal and non-fatal repetition of suicide behavior, estimates of fatal repetition of suicide behavior range from 1.6% in the first year, to 3.4% by nine years, and 6.7% beyond nine years. Estimates

of non-fatal repetition range from 15-16% in the first year following hospitalization for suicide behavior, rising to 20-25% over the following years (D. Owens, et al., 2002). These estimates are derived from studies conducted primarily in Europe, Australia and New Zealand; therefore, these estimates may not be generalizable to the US population. A history of utilizing psychiatric services increases the risk of repetition of suicide behavior. In a pooled unadjusted analysis of two studies (Johnsson, et al., 1996; D Owens, et al., 1994), the experience of prior inpatient and outpatient psychiatric care more than tripled the likelihood of repetition of non-fatal suicide behavior, OR = 3.46, CI = 2.26-5.3. These studies did not adjust for confounders, and treatment for any one psychiatric diagnosis was not specified. History of psychiatric treatment was ascertained from local psychiatric services' case register (D Owens, et al., 1994) and from psychiatric records of psychiatric hospital (Johnsson, et al., 1996).

In females, current psychiatric treatment increased the likelihood of suicide behavior repetition for those with one to three repetitions during the observation period, adjusted OR = 1.67, CI = 1.14-2.44; this association was stronger in females with more than four repetitions, adjusted OR = 3.05, CI = 1.56-5.95 (Haw, et al., 2007). A separate study reports similar findings after adjusting for confounding variables; current psychiatric treatment increased the risk for repetition for male and female patients, HR = 1.42, CI = 1.27-1.59 (Kapur, et al., 2006).

Limitations surrounding the study of fatal and non-fatal suicide behaviors relate to population sample characteristics, unadjusted analysis of risk factors (precluding ability to detect confounding effects of other risk factors), and the use of suicide attempts as an outcome (Haney, et al., 2012). In the study of veteran populations, samples were derived from registries defined by a particular diagnosis such as depression (Valenstein, et al., 2009) or utilization of inpatient psychiatric services (Desai, et al., 2005). The heterogeneity of these samples precludes adequate comparison across studies, even within veteran populations. There are weaknesses associated with the use of suicide attempts as an outcome variable. Self-reports of past suicide behaviors are unreliable, as patients can distort the frequency and severity of past attempts (Silverman, et al.,

2007a). Objective determinations of suicide attempts rely upon the accuracy of provider assessment and documentation, which can be variable.

Organizational Factors and Suicide Behavior

There is a paucity of literature regarding healthcare organizational level factors associated with suicide risk. This is surprising since many organizational factors related to other causes of patient mortality have been investigated. Programs that have demonstrated statistically significant reductions in their suicide rates attribute much of their success to widespread organizational and cultural changes (Coffey, 2007; Knox, Litts, Talcott, Feig, & Caine, 2003). One study considered VHA facility-level characteristics and delivery-of-care variables among risks for fatal suicide behavior in veterans (Desai, et al., 2005). Although facility level characteristics were not associated with risk for fatal suicide behavior (i.e. facility size, funding allocation, or academic affiliation), a measure of continuity of post-discharge care indicated an increased risk of fatal suicide behavior with “poorer continuity”. These findings suggest that there are intermediate organizational risk factors for suicide, such as poor continuity of care or reduced access to mental health services, where the locus of control for modification lies with the healthcare organization and not the patient.

Another clue regarding the potential impact of healthcare systems on suicide risk is found with patient-level utilization patterns. Many suicides occur after recent contact with a healthcare system, indicating there may be opportunities for intervention by the healthcare system to reduce suicide risk (Dennesson, et al., 2010). As noted above, individuals who complete suicide demonstrate various patterns of healthcare utilization. These patterns may provide some insight into the healthcare needs of individuals at high risk for suicide.

Preventive Treatment

The distinction between prevention and treatment is dependent upon one’s point of reference along the trajectory of illness, and the ultimate goal of prevention efforts. If the goal is to prevent any suicide behavior, the point of reference of the healthcare system is usually situated

after the opportunity for prevention has passed. However, if the goal were to prevent mortality from suicide, all interventions would be considered preventive. For example, once a patient has presented to the Emergency Department after a suicide attempt, the goal is to treat the immediate sequelae of the suicide attempt. However, many interventions, delivered after that time, are designed to *prevent* further injury or death from future suicide behavior. To accommodate the preventive nature of these treatments, they will heretofore be referred to as “preventive treatments”.

I have conceptualized preventive treatment modalities according to Kane’s model for treatments and outcomes (Kane, 2006). Three treatment modalities are described: medications, procedures, and education/counseling. I will present these treatments in the following paragraphs, as they relate to evidence for mitigating the risk for suicide behavior.

Medications. Medications “include everything that a patient physically takes into his or her system that has some causal, nontrivial relationship to health status” (Kane, 2006).

Medication classes investigated for reducing risk of suicidal SDV include antidepressants, antipsychotic medications, and mood-stabilizers. Pharmacotherapy results are based on few studies with limited sample sizes, some methodological quality concerns, and short-term follow-up assessment periods. In many studies, suicide rates were too low to detect differences between treatment groups (O’Neil, et al., 2012). Despite low strength evidence for pharmacotherapy in reducing the risk for fatal suicide behavior, assertive treatment of an underlying psychiatric condition, especially depression and schizophrenia, is recommended as a suicide prevention strategy.

Procedures. Procedures include anything physically done to the patient. There are few “procedures” used to directly treat psychiatric conditions. The only procedure routinely performed in psychiatry is electroconvulsive therapy (ECT). ECT has shown no demonstrable effect on suicide behavior (Read & Bentall, 2010) , and will not be discussed in this review.

Counseling and education. The counseling and education of patients refer to “an information exchange between the patient and clinician for a therapeutic purpose...this category also includes psychological or psychiatric counseling in which the information exchange itself is therapeutic” (Kane, 2006). In this category, preventive treatments include psychotherapeutic interventions. A systematic review of suicide prevention interventions reports overall insufficient to low strength of evidence for the effectiveness of psychotherapy. Studies were characterized by small sample sizes, short-term follow-assessment periods, and methodological flaws (such as lack of blinding procedures, non-randomization, selection bias and differing drop-out rates among groups). Again, low rates of suicide precluded sufficient power to detect differences between treatment groups (O'Neil, et al., 2012).

Previously published reviews on psychotherapeutic interventions for the prevention of suicide behavior present mixed findings related to cognitive therapies, positive findings related to Dialectical Behavior Therapy for people with Borderline Personality Disorder, positive findings for interpersonal psychotherapy, null findings for outpatient day hospitalization, positive findings for problem-solving therapy, positive findings for psychoanalytically oriented partial day hospitalization for people with Borderline Personality Disorder, and positive findings for transference-focused psychotherapy. Investigations of Attachment-Based Family Therapy vs. Enhanced Usual Care, Collaborative Assessment and Management of Suicidality vs. Enhanced Care as Usual, and skills based intervention vs. a supportive therapy control condition did not use sufficient methodological rigor to support conclusions about their effectiveness (O'Neil, et al., 2012).

Care Continuity. Kane's conceptualization of treatment does not adequately capture activities that could be described as “care continuity”. This additional conceptualization of treatment captures activities that would not be classified as psychological or psychiatric counseling. Rather, activities that support care continuity may enhance referral and follow-up services designed to reduce the risk of suicide behavior. These activities may not directly involve

the patient, and therefore do not fit Kane's conceptualization of treatment with education and counseling.

The concept of care continuity is often discussed in the context of broader concepts of care coordination and care transitions. There are many definitions for care continuity, and consensus on any one definition remains elusive. One systematic review organizes continuity of care into three dimensions: informational continuity, or the "use of information on past events and personal circumstances to make current care appropriate for each individual;" interpersonal continuity, defined as an "ongoing therapeutic relationship between a patient and one or more clinicians;" and management continuity, defined as a "consistent and coherent approach to management of a health condition that is responsive to patient's changing needs." Continuity of care represents an individual patient's experience of coordination over time with either a single clinician or with multiple clinicians (i.e., the extent to which the appropriate care is perceived to occur at the right time and in the right order) (Reid, Haggerty, & McKendry, 2002).

Patients who receive psychiatric care are more likely to receive complex care and services across different areas, increasing the risk for fragmented care. This is especially relevant to the continuity of care surrounding the transition between levels of care, such as from inpatient to outpatient care. Psychiatric patients who do not complete an outpatient appointment after discharge are more than twice as likely to experience a one-year readmission, compared to patients who complete a post-discharge outpatient appointment (Nelson, Maruish, & Axler, 2000). The likelihood of completing the first post-discharge appointment increases when patients' discharge plans are successfully communicated between inpatient and outpatient providers (Boyer, McAlpine, Pottick, & Olsson, 2000; Steffen, Kusters, Becker, & Puschner, 2009).

A systematic review of suicide prevention referral/follow-up services reports insufficient to low-strength evidence for the effectiveness of any referral and follow-up services in the prevention of suicide behavior (O'Neil, et al., 2012). Specifically, the reviewed studies yielded

positive results from studies on case management/care coordination and 24-hour contact with a mental health professional. Mixed findings came from studies on emergency room contact cards and postal contact. Null findings were associated with intensive psychosocial follow-up, telephone follow-up, and video education plus family therapy. Limitations included small sample sizes, methodological flaws, and short follow-up periods.

The VHA suicide prevention program has not been formally assessed for its effect on prevention of suicide behavior. This program is characterized by a bundle of activities, few of which would be considered “treatment” according to Kane’s nosology. The primary function of the suicide prevention program is to connect veterans, who demonstrate a high risk for suicide, with indicated treatments with the goal of attenuating the suicide risk. In and of itself, the Suicide Prevention program is not a treatment, however variation in the implementation of the suicide prevention program, and its activities related to informational and management continuity, may have an impact on aspects of the received treatment, and potentially affect outcomes of that treatment. Other examples of care continuity include referral to specialty services (to address underlying risk factors for suicide), arranging aftercare appointments according to the patient’s preferences, and strategies for ensuring referral follow-through or attendance to these services. Arguably, variation in care continuity activities likely affects the likelihood of exposure to the indicated treatments.

Treatment Essentials

Treatment Essentials refer to aspects of treatment that contribute to variability in patient outcomes. These essentials are derived from Kane conceptualization of treatment variation, which are ideal for comparing the effectiveness of treatments on patient outcomes. These include provider characteristics, setting, and the timing, duration, and intensity of treatment. I have added “implementation” to this conceptualization, since variation in fidelity to the implementation of the intervention will contribute to variation in patient outcomes (Bellg, et al., 2004).

Provider Characteristics. There is some evidence on the association between provider characteristics and outcomes related to suicide. Associations between psychiatric outcomes and provider gender, for example, are inconsistent, however some differences in outcomes that are attributable to gender could be related to differences in prescribing habits (Abe, Moriya, Ikeda, Kuroda, & Hagihara, 2011). Age (as a proxy for clinical experience) and its association with patient outcomes have been investigated in psychiatry and other branches of medicine. Two studies demonstrate that inpatient treatment by younger psychiatrists was associated with improvements in patient outcomes, such as a reduced risk of post-discharge suicide (Lee & Lin, 2009) or improved functional status (Abe, et al., 2011). One explanation is that older providers may rely more on their experience than current advances in knowledge, compared to younger providers. Another explanation is that older providers, perceived to be more experienced and knowledgeable, receive more difficult cases, characterized by more severe symptomatology and poorer baseline functioning.

Based on these findings related to age and patient outcomes, it is reasonable to consider provider characteristics as variable of interest in any study examining care delivery to patients with a high risk of suicide. Time since formal training may be a more accurate proxy of experience, compared to age, to impart variation in experience of individual providers. Frequent turnover of residents in inpatient and outpatient settings may translate to unfamiliarity with non-clinical procedures (entering a referral or scheduling an appointment) and capital inputs (no access to voicemail, email), which impede direct communication with the outpatient provider.

Setting. Variation in the setting of care delivery has a potential impact on health-related outcomes (Kane, 2006). Inpatient and outpatient care settings are characterized by size, staffing, teaching status, and proximity to the patient's residence. Investigators have determined an association between geographic characteristics, proximity to VHA facilities and the risk for fatal suicide behavior (Desai, et al., 2005; McCarthy, et al., 2012). In one study, academic affiliation

and facility size were not associated with an increased risk of suicide for recently discharge psychiatric VHA patients (Desai, et al., 2005).

Intensity, timing, & duration. Differences in intensity, timing and duration of a treatment, contribute to variation in outcomes. Intensity refers to the amount of treatment per unit. For example, in the case of the patient who recently attempted suicide, an inquiry related to treatment intensity might ask whether several encounters in a short period of time, results in comparable outcomes to the same number of encounters spread out over a longer time period. Timing, in this case refers to when the preventive treatment is delivered, relative to the discharge. Duration refers to the amount of time over which a preventive treatment is consistently delivered. Questions related to duration relate to how long an intervention has to be delivered to achieve the desired effect. For example, a postcard study delivered the intervention in varying intervals over five years (Motto & Bostrom, 2001); further comparison might examine whether the same intervention delivered over a shorter period of time results in similar efficacy. Conversely, the inverse of duration, or the observation of gaps/interruptions in treatment, would also affect the outcome of the treatment under study.

Due to the high rates of suicide that occur immediately after discharge, it is hypothesized that the timing of service delivery is important to prevent repetition of suicide behavior. Recommendations for the timing of psychiatric aftercare for patients who were recently hospitalized for a suicide attempt have not been rigorously evaluated. There is an assumption, based on the disproportionate rates of suicide in the days and weeks after discharge that an intervention delivered during this time could potentially thwart future suicide behavior. The timing of post-discharge psychiatric aftercare is important to preventing thirty-day psychiatric re-admissions, especially if that care was delivered within five days of discharge; one study empirically supported this hypothesis by demonstrating that recently discharged patients who received aftercare within five days of discharge were less likely to experience a psychiatric re-admission within thirty days, OR = 0.71, CI = 0.56-0.79. Additionally, exposure to increasing

numbers of unique providers (a measure of discontinuity) doubled the risk of thirty-day readmission, OR=2.18, CI = 1.62-2.81 (Huff, 2000).

The unexpected association between aftercare appointment frequency and completed suicide precludes the development of sound recommendations for follow-up care after discharge from psychiatric hospitalization. The risk for re-admission (Huff, 2000) or suicide (Large, Sharma, Cannon, Ryan, & Nielssen, 2011) after psychiatric hospitalization is reduced as the number of post-discharge appointment *decreases*. Huff risk adjusted for severity (psychosis vs. no psychosis) but did not control for diagnosis.

Few studies have been attempted to examine the effect of provider exposure on the risk for repeat suicide behavior. The studies that have been conducted provide mixed results. Tohorst (1987) randomized recently discharged psychiatric patients to receive aftercare from the same clinician (experimental) who assessed them in the hospital, or to a new clinician (control). Surprisingly, the group who did not change clinicians, (i.e. those who experienced enhanced continuity of care) experienced a statistically significantly higher rate of repeat suicide behavior compared to the group that had a change in clinician, OR = 3.70, CI = 1.13-12.09. However, those in the continuity group were almost three times more likely to attend at least one outpatient treatment session, compared to the group who changed clinicians, OR = 2.75, CI = 1.37-5.52 (Torhorst, et al., 1987).

Conceptual Model and Analytical Framework

The concepts described in the previous sections do not currently exist in a single conceptual model. Therefore, I developed a nascent model (Figure 1) and have described it in the following paragraphs. This model includes the aforementioned concepts, and describes the directionality of potential associations among these concepts. From this model, I derived an analytical framework for the proposed inquiry, which highlights the concepts relevant to the

prevention of suicide behavior from the perspective of a healthcare setting (Figure 2). This is described in later paragraphs.

The conceptual model in Figure 1 depicts the various points of intervention for the person who engages in non-fatal suicide behavior (termed “non-fatal self-directed violence” in this model). It starts with the act of non-fatal suicidal self-directed violence. This act is driven by the presence of modifiable and fixed risk factors, as demonstrated by unidirectional arrows from the boxes labeled “Fixed Risk Factors” and “Modifiable Risk Factors” to the box labeled “Non-Fatal Suicidal Self-Directed Violence”. This represents the association between risk factors and the incidence of non-fatal suicidal self-directed violence.

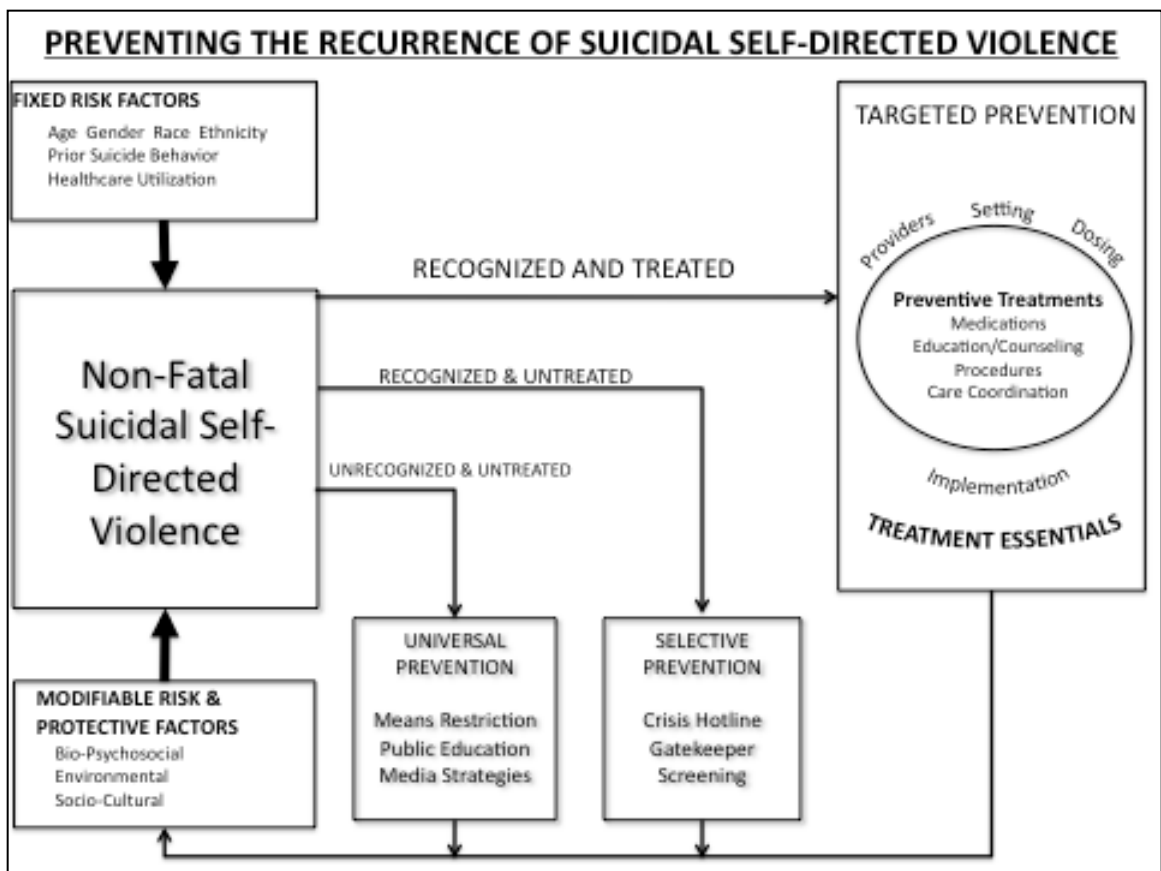


Figure 1. Conceptual Model for the Treatment and Prevention of Recurrent Suicide Behavior

Once an act of non-fatal suicidal self-directed violence (SDV) behavior occurs, one of three outcomes is possible: the behavior is 1) unrecognized and untreated, 2) recognized and

untreated, 3) recognized and treated. Each of these outcomes is met with a specified level of prevention intervention. Non-fatal suicidal SDV that is “un-recognized and untreated” does not reach the healthcare system and is not exposed to targeted prevention efforts. Non-fatal suicidal SDV that follows this trajectory, represented by a unidirectional arrow, is exposed to universal prevention interventions for suicidal SDV. These interventions include policies that affect means restriction (such as gun control policies), public education about suicidal SDV, and media strategies that guide the reporting of fatal suicidal SDV in the community.

Suicidal SDV that is “recognized and untreated” is exposed to selective prevention interventions. These suicidal SDV behaviors may be recognized by a crisis line worker, a “gatekeeper” (a community member trained to recognize warning signs for suicidal SDV) or as a result of screening process (such as the screening provided when a service member is returning home from a combat zone). These selective interventions are not designed to treat acute suicidal SDV, but to provide resources to address underlying risk factors for suicidal SDV. Recognized and untreated suicidal SDV does not come into contact with the healthcare system for treatment.

The third potential outcome of non-fatal suicidal SDV is recognition and treatment of the behavior via “targeted prevention” interventions. The provision and ongoing management of these interventions are the domain of the healthcare organization. Within the area of targeted prevention exist the concepts of “preventive treatments” and “treatment essentials”, which were described in earlier sections.

From each of the prevention areas, an arrow follows a unidirectional trajectory back to “modifiable risk factors”. This represents the potential impact of these prevention interventions on risk factors for future non-fatal suicidal SDV. There is an intentional absence of indication related to whether these interventions increase or decrease the risk of future non-fatal suicidal SDV. This is due to paucity of consistent evidence in this area, which is marked by mixed findings especially related to the impact of hospitalization on future non-fatal suicidal SDV.

The variables of interest for this study are organized according to Andersen’s model of health behavior (Andersen, 1995). This framework was selected to correspond with the conceptual model described in Figure 1, which depicts the various opportunities of intervention for the patient who has demonstrated non-fatal suicidal SDV. Andersen’s framework describes a multi-directional relationship among three concepts: determinants of health behavior, the demonstration of health behavior, and health outcomes (Figure 2).

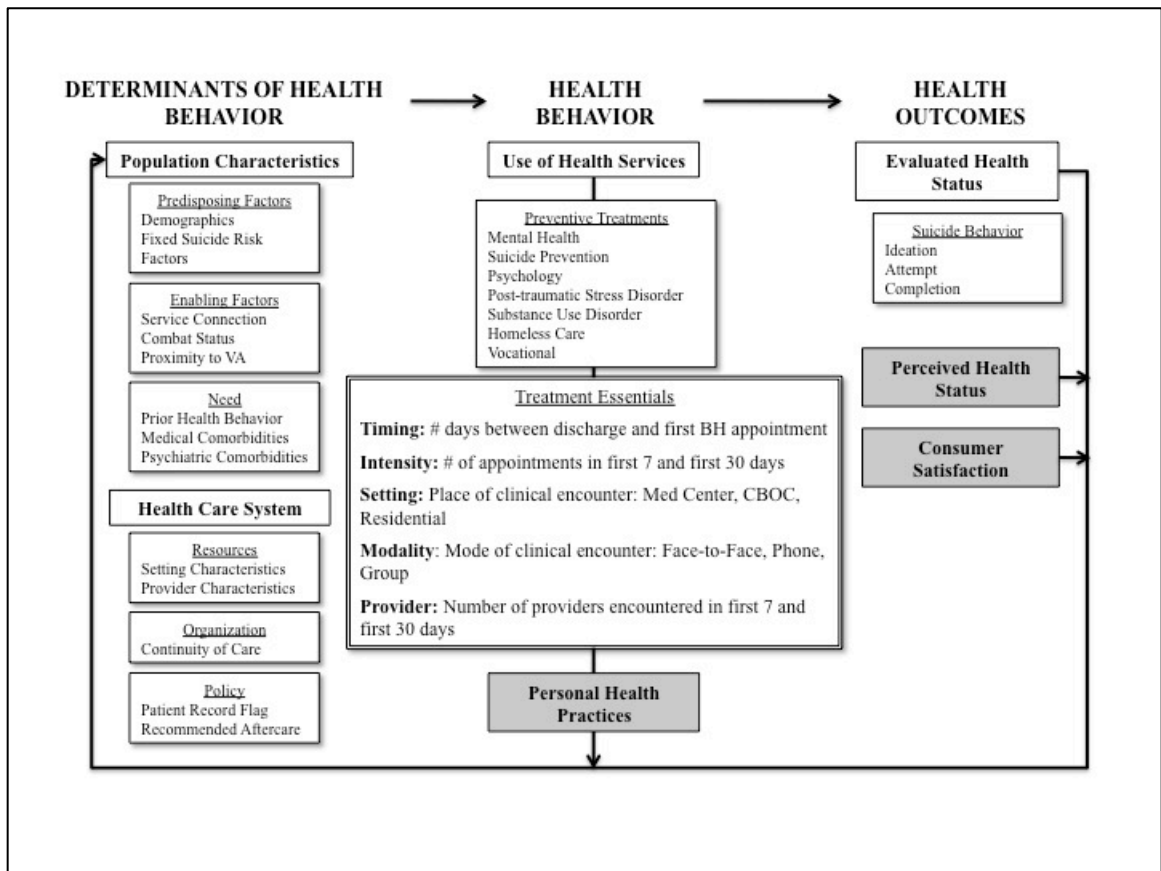


Figure 2. Andersen’s Model of Health Behavior, Adapted for the Management of Suicide Behavior. Note. Adapted from “Societal and Individual Determinants of Medical Care Utilization in the United States” by R. Andersen and J. F. Newman, 2005, *The Milbank Quarterly*, 83(4). Preventive treatments and treatment essentials adapted from “Understanding Health Care Outcomes Research” by R. L. Kane, 2006.

This relationship begins with determinants of health behavior, which exist within populations, and within organizations. In populations, these determinants include predisposing factors with low mutability (e.g. demographic characteristics), enabling factors with high

mutability such as availability of health insurance or benefits, and factors describing need, or the immediate reason for care to take place. The construct of “need” is characterized, in part, by the presence of illnesses, which require treatment. “Need” may also be informed by experiences prior health behavior. For example, for the patient experiences multiple hospitalizations in a psychiatric crisis, this patient may perceive that he or she “needs” to be hospitalized in order to address the crisis, and may not be open to seeking less restrictive alternatives for care. Therefore, the patient engages in health behavior that corresponds with the perceived need.

This framework allows for the inclusion of concepts related to patient level risk factors for suicide (in population characteristics) and characteristics of treatment, as described by Kane (2006): timing, duration, intensity, provider and setting. For this adaptation of Andersen’s framework, concepts related to information continuity (activation of a Category II Patient Record Flag: High Risk of Suicide) and management plan continuity (initiation of specialty behavioral health consults) are included in organizational determinants of health behavior.

The second concept in this framework describes the health behavior. Health behavior refers to the patient’s engagement in personal health practices, and the use of health care services. The proposed study will focus on the use of behavioral health services: Mental Health, Suicide Prevention, Substance Use, Psychology, PTSD, Homeless Care and Vocational. Here, the inclusion of Kane’s factors of treatment: timing, duration and intensity, is appropriate, since these factors are theorized to affect patient outcomes. Andersen’s framework depicts the multi-directional impact of health behavior. Here, the effect of health behavior impacts health outcomes, but also impacts determinants of health. For example, if the use of healthcare services, such as group therapy, targets suicidal ideations, then the ideal health outcome of this service is a reduction in suicidal ideations. However, if the content of the group therapy related skills in building a support system, this treatment may have an impact on the enabling factors (such as family support) that precede the health behavior.

The third concept in Andersen's framework describes health outcomes. The health outcome of the proposed study is the repetition of a suicide attempt. A suicide attempt is not only a health outcome, but also a predisposing patient characteristic, which contributes to the patients overall risk of suicide. This is represented in Anderson's framework, with an arrow originating at the health outcome, and feeding back into the population determinants of health behavior.

The adapted framework corresponds to the aims of this study. These aims will determine (1) associations among population characteristics, health service utilization, and the outcome of interest: suicide attempt repetition, and (2) associations between organization factors of continuity and the utilization of healthcare services.

This framework proposes a multi-directional relationship, depicted by the arrow leading from "delivered preventive treatments" and "outcome" of suicide attempt or suicide completion. This framework also considers the possibility that variation in treatment essentials can contribute to variation in the outcome of suicide behavior, independent of the delivery of the preventive treatments. Investigation of these relationships has the potential to uncover previously unmeasured effects of care delivery on suicidal self-directed violence in veteran populations.

CHAPTER III

METHODS

The objectives of this study were twofold. First, I sought to describe associations between characteristics of the delivery of mental health care to veterans who were recently hospitalized for a suicide attempt and the likelihood of a repeat suicide attempt. These characteristics included the timing, duration, intensity, provider, and setting of treatment. Second, the investigator determined whether there were factors—during or proximal to the initial hospital admission—that increased the likelihood of linkage to specialty mental health treatment.

In the following sections, I will describe the aims, methods and analytical strategy employed in this study. I will also discuss my strategy of managing the rare occurrence of my outcome of interest: reattempt of suicide within six months of an index suicide attempt.

Research Aims and Design

This study has the following specific aims:

Aim One: for patients who did and did not experience a suicide re-attempt in six months after the index attempt, describe the setting, provider, type, timing, duration and intensity of behavioral health care to veterans recently hospitalized for a suicide attempt.

Aim Two: describe associations between factors related to patient characteristics, prior health utilization, index admission and the timing of post-discharge behavioral health care.

A retrospective cohort design was employed to examine patient groups who experienced the outcome of interest and those who did not. This cohort was selected based on the shared experience of hospitalization for a suicide attempt. This cohort was retrospectively observed for

six months after discharge from the index hospitalization. During the six-month observation period there were two outcomes of interest. The outcome of interest for Aim One is the repetition of a suicide attempt, and the exposure is the delivery of a specialty mental health treatment. The outcome of interest for Aim Two was the completion of an initial behavioral health specialty appointment; the exposures of interest were the characteristics of the index admission: High Risk Flag activation, length of stay, consult initiation, and site transfer.

A retrospective single cohort design, with six months of longitudinal observation, was determined to be the best fit for this type of inquiry, due to the efficiency and relatively low cost, compared to a prospective study design. A single cohort design was selected instead of a design that includes a comparison cohort. The patients included in the cohort were similar in that they were hospitalized for a suicide attempt, and as a result, exposed to similar recommendations for behavioral health treatment after discharge. These recommendations did not apply to other cohorts hospitalized for other reasons.

Description of Research Setting

The research setting was all VA facilities, Outpatient Clinics, and Community Based Outpatient Clinics (CBOCs) in the Veterans Integrated Service Network (VISN) 9, where patients received behavioral health care after hospitalization for a suicide attempt. This network encompasses six VA medical centers and approximately sixty CBOCs. Five of the six medical center facilities offered psychiatric inpatient services and all six offered outpatient behavioral health services. The availability of these services in CBOCS was variable. Some facilities offered more intensive mental health services, such as residential treatment programs for Post Traumatic Stress Disorder (PTSD) and Substance Use Disorders (SUD).

The study of suicide re-attempts in a VA setting offered several opportunities for description that were not available in other healthcare settings. The VA is a nationally integrated

healthcare system with access to both inpatient and outpatient administrative data. The VA National Suicide Prevention program operates a registry of veteran suicide behavior, which can be drilled down to the VISN and facility levels. VISN 9 was targeted for study due to convenience to the investigator, who was employed by a VISN 9 facility.

Sample

The study sample was comprised of VISN 9 VA patients for whom a known suicide attempt occurred after 1/1/2009 and before 3/31/2012, and the suicide attempt resulted in a VA hospital admission. These patients were identified in the VA's registry of suicide behaviors: the Suicide Prevention Application Network (SPAN). All known suicide attempts and completions by VA patients were recorded in this registry. This data source is described in later sections of this chapter.

Nature and size of sample

The sample consisted of VA patients who were identified in SPAN as a "suicide attempt" between 1/1/2009 and 3/31/2012. The observation period for each veteran was six months after index discharge or until the next suicide event, whichever occurred sooner.

Only veterans, who were *hospitalized* for a suicide attempt, were included in the study. This strategy presumes that the severity of all attempts was high enough to warrant admission to an inpatient unit. In contrast, suicide attempts with other outcomes, such as outpatient treatment, indicated the possibility that the attempt was either not severe enough to require hospitalization, or represented a retroactive report of a prior attempt, from which the informant has fully recovered, and was not in acute crisis. Patients who were hospitalized for a suicide attempt were exposed to unique processes that were specific to the transition from the inpatient to outpatient setting.

Criteria for sample selection

Patients who are identified in SPAN to have demonstrated a suicide attempt between 1/1/2009 and 3/31/2012 were selected for screening. This surveillance process did not start in the VA until late 2008, so it was not possible to identify cases in this manner prior to 2009.

Cases were excluded if:

1. The index event was not identified as a suicide attempt
2. The index event did not result in hospital admission
3. The Veteran is under 18 years of age (this is highly unlikely since the required age for military service is 18 or older).

There were no exclusions based on sex, race, ethnicity, marital status, service connection, or diagnosis.

Methods for subject recruitment

Because cases were retrospectively selected from administrative data, subjects were not recruited for participation. The consent process was waived since this study involved no more than minimal risk to subjects. This study could not have been practicably carried out without a waiver of informed consent. Obtaining informed consent would have required locating each Veteran through phone or mail, which would not have been possible if the veteran had been deceased, institutionalized, homeless (and therefore not reachable by traditional means), or residing at an address that is not listed in the administrative data.

Strategies to ensure human subjects protection

This study did not involve direct patient contact, and was non-interventional. The primary risk to subjects in this retrospective study was a breach of data security, potentially compromising patient privacy and confidentiality. The consequences of a security breach, in an investigation of suicide behavior, had the potential for undue suffering of the patient, due to the stigma surrounding suicide behavior.

Investigators and associated personnel in the proposed study adhered to VA directives

regarding data security and privacy. They attended all required trainings and enacted precautionary measures to protect patient information. Data was stored on a VA research server, located in computer room D-03 at the VA Tennessee Valley Healthcare System (TVHS) facility in Nashville, TN. Data was not transmitted outside of the VA; only committee members with VA employee status or Without Compensation (WOC) status viewed the data. Upon study completion, the data was archived on this VA server, for a time period consistent with VA mandates.

A VISN 9 Data Agreement was completed to allow access to VA National and Local databases, and to ensure extra security for these data. This study was approved by the Institutional Review Board (IRB) at the VA TVHS (Nashville, TN) and at Vanderbilt University (Nashville, TN).

Description of Data Sources

This study used three data sources: the Suicide Prevention Application Network (SPAN), VA national databases and VA local databases. In the following paragraphs, I have described each data source and discuss their known limitations.

Suicide Prevention Application Network (SPAN)

SPAN is a national VA registry that was created by the VA Suicide Prevention Program in 2008. It is a surveillance tool that records veteran suicides and suicide behaviors in real time. Presently, there is no published literature describing the use of SPAN data for suicide research, or testing the reliability of data entry, or the validity of entries. Preliminary research is currently underway at the VA Suicide Prevention Center of Excellence in Canandaigua, NY, using SPAN as one data source to describe suicide behaviors in VA populations. However, due to a dearth of published literature on this resource, current knowledge about the SPAN registry is primarily anecdotal.

SPAN entries are routinely populated by each VA facility's Suicide Prevention Coordinator (SPC). SPAN data are entered monthly by SPCs and reflect local knowledge of three types of suicide behaviors: suicidal ideations, suicide attempts and suicides.

Reliability of SPAN Data. There are some threats to reliability to consider when using the SPAN registry for research. The most critical is unmeasured variation in data entry practices by the hundreds of suicide prevention personnel in the VA system. Completion of the SPAN items requires extensive chart abstraction, and variation in these practices potentially impacts the reliability of data entry practices.

Reliability of data entry practices was enhanced through the design of the SPAN web-based application, and through standardized training for Suicide Prevention personnel. These enhancements improved the likelihood that all SPCs are using replicable procedures to enter data, thus reducing variation in data entry practices. The SPAN web application guides data entry with drop-down menus, radio buttons and fixed item responses. Most item responses are limited to the items built into the web application, however there are a few opportunities for free text entry. To improve the reliability of suicide event reporting, the SPAN web-based data entry tool introduced items to guide the respondent to use approved nomenclature to classify the self-directed violence behavior (Brenner, Breshears, et al., 2011). Although this method ensures that all respondents are classifying these events according to the same criteria, it was implemented after the initial creation of the SPAN registry, and was not available for all cases in the sample.

There have been anecdotal reports that suicide prevention personnel receive standardized training for SPAN data entry practices, however training materials have neither been published nor been made available for viewing on centrally located VA Suicide Prevention information repositories. Without guidance on which chart elements should inform data entry, each SPC has created his or her unique method for conducting a chart review.

Validity of SPAN data. A critical threat to the validity of SPAN data, relates to the verification of suicide events. SPAN captures three types of suicide events: suicides, suicide

attempts, and suicidal ideations. If a suicide event cannot be verified, the respondent may choose “Undetermined” as an option. The validity of entered data is affected by varying interpretations of clinical information or may be informed by the use of different primary information sources during chart abstraction. One example is the occurrence of a thwarted attempt, which is called “interrupted by self or other” in the suicide behavior nomenclature. Sometimes this is documented as a suicide attempt, and other times this is documented as “undetermined”. The verification of past suicide attempts encounters similar challenges. This can be verified by patient self-report or from past documentation. When relying on past documentation, suicide prevention personnel use varying strategies to obtain this information from the electronic health record, which is further confounded by variation in provider documentation of past suicide events.

Many of the data elements in SPAN are duplicated by other VA data sources, and have been described in later sections. Therefore, there is no need to rely on SPAN for most of this information. However, there are some data elements that are not available from other VA data sources. Specifically, these are:

- Suicide Event Type: the ability to differentiate between completed suicide, suicide attempts and suicidal ideation
- Number of suicide attempts prior to the recorded suicide behavior
- Outcome of the Event: the ability to differentiate between suicide attempts resulting in hospitalization and other outcomes, such as “outpatient care” or “no treatment sought”.
- Repeat entries into SPAN after the index event will be used to determine the primary outcome of interest: the repetition of suicide behavior.

The method to identify repetition of suicide behavior was briefly presented at the VA-DoD Annual Suicide Prevention Conference, June 20-22, 2012, in Washington, D.C. by Robert Bossarte, PhD. Dr. Bossarte conducts research at the VA Suicide Prevention Center of Excellence. However, at this time, there are no published works describing the use of SPAN to capture the repetition of suicide behavior.

Considering the aforementioned limitations of the SPAN data, other VA data sources are needed to inform the variables under study. The next two sections will describe the other VA data sources: VA National Databases, and VA local databases.

VA National Databases: Patient Treatment Files and Outpatient Care Files

The following paragraphs will describe VA data sources, specifically those that provide data on patient demographics, inpatient treatment, and outpatient healthcare delivery at VA facilities. These national data are housed at a central data repository and made available to researchers in the form of Statistical Analysis System® (SAS) datasets. General limitations surrounding the use of these data in research are addressed in this section. Issues related to the validity of data informing specific variables are discussed in the section describing “Data Elements”.

VA health care facility staff members across the United States and Puerto Rico enter patient care information into Veterans Health Information Systems and Technology Architecture (VistA), the main information collection and data management system in the Veterans Health Administration (VHA). A select set of data collected during patient health care encounters are entered in local health care facilities VistA systems are then electronically transferred from each local VistA system to a centralized data warehouse, the National Patient Care Database (NPCD), housed at the Austin Information Technology Center (AITC; formerly the Corporate Franchise Data Center) in Austin, Texas. From the NPCD, two national databases are created: the Patient Treatment Files (PTF) and the Outpatient Care Files (OPC). AITC staff members construct Medical SAS® Datasets from NPCD data extracts. National Data Systems (NDS) oversees the construction of extracts from the NPCD and makes the extracts available in the form of SAS® Datasets to authorized users. NDS monitors and provides oversight for the information systems at AITC and is responsible for program and project coordination between VHA program offices and AITC (VA Information Resource Center, April, 2011).

The PTF files are analogous to hospital discharge abstracts and include basic demographic data as well as principal, primary, and nine secondary ICD-9-CM codes. In the VA, the primary diagnosis code refers to the condition that accounted for the majority of the hospital stay. For hospital admissions secondary to a suicide attempt, the primary diagnosis code may refer to the injury sustained as a result of the suicide attempt, or may reflect an underlying psychiatric condition.

The OPC files contain information on all patients who are seen in VA outpatient clinics. These files contain information on patient demographics, clinic location and stop code, ambulatory procedures (in the form of CPT codes), one primary and up to nine secondary diagnosis codes.

A major limitation of these VA databases is that they lack important clinical detail that cannot be determined from ICD-9-CM codes, or CPT codes. For example, it is not possible to determine if specific suicide prevention activities, such as risk assessment or safety planning, occurred during an inpatient or outpatient contact. This information would only be available via chart abstraction. Information related to the repetition of suicide behavior would not be readily available, without abstracting admission information for all admissions. The availability of SPAN data remedies this limitation.

Another shortcoming specific to VA databases is that they only capture data on veterans who seek care at the VA, precluding generalizability of findings to veteran populations who do not seek VA healthcare services. Furthermore, many veterans who seek VA healthcare services also receive services in the private sector. This can be resolved, in part, by merging VA and Medicare data to determine where veterans aged 65 and older receive their care. This strategy was not employed in the current study.

In spite of these limitations, there are many advantages to using VA national databases. As it pertains to this study, which investigated the inpatient and outpatient utilization of a specific cohort of patients, it was possible to upload a file of social security numbers to the mainframe and

merge these data with the files of interest to determine utilization. In this study, the social security numbers of veterans identified in the SPAN registry were uploaded. It was also possible to follow a cohort of patients over time to capture outcomes of interest to the investigator, such as the delivery of specialty healthcare services.

VA Local Databases

The VistA data source contains extensive clinical information not available in the PTF or OPC files. Of interest to this investigation, VistA provided information about patient scheduling and bed utilization, in addition to fiscal operations, file transfers to national databases, and eligibility queries. These data allowed for differentiation between completed (scheduled and unscheduled), cancelled or “no-show” patient encounters. This is especially relevant to the study of suicide prevention, since many of the clinical outreach encounters that occur, as part of suicide prevention efforts, are not scheduled and occur within non-traditional modalities, such as telephone contact.

Decision Support System

The Decision Support System (DSS) is a national database of particular importance to epidemiologists and health services researchers. The DSS is a longitudinal database that combines selected elements of cost and clinical data from the aforementioned PTF, OPC and VistA files. Each VA facility has a DSS site team and manager who are responsible for running reports requested by facility administrators, clinic managers and others. While the DSS was designed to support local administrative decision making, it is of potential value to VA researchers (Maynard & Chapko, 2004). The VA data used in this study was requested via DSS support staff at TVHS.

Data Elements

This section describes the data elements used in this study. Pertinent methodological issues and limitations for each data element are discussed. Please refer to Appendix B for a list of all variables. The following sections will be organized by conceptual elements:

- Identification of index suicide event and hospitalization
- Patient characteristics and prior health behavior
- Characteristics of treatment delivery: Timing, Duration, Intensity, Provider and Setting
- Clinical Outcome: Repetition of suicide attempt

Identification of index suicide event and hospitalization

The suicide event was identified through a query to the SPAN registry. The query specified: VISN 9, all facilities, attempts only, according to date of event. In the SPAN registry, each event entry had a corresponding “outcome” designation. The events with an outcome of “hospital admission” were reviewed for eligibility in the study. This designation did not indicate whether the hospitalization occurred at a community hospital or at a VA facility. A VA admission was verified if a hospital admission date was identified in the VA administrative data within 14 days of the suicide attempt “event date”. This two-week grace period allowed for any non-VA admissions that may have resulted from the index suicide event with patient transfer to a VA facility. Cases where a VA admission could not be verified were marked as “non-VA admission”.

Index Event Date. The index event date was defined as the month, day and year that the veteran first demonstrated a suicidal behavior, such as a suicide attempt. This date was derived from the SPAN registry, labeled as “event date”. This date was included in the DSS data request, to retrieve inpatient admission data surrounding the event date.

Index Discharge Date. The index discharge date is the month, day, and year marking the day of discharge from the inpatient hospitalization that occurred as a result of the suicide attempt.

This date was used to generate the number of days from the discharge to other events, such as the first outpatient encounter after discharge, or if applicable, a suicide reattempt.

Patient Characteristics

Study Identification (ID) Number. The study ID number, a randomly generated number, replaced confidential identifying information, such as name and social security number, in the analytic data set. The random number function in SPSS was used to create a 4-digit study ID for each patient. A crosswalk file, stored on the secure server, pairs each case ID with the name, social security number, and date of birth of the corresponding case. To protect personal privacy and confidentiality, access to the crosswalk file was limited to authorized personnel.

Sex. The patient's sex is categorized as male or female. In the VA, those who identify themselves as transsexual are not recorded as anything other than male or female, according to the preference of the patient.

Date of Birth. The patient's date of birth—the calendar date on which the person was born—was used to calculate the person's age, in years, on the index event date. The date format is mm/dd/yyyy. This was one data element used to identify the patient in the DSS data request.

Age. The age of the person at the time of the suicide event was the difference, in years, between the date of birth and the index event date.

Race and Ethnicity. The race and ethnicity of the veteran were derived from the PTF as the race and ethnicity that were available in the PTF during the index hospitalization. Race and ethnicity are important demographic characteristics, which inform one's risk for suicide and suicide behavior. However, there are some challenges in securing valid race and ethnicity data, of which, the VA is not exempt. These challenges, and methods for resolving them, are described in the following paragraphs.

Managing missing data on race and ethnicity is a reality of working with large administrative databases. The Department of Veterans Affairs Information Resource Center (VIREC) conducted an analysis of the completeness of race and ethnicity information in VA

administrative data. The primary findings were (1) that a “usable” race value (i.e. not missing or categorized as “unknown”) was found for 56% of individuals in the sample and that this proportion increased to 88% when looking at patients who had an inpatient hospitalization, (2) those without a usable race value were younger (mean age 59 vs. 65) and less likely to be male (82% vs. 94%) or have non-VA healthcare coverage (34% vs. 51%), (3) adding information from more than one fiscal year, from Medicare data, or from the Department of Defense (DoD) data increased the proportion of usable race and ethnicity values, and (4) that levels of concordance between VA and Medicare data or DoD data, were higher for Whites and African-Americans compared to those identified as American Indian/Alaskan Native or Asian/Pacific Islander (Stroupe, et al., 2010).

Excluding all data on patients whose race is not known from sample analysis changes important sample characteristics and could bias study results. In the event that these data are missing, the report recommends creating an “unknown” category for the study’s race and ethnicity variable and to analyze data separately on patients whose race or ethnicity is not known (VA Information Resource Center, Sept 2011). VIREC continues to investigate those instances where a race variable has the value “Unknown – Unknown by Patient”. This accounts for less than 1% of all responses (VA Information Resource Center, April, 2011).

The Office of Management and Budget (OMB) recommends that self-identification of race and ethnicity be used whenever possible, and that respondents have the option to select multiple race categories if applicable (Office of Management and Budget (OMB) & Office of Information and Regulatory Affairs, 1995). The VA collects the reporting method for race and ethnicity (i.e. reported by self, proxy, or observer), however a published report of race data quality reveals that there is known systematic misreporting of the race and ethnicity data collection method and recommends against using this label in research (VA Information Resource Center, Sept 2011).

In light of these limitations, efforts were not made to determine the source of race and

ethnicity data. These data were derived from information available at the index hospital admission, increasing the reliability of this information.

Marital Status. Data regarding marital status reflects the veteran's status at the time of the data request (February, 2013) and may not reflect the veteran's marital status at the time of the index event.

Residence or Address. Components of the veteran's address were used to determine proximity to healthcare services, as a proxy for access to healthcare services (Andersen, 1995). There are several methods for measuring proximity to healthcare services, which will be discussed in the following paragraphs.

Proximity to VA services as measured by determining the presence of a VA facility in the county of residence, has demonstrated predictive power for mental health service utilization, even when controlling for distance to the nearest VA facility (Weissman, Rosenheck, & Essock, 2002). Using county of residence data is a more efficient method for determining access to VA mental health services, since time-consuming geocoding procedures are not required. Therefore, the presence of a VA facility in the county of residence was used as a proxy for geographical access to care.

Data regarding the veteran's county of residence reflects the veteran's residence information available at the time of the data request (February, 2013) and may not reflect the veteran's county of residence at the time of the index event.

Service Connected Disability Rating. This rating is reported in 10% increments from 0-100. Data regarding the veteran's serviced connected disability rating reflects the veteran's status at the time of the data request (February, 2013) and may not reflect the veteran's rating at the time of the index event.

Military Service Era and Combat Status. The assigned military service era reflects the time period during which the veteran served, and imparts potential exposure to specific conflicts. Combat veterans discharged from active duty on or after January 28th 2003 are eligible for

enhanced enrollment placement in Priority Group 6 or “Combat Status” for 5 years post discharge. Combat Status confers enhanced benefits for veterans receiving care at VA. Veterans in this group enjoy waived medication copays, and reduced or waived inpatient hospitalization copays, even in the absence of a service-connected condition.

Psychiatric Diagnosis. This study identified the primary psychiatric diagnosis, i.e. the primary psychiatric condition treated during the index hospitalization, and secondary diagnoses of a substance use disorder or post-traumatic stress disorder. These diagnoses were reported as International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes.

The ICD nosology is the most widely used classification of diseases, and has been applied to healthcare reimbursement, administration, epidemiology, and health services research (O'Malley, et al., 2005). Currently, the ICD is in its ninth iteration, and has been modified to be more precise in clinical use; the modified version is called the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). In the proposed study, ICD-9-CM classification was used to describe the cohort under study.

By virtue of the ICD-9-CM nosology, the PTF contains more detailed diagnostic information than the SPAN registry. The SPAN registry reports the presence or absence of certain psychiatric diagnostic categories at the time of the index event, and lacks the detail available in ICD-9-CM coding. When a diagnosis is entered into SPAN, the diagnostic information is derived from chart review, which introduces variability in which chart documents are utilized to make these determinations. Additionally, it is possible to select more than one diagnosis, which precludes valid and reliable determination of a primary psychiatric disorder. Therefore, data from the inpatient SAS dataset were used to determine primary and secondary diagnoses, instead of SPAN data.

ICD-9-CM data in the PTF allowed this investigator to identify the psychiatric illness that was the focus of treatment during the index hospital admission. It was assumed that this ICD-9-

CM code corresponds with the psychiatric illness that contributed most to the suicide behavior that led to the hospital admission. The presence of secondary psychiatric condition, such as a Substance Use disorder (SUD) or Post Traumatic Stress Disorder (PTSD), may further contribute to the risk for suicide behavior.

ICD-9-CM code accuracy is the extent to which the assigned code reflects the underlying patient's disease. When a patient is admitted for suicide behavior, the primary diagnosis may reflect the injury sustained by the suicide behavior, or may reflect the underlying psychiatric condition that contributed to the event, and was the focus of psychiatric treatment. This presents a challenge when attempting to discern the primary psychiatric condition, independent of the suicide behavior.

In most cases, the primary psychiatric diagnosis was reflected as the first ICD-9-CM code listed among discharge diagnoses in the SAS Inpatient Data Set, and corresponds with a numeric ranking variable of "1"). In cases where the suicide behavior resulted in a significant injury that required treatment, the primary diagnosis reflected injury or poisoning, and the second or third listed diagnosis was considered to be underlying psychiatric condition that was present at the time of hospital admission. In these cases, the first listed psychiatric condition was considered the primary psychiatric diagnosis.

Risk Adjustment. Risk adjustment is the process by which the health status of a population is taken into account when evaluating patterns or outcomes of care. Methods for risk adjustment considered both psychiatric and medical co-morbidities. Both diagnostic groups have implications for utilization of inpatient and outpatient services.

Psychiatric ICD-9-CM codes were grouped according to a predetermined list of codes reflecting psychiatric disorders according to the VA-MH12. This was selected instead of the PSY-CMS (described in Chapter 2). Both the VA-MH12 and the PSY-CMS have been used to adjust for case mix of psychiatric populations. PSY-CMS case mix is better at predicting utilization (Sloan, et al., 2006), however the relatively small sample size for this study precluded

the use of 46 diagnostic categories. The VA-MH12 is currently in use at VA. The VA-MH12, found in Table 3.1, includes twelve categories of psychiatric diagnoses.

Table 3.1

VA-MH12 Psychiatric Diagnostic Categories and Corresponding ICD-9-CM Codes

Diagnostic Category	ICD-9-CM Codes
Dementia/Alzheimer disease	290–290.9, 293–294.9, 310.xx
Alcohol disorder	303.xx, 305.00
Drug disorder	292-292.9, 304.xx, 305.2–305.93
Schizophrenia	295.xx
Other psychoses	297–299.9
Bipolar disorder	296.0–296.16, 296.4–296.89
Major depression	296.2–296.36
Other depression	300.4x, 296.9x, 311, 301.1
PTSD	309.81
Anxiety disorder	300.xx excluding 300.4
Adjustment disorder	309.xx excluding 309.81
Personality disorder	301.0x, 301.2–301.9

Note. Adapted from “Development and validation of a psychiatric case-mix system” by K. L. Sloan, M. E. Montez-Rath, A. Spiro, C. L. Christiansen, S. Loveland, P. Shokeen, L. Herz, S. Eisen, J. N. Breckenridge, and A. K. Rosen, 2006, *Medical Care*, 44, p. 178.

Possible tools for risk adjustment for medical co-morbidities include the Charlson Comorbidity Index and the Elixhauser Comorbidity index (Charlson, et al., 1987; Elixhauser, et al., 1998). Both can be used to predict mortality, however the Elixhauser index is also used to predict length of stay and hospital charges. The proposed study considered utilization patterns, including length of stay, and did not consider the prognostic endpoint of mortality. Therefore, the Elixhauser index was one method used in this study to adjust for medical comorbidities.

Table 3.2

Elixhauser Risk Adjustment Categories and ICD-9-CM Codes for Medical Comorbidities

Elixhauser Comorbidity Index	
Diagnostic Category	ICD-9-CM Codes
Congestive heart failure	398.91, 402.11, 402.91, 404.11, 404.13, 404.91, 404.93, 428.x
Cardiac arrhythmias	426.10, 426.11, 426.13, 426.2–426.53, 426.6–426.8, 427.0, 427.2, 427.31, 427.60, 427.9, 785.0, V45.0, V53.3
Valvular disease	093.2, 394.0–397.1, 424.0–424.91, 746.3–746.6, V42.2, V43.3
Pulmonary circulation disorders	416.x, 417.9
Peripheral vascular disorders	440.x, 441.2, 441.4, 441.7, 441.9, 443.1–443.9, 447.1, 557.1, 557.9, V43.4
Hypertension, uncomplicated	401.1, 401.9
Hypertension, complicated	402.10, 402.90, 404.10, 404.90, 405.1, 405.9
Paralysis	342.0, 342.1, 342.9–344.x
Other neurological disorders	331.9, 332.0, 333.4 ^a , 333.5, 334.x, 335.x, 340.x ^a , 341.1–341.9, 345.0 ^a , 345.1 ^a , 345.4 ^a , 345.5 ^a , 345.8 ^a , 345.9 ^a , 348.1, 348.3, 780.3, 784.3
Huntington's Disease: (Farrer, 1986; Fiedorowicz, Mills, Ruggle, Langbehn, & Paulsen, 2011; Schoenfeld, et al., 1984)	
Multiple Sclerosis: (Bronnum-Hansen, Stenager, Nylev Stenager, & Koch-Henriksen, 2005; Giannini, et al., 2010)	
Epilepsy: (Hesdorffer, et al., 2012)	
Chronic pulmonary disease	490–492.8, 493.00–493.91, 494.x–505.x, 506.4
Diabetes, uncomplicated ^a (Ilgen, et al., 2010)	250.0–250.3
Diabetes, complicated ^a (Ilgen, et al., 2010)	250.4–250.7, 250.9
Hypothyroidism	243–244.2, 244.8, 244.9
Renal failure ^a (Maris, et al., 2000)	403.11, 403.91, 404.12, 404.92, 585.x, 586.x, V42.0, V45.1, V56.0, V56.8
Liver disease	070.32, 070.33, 070.54, 456.0, 456.1, 456.2, 571.0, 571.2–571.9, 572.3, 572.8, V42.7
Peptic ulcer disease excluding bleeding ^a (Maris, et al., 2000)	531.70, 531.90, 532.70, 532.90, 533.70, 533.90, 534.70, 534.90, V12.71
AIDS/HIV ^a	042.x–044.x
Lymphoma	200.x–202.3x, 202.5–203.0, 203.8, 238.6, 273.3, V10.71, V10.72, V10.79
Metastatic cancer ^a (Fang, et al., 2012)	196.x–199.x
Solid tumors without metastasis ^a (Fang, et al., 2012)	140.x–172.x, 174.x, 175.x, 179.x–195.x, V10.x
Rheumatoid arthritis/collagen vascular diseases	701.0, 710.x, 714.x, 720.x, 725.x
Coagulopathy	286.x, 287.1, 287.3–287.5
Obesity	278.0
Weight loss	260.x–263.x
Fluid and electrolyte disorders	276.x
Blood loss anemia	280.0
Deficiency anemia	280.1–281.9, 285.9

Note. Embedded citations indicate literature that reports association between diagnosis and suicide risk.

^a Diagnosis is associated with an increased risk of suicide.

Table 3.3

Risk Adjustment Categories and ICD-9-CM Codes for Medical Comorbidities Associated with an Increased Risk of Suicide

Conditions Associated with Suicide Risk	
Diagnostic Category	ICD-9-CM Codes
Migraine (Breslau, Schultz, Lipton, Peterson, & Welch, 2012)	346.xx
Traumatic Brain Injury (Brenner, Ignacio, et al., 2011)	850, 800, 801, 803, 851-854.
Spinal Cord Injury (Giannini, et al., 2010; Hartkopp, Bronnum-Hansen, Seidenschur, & Biering-Sorensen, 1998)	952, 806
Cerebrovascular Disease (Ilgen, et al., 2010)	430-438
Chronic Obstructive Pulmonary Disease (Ilgen, et al., 2010)	430-438

Note. Embedded citations indicate literature that reports association between diagnosis and suicide risk.

Table 3.2 describes the comorbidities, and corresponding ICD-9-CM codes, included in the Elixhauser index. I have excluded diagnoses that are already captured by the VA-MH12: alcohol abuse, drug abuse, psychoses, and depression. Starred items in Table 3.2 indicate disorders that have also been associated with an elevated risk for completed suicide. In combination with the starred items in the Elixhauser, these conditions, with accompanying ICD-9-CM codes, was used to create an index of conditions known to increase suicide risk. Conditions associated with elevated suicide risk that are not included in the Elixhauser index are described in Table 3.3. These conditions were included in the analysis if they were listed as a discharge diagnosis from the index hospitalization or one hospitalization in the past two years.

Healthcare Utilization

Episode of care prior to index suicide attempt. The outpatient SAS dataset was queried to report all encounters in the two years prior to the index suicide attempt. Information pertaining to the date, location, provider, and clinic type of the most recent clinical encounter was obtained from these data. These data were used to inform variables related to past utilization of outpatient behavioral health and primary care services, as well as prior psychiatric and medical hospitalizations.

Episode of care during the index hospitalization. The index hospitalization was identified by matching the index suicide event date (+/- 14 days) with a corresponding hospital admission in the PTF. Data were collected on aspects of care delivery during inpatient treatment for the index suicide attempt. These data were used to elucidate the potential for handoffs during the inpatient stay.

Activation of Category II Patient Record Flag: High Risk of Suicide. Data elements related to patient record flags were available via query to VistA data sources. If an active “Category II Patient Record Flag: High Risk of Suicide” was identified within three days of discharge, a dichotomous variable indicated that the patient had an active High Risk Flag upon discharge. The activation of the High Risk Flag is the responsibility of the facility’s Suicide Prevention Coordinator. Its activation communicates recommendations for patient monitoring and is considered a form of information continuity. There are no published studies regarding the validity and reliability of flag activation and informational continuity.

Site transfer. SPAN data reflect the site where the suicide attempt was identified. This was compared to the facility where the veteran experienced the index hospitalization. This was reported as a dichotomous variable reflecting whether the identification of the suicide attempt occurred at the same facility where the veteran received the inpatient care. At this time, there are no published studies on the extent to which veterans travel between facilities to receive acute inpatient treatment for a suicide attempt, and whether this transition has an effect on post-discharge care. An association between this movement and the delivery of indicated outpatient treatments for a suicide attempt has implications for organization of the transition of care from inpatient to outpatient settings.

Hospital admission type. A categorical variable was created to reflect the type of hospital admission experienced by the patient. The type of inpatient unit is determined by the bed section code. The admitting bed section and discharging bed section were available in the SAS dataset. If these bed sections were different, a unit transition was noted during the index admission. Prior

investigations of the reliability of VA bed section data have reported that some bed section data is more reliable than others. Bedsections where the Patient Treatment File (PTF) and the Medical Record agreed best were Orthopedic, $k = 0.852$, Medical ICU, $k = 0.846$, and Neurology, $k = 0.820$. Bedsections with the worst rates of agreement were Hematology/Oncology, $k = 0.009$, Intermediate Medicine, $k = 0.248$, Substance Abuse, $k = 0.259$, and Ear, Nose, Throat, $k = 0.290$. Agreement between the PTF and Medical Record was not evaluated for psychiatry bedsections (Kashner, 1998).

Inpatient length of stay. The inpatient length of stay was calculated from the admission date and discharge date of the index hospitalization. This variable reflects the duration of inpatient care. Shorter inpatient stays have been associated with an elevated risk of suicide after discharge from a VA psychiatric unit (Desai, et al., 2005). Investigations of the reliability of length of stay calculations in VA administrative data have found 98% agreement between the PTF and the medical record (Kashner, 1998).

Episode of care after hospital discharge. Aim One of this study described two aspects of treatment delivery: the type of treatment (Mental Health, Suicide Prevention, Substance Use Disorder Treatment, Psychology, Homeless Care, Vocational) and factors that potentially affect variation in treatment outcomes, as defined by Kane (2006): timing, duration, intensity, provider, and setting. Outpatient encounters were analyzed in temporal increments so that the delivery of care could be compared between different time periods. These increments—the seven and the thirty days after discharge—reflect VA recommendations for clinical care that should be delivered during these intervals.

Type of treatment. The ideal method for determining the type of behavioral health treatment is described in a study that validated the use of specific VA administrative data elements to describe outpatient clinical encounters for substance use treatment (Harris, Reeder, Ellerbe, & Bowe, 2010). The three key data elements are: diagnosis, current procedural terminology (CPT) codes, and “DSS Identifiers”, also known as “clinic stop codes”. VHA uses

DSS Identifiers to collect workload data in order to indicate the work group responsible for providing the specific set of clinic products, and to serve as a stable identification method that can be used to compare costs between facilities. The investigators described a relatively reliable method for operationalizing specialized care delivery for substance use disorders (SUD). This process involves specifying, a DSS Identifier for any SUD clinic, a SUD diagnosis, and a mental health CPT code. When these criteria were applied, investigators found 92% agreement in SUD care between the administrative data and the patient record. Conversely, when only the SUD DSS Identifier (or SUD bed section, for inpatient SUD treatment) was used, agreement was determined on only 55% of the records. A separate investigation further supports the claim that bed section and clinic stop code data alone are inadequate for reliably determining where clinical care was delivered (kappa approximately 0.5), and recommends that these data are combined with other information, such as diagnosis, to more accurately capture the location of care (Kashner, 1998).

This study used only stop codes to identify the type of treatment delivered during the observation period, and to differentiate behavioral health treatment from other types of outpatient clinical care. Outpatient ICD-9-CM codes and CPT codes were not made available to this investigator, therefore only stop codes were used to infer the type of treatment that was delivered. The stop codes used to create these data elements are listed in Appendix C

Identification of providers. Provider information accompanies every encounter recorded in the PTF and OPC, including the provider's name and discipline. Each provider is also assigned a unique "provider ID". However, these codes are assigned at the local level, and it is possible for one provider to have multiple provider IDs depending on the number of stations with which he/she may be associated. Therefore, it is difficult to associate a unique provider with a provider ID beyond the facility level. For this study, the provider name served as the provider's unique identifier.

There is no provider related data that describes the specialty role of the provider; this must be extrapolated from other contextual clues, such as the clinic stop code. For example, a provider who works in the PTSD clinic will use a clinic stop code that is specific to the PTSD clinic. This provides the basis for distinguishing providers who work in specialty areas, such as SUD and PTSD, from mental health providers who work, for example, in the general mental health clinic. Unfortunately, there are no such contextual clues for providers who function as part of the suicide prevention team. For example, a psychiatrist who provides care in the mental health clinic may be indistinguishable from a psychiatrist on the suicide prevention team, who provides a treatment to a patient. At TVHS, the clinic stop codes would be identical and would not differentiate between provider “roles”.

To accommodate for this limitation, it was necessary to devise a method for identifying providers who function within a suicide prevention team. In the present study, I used the provider name to cross-reference information requested from VISN 9 Suicide Prevention leadership. This request included the names and dates of service for those working in the suicide prevention program since 2008.

Setting and Modality of Care. The setting of behavioral health care delivery was categorized into “Medical Center”, “Community-Based Outpatient Clinic” (CBOC), and “Residential” treatment. These were determined through examination of the clinic stop code and clinic location. The modality of care was also ascertained through the examination of clinic stop code title and description. Modality was categorized as “Individual”, “Group”, and “Telephone”. Individual clinic stop codes and category assignment can be viewed in Appendix C

Measuring Continuity of Care. Continuity of care is an intangible aspect of health care delivery that is not easy to measure. There are many aspects to continuity of care, requiring multiple measures to capture the complexity of the whole concept. Two core elements—patient experience with provider, and continuation of care over time (i.e. chronology), and three types of continuity—informational, relational, and management continuity—are germane to healthcare

settings, in varying degrees (Reid, et al., 2002). Transitions between healthcare settings are a potential source of disruption in care continuity. In this scenario, the types of continuity that are impacted are (1) informational continuity (due to barriers in communicating the discharge plan between facilities) and (2) management plan continuity (due to potential delays in establishing aftercare appointments, secondary to the disruption in informational continuity). Describing the continuity of mental health care presents challenges, primarily because mental health treatments are traditionally delivered by multiple providers, representing a variety of health professions and disciplines. The extent to which these providers function as a team is difficult to measure.

The components of many continuity measures are consistent with Kane's constructs of treatment variation, i.e. timing, intensity, duration, provider, and setting (Kane, 2006). Therefore, the measures included in the present study were limited to those that incorporated at least one of Kane's constructs. Table 3.4 lists Kane's treatment concepts on the left, and the corresponding continuity constructs on the right.

Table 3.4

Kane's Treatment Constructs, Continuity of Care Measures, and Resulting Data Elements

Kane Construct ^a	Type of Care Continuity ^b	Corresponding Measure ^b	Description	Data Element
Timing, Duration	Management	“Evidence of Longitudinal Follow-up”	Evidence of indicated follow-up of care for particular problems; often used during transition of care between providers, facilities or levels of care (inpatient to outpatient).	Days until first post-discharge appointment is completed
Intensity, Duration	Chronology	“Intensity of Patient/Provider Affiliation”	Examines the number and/or total duration of visits with provider over a defined interval	The number of appointments attended during defined time intervals
Provider	Chronology	“Concentration of Care”	Number of providers with whom the patient had contact during an episode of care or in a defined time interval	The number of providers who conducted appointments during defined time intervals.
Timing	Informational	“Information Transfer”	Evidence a mechanism for information transfer exists or that information has successfully transferred (from one visit to next, or between facilities)	The activation of the Category II PRF: High Risk of Suicide during inpatient stay or within 3 days of discharge.

^a Adapted from “Understanding Health Care Outcomes Research” by R. L. Kane, 2006.

^b Adapted from “Defusing the Confusion: Concepts and Measures of Continuity of Healthcare” by R. Reid, J. Haggerty, and R. McKendry, 2002, *Canadian Health Services Research Foundation*, p. 4.

Patient Record Flag activation. Because of its relevance to the continuity construct of “information transfer” the following paragraphs will explain the purpose of the Category II Patient Record Flag (PRF): High Risk of Suicide.

Identification as a “High Risk of Suicide” is determined by a VA healthcare provider, upon face-to-face assessment of the veteran in a VHA facility. This assessment may be guided by a VA-endorsed suicide risk assessment tool, and is usually made in collaboration between the treating provider and the facility’s Suicide Prevention Coordinator (SPC). When a veteran is

identified as a high risk of suicide, the assigned SPC activates a “Category II Patient Record Flag (PRF): High Risk of Suicide” on the veteran’s electronic medical record.

When the PRF is active, it automatically appears in a pop-up window each time the patient’s record is accessed by a healthcare provider. This only occurs in the assigned VA facility (i.e. if the veteran is flagged at the Louisville VA, it can only be viewed by providers in the Louisville VA medical center and its affiliated outpatient clinics). The text of the PRF contains recommendations for an increased level of monitoring. The basic language of the PRF, which can be read by anyone accessing the medical record, is standardized, but can be modified to incorporate information specific to the individual veteran. This action is intended to communicate recommendations for care of the veteran identified as a high risk of suicide. An example of the full language of the PRF used at VA Tennessee Valley Healthcare System can be found in Appendix A.

Analysis Strategy

In the following paragraphs, I describe methods for data cleaning and preparation of the analytic dataset, and the analysis strategies for Aim One and Aim Two.

Preparation

Data preparation involved the identification of unique episodes of care, as well treatment types, settings, modalities and providers of care. This was accomplished by using the Aggregate function in SPSS. Appendix B describes the data elements used to inform these variables. Variables with more than 10% missing data were excluded from analysis. The only variable with more than 10% missing data was Combat Status. Missing data in less than 10% of cases were categorized as “missing” in the creation of the variable. The only variable containing a “missing” category was “Race”. Missing encounter data attributable to death was verified by cross-referencing the death file in the VA’s Beneficiary Identification Record Locator System (BIRLS).

Data reduction activities included the grouping of diagnoses according to psychiatric and medical comorbidity indices. Stop codes were categorized to treatment types according to the title of the stop code or the description of the stop code (Appendix C).

Descriptive statistics were generated to provide univariate frequencies and distributions and to determine variation among the data elements. The process allowed for the rate of reattempt within six months to be determined, and therefore, an appropriate analysis strategy to be developed.

Analysis by Aims

Aim One. This aim described, for patients who did and did not experience a suicide reattempt in six months after the index attempt, the setting, provider, type, timing, duration and intensity of behavioral health care to veterans recently hospitalized for a suicide attempt.

First, descriptive statistics for the variables of interest were organized according to outcome group: those who re-attempted suicide during the observation period, and those who did not. These were reported on the VISN level. To determine differences between the outcome groups, single-sample chi-square test were used for ordinal and nominal variables reported as percentages. Continuous variables presented as interval/ratio data were evaluated between the no-reattempt group and the reattempt group using non-parametric tests, since the distributions of these variables were skewed.

For the purpose of describing the post-discharge treatment delivered to patients hospitalized for a suicide attempt, I divided patients who received post-discharge treatment into three groups: those who did not reattempt suicide in the 6 months after discharge (“no-reattempt group”, n = 467), those who reattempted between 8 and 30 days after discharge (“8-30 day reattempt group”, n = 7) and those who reattempted between 31 and 180 days after discharge (“31-180 day reattempt group”, n = 20).

In order to conduct accurate comparisons between patients who did not reattempt suicide, and patients who reattempted suicide in the 6 months after discharge, analysis was limited to the

behavioral health treatments delivered during two time intervals: 7 days post-discharge and 30 days post discharge. This adjustment accommodated the varying observation periods experienced by the patients who reattempted suicide after discharge and allowed for comparison during the interval that all patients had an equal opportunity to attend appointments. In light of this adjustment, patients who reattempted between 0-7 days after discharge ($n = 3$) were not included in the description of post-discharge treatment.

The three patient groups described in Aim One experienced equal opportunities to participate in treatment during the first seven days of the observation period. Therefore, descriptions related to the first seven days of the observation period were conducted between the no-reattempt group and the 8-30 day reattempt group, as well as the no-reattempt group and the 31-180 day reattempt group. Statistical comparisons related to the first thirty days of treatment will be limited to the no-reattempt group and the 31-180 day reattempt group. The 8-30 day reattempt group will not be included in the thirty-day comparisons, since the observation period for this group is truncated when the reattempt occurs. As a result, patients in this group experienced unequal opportunity for participation in care and cannot be accurately compared to the no-reattempt group. Due to the relatively small size of the 8-30 day reattempt group ($n = 7$), no statistical comparisons with this group were generated as part of this analysis.

Aim Two. This aim described the association between factors related to patient characteristics, prior health utilization, index admission and the timing of post-discharge behavioral health care. The timing of the first specialty mental health appointment was measured in days, from the date of discharge, to the date of the first completed behavioral health appointment.

The analysis strategy for this aim described whether differences in the number of days to appointment differ, according to patient characteristics, prior health behavior, and factors associated with hospital stay. The number of days to the first behavioral health appointment was not evenly distributed. Therefore, a Mann-Whitney test was used to determine differences

between dichotomous groups: gender, history of prior suicide attempts, living in same county as VA facility, PRF activation, change in VA facility and specialty mental health consult initiation.

In comparing categorical variables, a Kruskal-Wallis test was used to determine if there are differences in days to appointment among categories in the variable: race, marital status, service connection, and primary psychiatric diagnosis.

Finally, to compare continuous variables—length of stay, age, number of medical comorbidities, days since last mental health appointment, days since last medical appointment, days since last psychiatric admission, and days since last medical admission—to the number of days until the first appointment, a Spearman’s rank correlation was used.

Analyses were conducted using IBM SPSS Version 20.

Determining the Sample for Analysis

The cohort was identified through a query to the SPAN registry. The query specified: VISN 9, all facilities, attempts only, according to date of event. The report returned 975 unique patients representing 1110 events. Of these 975 patients, five were excluded because the corresponding suicide attempts were the only events reported between 2009 and 2010.

Cases with index events occurring after March 31, 2012 were excluded (n = 149). This allowed for six months of observational data to be assembled at the time of the data request in November 2012. March 31, 2012 is also the last day of the second quarter of FY12, allowing for description of events by fiscal year and quarter, if needed.

In the SPAN registry, each event entry had a corresponding “outcome” designation. The events that resulted in hospital admission (as reported in SPAN) were included in the sample for analysis. This designation does not indicate whether the hospitalization occurred at a community hospital or at a VA facility. Cases with outcomes of “No Treatment Sought” (n = 60), “Outpatient Treatment” (n = 40), “Referred to Outside VA” (n = 9), or “Other” (n = 22) were excluded. The resulting cohort, with the event outcome labeled “Hospital Admission”, contained 690 cases.

To determine factors related to the inpatient admission and the discharge date to inform time-based variables, only events with corresponding VA admissions were included in the analysis. A VA admission was verified if a hospital admission date was identified in the VA administrative data within 14 days of the suicide attempt “event date”. This two-week grace period allowed for any non-VA admissions that may have resulted from the index suicide event with patient transfer to a VA facility. As a result, 184 cases were excluded from the final analytic sample. The number of those patients who attempted suicide between January 1, 2010 and March 31, 2012, and were hospitalized at a VA facility included 506 cases. Figure 3 depicts a flow map describing the patients included in and excluded from the final analytic sample. In Chapter Four, I will compare the patients who attempted suicide and were admitted to a VA facility, with those patients who attempted suicide, but were not admitted to a VA facility as a result of their attempt.

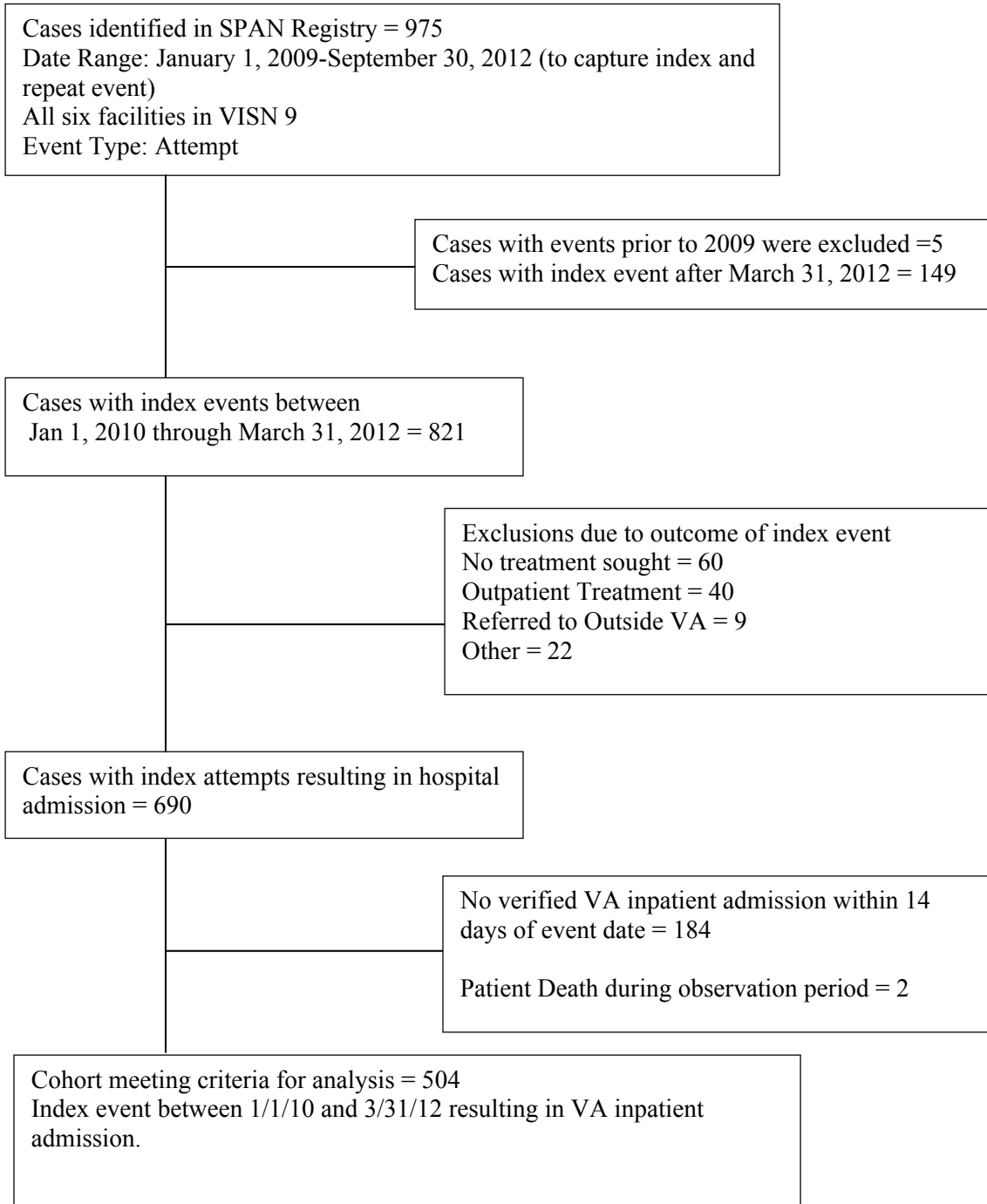


Figure 3. Description of cases included in and excluded from the final analytic sample.

CHAPTER IV

RESULTS

In this chapter, I will first describe the data reduction strategy, including the process by which missing data were identified and managed. Second, I will describe the demographic, clinical, and utilization characteristics of the patient sample, as well as patient level factors related to the index hospitalization. Finally, I will report the results from the respective statistical analyses for Aim One and Aim Two.

Data Reduction

One variable—combat flag status—was excluded from analysis since the amount of missing data affected more than 10% of the sample. Of the 690 patients in the preliminary sample (before excluding non-VA hospital admissions) 102 (15%) had missing data for this variable. As a result, this variable was not considered for analysis. Several categorical variables were further reduced for ease of description and analysis. In Table 4.1 I have described the original and reduced categories for the cohort that experienced a VA admission (N = 504), with descriptive statistics. Treatment types were divided into six categories: Mental Health, Substance Use, Suicide Prevention, Posttraumatic Stress Disorder (PTSD), Homeless Care, and Vocational. Within each treatment type category, the treatment delivery modalities “Individual”, “Group” and “Telephone” were identified. The treatment type categories and the corresponding clinic stop codes included in each category can be viewed in Appendix C. ICD-9-CM codes were used to categorize the primary psychiatric diagnosis and medical comorbidities. Tables depicting the reduction of ICD-9-CM codes into VA-MH 12 and Elixhauser categories can be found in Appendices D & E.

Table 4.1

Original and Reduced Variables for Patient Demographic Characteristics (N = 504)

Original Categories		Reduced Categories	
Demographic Characteristic	n (%)		n (%)
Race			
American Indian or Alaskan Native	1 (0.2)	Non-White	75 (14.9)
Black	65 (12.9)	White	415 (82.3)
Native Hawaiian or Other Pacific Islander	2 (0.4)	Missing	16 (3.2)
White	415 (82.3)		
Unknown	7 (1.4)		
Missing	16 (3.2)		
Marital Status			
Divorced	203 (40.3)	Divorced/Separated	248 (49.2)
Married	146 (28.9)	Married	146 (29.0)
Never Married	93 (18.5)	Never Married	93 (18.5)
Separated	45 (8.9)	Widowed	18 (3.6)
Unknown	1 (0.2)	Unknown	1 (0.2)
Widowed	18 (3.6)		
Service Period			
Air Force--Active Duty	1 (0.2)	Persian Gulf War	205 (40.7)
Army--Active Duty	1 (0.2)	Post-Vietnam	125 (24.8)
Korean	6 (1.2)	Vietnam Era	153 (30.4)
Other Non-Veterans	1 (0.2)	WWII-Post Korea	14 (2.8)
Other or None	6 (1.2)	Other	9 (1.8)
Persian Gulf War	205 (40.7)		
Post-Korean	4 (0.8)		
Post-Vietnam	125 (24.8)		
Pre-Korean	1 (0.2)		
Vietnam Era	153 (30.4)		
World War II	3 (0.6)		
Service Connected Disability SCD Rating (%)			
0	235 (46.6)	No SCD	235 (46.6)
10	30 (6.0)	<50%	88 (17.5)
20	16 (3.2)	50-100%	183 (36.3)
30	26 (5.2)		
40	16 (3.2)		
50	16 (3.2)		
60	24 (4.8)		
70	37 (7.3)		
80	17 (3.4)		
90	12 (2.4)		
100	77 (15.3)		

Participants

In the following sections I will describe the cohort of patients who were excluded from analysis ($n = 184$), and compare the frequency of patient characteristics with those included in the analysis ($N = 506$). From this cohort, the sample that was included for analysis will be described, and comparisons between the group that experienced a suicide reattempt ($n = 31$) and the group that did not experience a suicide reattempt ($n = 473$) will be described.

Approximately 27% of patients in the original sample were excluded because they did not experience a VA inpatient admission at the time of the index suicide attempt. The proportion of excluded cases was larger than anticipated. Potential differences in patient characteristics between the included and excluded cases will inform the generalizability of findings. Therefore, a descriptive analysis was conducted to determine if there were any statistically significant differences between veterans included in the analysis and veterans who were excluded because of a non-VA admission for the index hospitalization. I compared demographic characteristics and proxies for access in the group that experienced a VA inpatient admission (“VA admit group”) with those in the group that did not experience a VA admission (“non-VA admit group”). Please refer to Table 4.2 for descriptive statistics of these two groups.

There were no statistically significant differences between the two groups in the proportions of race, gender, marital status, services connection, and repetition of suicide attempt. Both groups were predominately male, white, and divorced or separated. Statistically significant differences between the two groups were identified in the variables of age, number of comorbidities, service period, and residence in a county with a VA facility. The VA admit group was slightly older, with a mean age of approximately 48 years, $SD = 12.9$, compared to the non-VA admit group, with a mean age of approximately 43 years, $SD = 14.9$. At first glance it appeared that the non-VA admit group contained a greater proportion of cases who had zero

observed comorbidities (82%) compared to the VA admit group (27%). A greater proportion of those in the VA admit group resided in a county with a VA facility (50%) compared with the proportion of those who were not admitted to a VA facility (38%). Among the five categories for service period, those who served in the Persian Gulf period represented the largest proportion of both VA and non-VA admit groups (41 % and 61% respectively), and this proportion was greater in the non-VA admit group.

Table 4.2

Description of Patient Characteristics for VA and Non-VA Hospital Admissions for a Suicide Attempt

Demographic Characteristic	Total N = 690	Non-VA Admit n = 184	VA-Admit n = 506	<i>t</i>	<i>p</i>
	Mean (SD)	Mean (SD)	Mean (SD)		
Age (years)	46.7 (13.6)	43.2 (14.9)	47.9 (12.9)	-3.79	<.001
Gender (Male)	n (%)	n (%)	n (%)	χ^2	<i>p</i>
Race	622 (90.1)	164 (89.1)	458 (90.5)	0.29	.59
White	573 (83.0)	158 (85.9)	415 (82.0)	3.33	.19
Non-White	93 (13.5)	18 (9.8)	75 (14.8)		
Missing Data	24 (3.5)	8 (4.3)	16 (3.2)		
Marital Status				0.98	.91
Divorced/Separated	334 (48.4)	86 (46.7)	248 (49.0)		
Married	201 (29.1)	55 (29.9)	146 (28.9)		
Never Married	127 (18.4)	34 (18.5)	93 (18.4)		
Widowed	26 (3.8)	8 (4.3)	18 (3.6)		
Unknown	2 (0.3)	1 (0.5)	1 (0.2)		
Service Period				24.77	<.001
Persian Gulf	317 (45.9)	112 (60.9)	205 (40.5)		
Post-Vietnam	154 (22.3)	29 (15.8)	125 (24.7)		
Vietnam Era	187 (27.1)	34 (18.5)	153 (30.2)		
WWII-Post Korea	21 (3.0)	7 (3.8)	14 (2.8)		
Other	11 (1.6)	2 (1.1)	9 (1.8)		
SCD Rating				4.38	.11
50-100%	261 (37.8)	78 (42.4)	183 (36.2)		
<50%	125 (18.1)	37 (20.1)	88 (17.4)		
No SCD Rating	304 (44.1)	69 (37.5)	235 (46.4)		
Lives in County w VA	323 (46.8)	69 (37.5)	254 (50.2)	8.74	.003
Number of Comorbidities				163.36	<.001
Zero	288 (41.7)	150 (81.5)	138 (27.3)		
One	295 (42.8)	14 (7.6)	156 (32.8)		
Two	125 (18.1)	10 (5.4)	115 (22.7)		
Three or more	107 (15.5)	10 (5.4)	97 (19.2)		
Repeat Attempt (6 mo.) ²	38 (5.5)	7 (3.8)	31 (6.1)	1.40	.24

Of the patients who were admitted to VA for the index hospitalization, patients were divided into two groups: those who reattempted suicide within six months of discharge from the index hospitalization—the “reattempt group”—and those who did not experience a suicide attempt within six months: “no reattempt group”. Two patient deaths occurred in the no-reattempt group and two deaths occurred in the reattempt group. The two deaths in the no-reattempt group were due to natural causes. They occurred at 79 and 130 days after discharge from the index hospitalization. Because these two patients did not survive the entire 6-month observation period, they were excluded from the final analysis. The two patients in the reattempt group experienced deaths as a results of their suicide attempts at days 21 and 178 after discharge. For these patients, the observation period was truncated at the time of reattempt. Therefore, these two patients remained in the reattempt group for analysis.

Tables 4.3 - 4.6 describe the demographics, clinical characteristics, index admission factors and past utilization patterns for the sample known to not reattempt (n = 473) and those who did reattempt (n = 31). Single Sample Chi-Square tests determined whether the proportion of nominal variables in the group that did not experience a suicide attempt was equivalent to the expected proportions. Expected proportions were derived from those in the no-reattempt cohort. Mann-Whitney tests were used to determine differences in continuous variables between the two groups.

Demographic Characteristics

Summaries of the demographic characteristics of the sample known to not reattempt (n = 473) and those who did reattempt (n = 31) are displayed in Table 4.3. The sample (N = 504) was predominantly comprised of white (82%) males (91%), with a median age of approximately 50 years at the time of the index suicide attempt, IQR = 38.2 - 57.6. A large proportion were divorced or separated (49%) and served in military during the Persian Gulf era (41%). Half of the sample resided in a county with a VA facility (50%). Service-connected disability ratings were

determined for 271 cases (54%); of these 183 (36% of the sample) had service-connected disability ratings of 50-100%. For 282 (56%) of the cases, the index attempt was the first recorded suicide attempt. There were no statistically significant differences between the no-reattempt group and the 6-month reattempt group in terms of any of these characteristics.

Table 4.3

Description of Demographic Characteristics for Patients Hospitalized at VA for a Suicide Attempt

Demographic Characteristic	All Patients N = 504	No Reattempt n = 473	Six-Month Reattempt n = 31	z	p
	Median (IQR, min, max)	Median (IQR, min, max)	Median (IQR, min, max)		
Age (years)	50.1 (38.1-56.0)	50.1 (38.8-56.9)	50.4 (34.6-56.0)	-0.54	.590
	n (%)	n (%)	n (%)	χ^2	p
Gender (male)	456 (90.5)	428 (90.5)	28 (90.3)	0.00	.976
Race (white)	414 (82.1)	390 (82.5)	24 (77.4)	1.32	.517
Marital Status				0.95 ^a	.917
Divorced/Separated	247 (49.0)	232 (49.0)	15 (48.4)		
Married	145 (28.8)	137 (29.0)	8 (25.8)		
Never Married	93 (18.4)	87 (18.3)	6 (19.4)		
Widowed	18 (3.6)	16 (3.4)	2 (6.5)		
Unknown	1 (0.2)	1 (0.2)	0 (0.0)		
Service Period				3.30 ^a	.509
Persian Gulf	205 (40.5)	188 (39.6)	17 (54.8)		
Post-Vietnam	125 (24.7)	119 (25.1)	6 (19.4)		
Vietnam Era	152 (30.2)	145 (30.7)	7 (22.6)		
WWII-Post Korea	13 (2.6)	12 (2.5)	1 (3.2)		
Other	9 (1.8)	9 (1.9)	0 (0.0)		
SCD Rating				0.25 ^b	.882
50-100%	183 (36.2)	173 (36.4)	10 (32.3)		
<50%	88 (17.4)	82 (17.3)	6 (19.4)		
No SCD Rating	233 (46.2)	218 (46.1)	15 (48.4)		
Lives in County w VA	253 (50.2)	234 (49.5)	19 (61.3)	1.63	.202

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; SCD = Service Connected Disability.

^a df = 4^c df = 2

Clinical Characteristics

Summaries of various clinical characteristics are shown in table 4.4. Each patient in the cohort has one primary diagnosis that was determined during the index hospital admission. In

addition, some patients carried a secondary diagnosis of a substance use disorder or post-traumatic stress disorder (PTSD), which was also determined during the index hospital admission. A primary diagnosis of major depressive disorder was identified during the index hospitalization in 29% of all patients. Depressive disorders other than major depressive disorder comprised 9% of the primary diagnoses in the cohort. Primary alcohol disorders and drug disorders comprised the second and third most prevalent diagnoses in the cohort (17% and 14% respectively). A secondary diagnosis of a substance use disorder (in cases where the primary diagnosis was not an alcohol or drug disorder) was determined in 37% of the cohort. A primary diagnosis of post-traumatic stress disorder (PTSD) was determined for 8% of the cohort. A secondary diagnosis of PTSD (in cases where the primary disorder was not PTSD) was determined for 22% of the cohort. Diagnoses associated with severe mental illnesses, such as bipolar disorder and schizophrenia, were determined in 10% and 5% (respectively) of the cases in this cohort. Psychotic disorders other than schizophrenia comprised 0.4% of the primary diagnoses in the cohort. Adjustment disorders, anxiety disorders, personality disorders and dementia comprised 6%, 0.2%, 0.4% and 0.8% of the primary diagnoses in the cohort, respectively.

Medical comorbidities were determined from ICD-9-CM codes listed during the index hospitalization and from VA hospitalizations that occurred in the two years prior to the index admission. Patients experienced a median of one medical comorbidity (IQR = 0-2). When described as a categorical variable, patients with zero medical comorbidities comprised 27% of the cohort. Patients with one medical comorbidity comprised 31% of the cohort. Patients with two medical comorbidities comprised 23% of the cohort. Patients with three or more comorbidities comprised 19% of the cohort.

When comparing the reattempt cohort with the cohort that did not experience a suicide reattempt, there were statistically significant differences in proportions of four diagnostic categories. The proportion of personality disorder diagnosis in the reattempt group was larger, compared to the no-reattempt group (3% vs. 0.2% respectively). The proportions of other

psychoses, dementia, and anxiety disorders were higher in the no-reattempt group (0.4%, 0.8% and 0.2% respectively), when compared to the group who experienced a suicide reattempt where no cases were detected with these diagnoses. There were no differences between the reattempt groups in the proportions of patients in each comorbidity category.

Table 4.4

Description of the Clinical Characteristics for Patients Hospitalized at VA for a Suicide Attempt

Clinical Characteristic	All Patients N = 504	No Reattempt n = 473	Six-Month Reattempt n = 31	χ^2	p
	n (%)	n (%)	n (%)		
History of Attempts (yes)	223 (44.2)	208 (44.0)	15 (48.4)	0.23	.632
Alcohol Disorder	85 (16.8)	79 (16.6)	6 (19.4)	0.17	.680
Drug Disorder	72 (14.2)	66 (13.9)	6 (19.4)	0.77	.380
PTSD	41 (8.1)	40 (8.4)	1 (3.2)	1.08	.299
Adjustment Disorder	32 (6.3)	32 (6.7)	0 (0.0)	0.55	.458
Bipolar Disorder	50 (9.9)	49 (10.3)	1 (3.2)	1.68	.195
Major Depressive Disorder	147 (29.1)	138 (29.1)	9 (29.0)	0.00	.993
Other Depressive Disorder	43 (8.5)	38 (8.0)	5 (16.1)	2.44	.171
Personality Disorder	2 (0.4)	1 (0.2)	1 (3.2)	14.22	<.001
Schizophrenia	25 (4.9)	23 (4.8)	2 (6.5)	0.19	.667
Other Psychosis	2 (0.4)	2 (0.4)	0 (0.0)	5.69	.015
Dementia	4 (0.8)	4 (0.8)	0 (0.0)	13.18	<.001
Anxiety Disorder	1 (0.2)	1 (0.2)	0 (0.0)	13.72	<.001
Secondary SUD	185 (36.7)	178 (37.6)	7 (22.6)	2.84	.092
Secondary PTSD	110 (21.7)	103 (21.7)	7 (22.6)	0.01	.915
Number of Comorbidities				5.38 ^a	.146
Zero	138 (27.3)	124 (26.1)	14 (45.2)		
One	155 (30.8)	147 (31.1)	8 (25.8)		
Two	115 (22.7)	110 (23.2)	5 (16.1)		
Three or more	96 (19.0)	92 (19.5)	4 (12.9)		

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; PTSD = Post Traumatic Stress Disorder; SUD = Substance Use Disorder.

^a df = 3.

Prior Utilization Patterns

Summaries of past healthcare utilization are described in Table 4.5. Healthcare utilization prior to the index attempt was determined by measuring the days between the index hospital admission and the discharge date of the last VA inpatient hospitalization (medical and psychiatric), and the date of the last outpatient visit (behavioral health and primary care). There were no statistically significant differences, between the reattempt groups, in the days since last

outpatient behavioral health visit, outpatient primary care visit or discharge from a medical hospitalization. Veterans in the reattempt group experienced more recent psychiatric hospitalizations, when compared to the no-reattempt group (median days since discharge were 234 days and 730 days, respectively). There were no statistically significant differences between the proportions of patients with a primary care or a behavioral health visits in the 30 days prior to the index hospital admission, between the no-reattempt and the reattempt groups.

Table 4.5

Description of Healthcare Utilization prior to the Index Hospitalization

	All Patients N = 504	No Reattempt n = 473	Six-Month Reattempt n = 31		
Prior Health Care Utilization	Median (IQR, min, max)	Median (IQR, min, max)	Median (IQR, min, max)	<i>z</i>	<i>p</i>
BH Appointment ^a	44.5 (9-356, 0,730)	45.0 (10-362, 0,730)	44.0 (6.0-265.0, 0,730)	-0.75	.456
PCC Appointment ^a	147.0 (49-567, 0,730)	144.0 (51-534, 0,730)	223.0 (31.0-730.0, 6,730)	-0.49	.624
Psychiatric Admission ^b	730.0 (275-730, 0,730)	730.0 (327-730, 0,730)	234.0 (54-730, 2,730)	-3.45	.001
Medical Admission ^b	730.0 (730-730, 0,730)	730.0 (730-730, 0,730)	730.0 (672-730, 40,730)	-0.27	.786
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	χ^2	<i>p</i>
Thirty Days since last BH Appt ^c	208 (41.3)	195 (41.2)	13 (41.9)	1.57 ^a	.667
Thirty Days since last PCC appt ^c	88 (17.5)	81 (17.1)	7 (22.6)	2.34 ^a	.504

Note. Observation period for prior utilization = 730 days; IQR = Interquartile Range; Min = Minimum; Max = Maximum; BH = Behavioral Health; PCC = Primary Care Clinic

^a Days between last outpatient appointment and admission date of index hospitalization. ^b Days between discharge from prior hospitalization and admission date of index hospitalization. ^c Proportion of patients who attended an appointment in the thirty days prior to the admission date of the index hospitalization

Index Hospitalization Factors

Summaries of factors pertaining to the index admission are described in Table 4.6.

During the index hospital admission, 70% of all of the patients were admitted to and discharged from a psychiatric unit, 8% were admitted to and discharged from a medical unit, and 23% experienced a transfer between a medical unit and psychiatric unit during their index hospital admission. Forty patients (8%) were transferred from their “home” VA site, to another VISN 9

VA facility for admission. The overall median inpatient length of stay was 6 days (IQR=3-9).

Behavioral health consults were initiated for 25% of patients. The majority of patients (95%) had an active High Risk Flag upon discharge from the index hospital admission. There were no statistically significant differences between the no-reattempt group and the 6-month reattempt group related to these factors.

Table 4.6

Description of Factors Related to the Index Hospitalization

	All Patients N = 504	No Reattempt n = 473	Six-Month Reattempt n = 31		
	Median (IQR, min, max)	Median (IQR, min, max)	Median (IQR, min, max)	<i>z</i>	<i>p</i>
Index Admission					
Length of Stay (days)	5.5 (3-9, 0,301)	5.0 (3-9, 0,301)	6.0 (4-11, 0,24)	-0.72	.471
	<u>n (%)</u>	<u>n (%)</u>	<u>n (%)</u>	χ^2	<i>p</i>
Site Transfer	40 (7.9)	35 (7.4)	5 (16.1)	3.03 ^a	.082
High Risk Flag Activation	480 (95.2)	450 (95.1)	30 (96.8)	0.17 ^a	.678
Consult Initiation	126 (25.0)	118 (24.9)	8 (25.8)	0.01 ^a	.915
Medical Admission	38 (7.5)	37 (7.8)	1 (3.2)	0.90 ^a	.342
Psychiatric Admission	351 (69.6)	327 (69.1)	24 (77.4)	0.95 ^a	.331
Med-Psych Transfer	115 (22.7)	109 (22.9)	6 (19.4)	0.22 ^a	.639

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum.

^a *df* = 1

Aim One Results

Aim One of this study was to “describe the setting, provider, type, timing, duration and intensity of behavioral health care to veterans recently hospitalized for a suicide attempt”. For the purpose of describing the post-discharge treatment delivered to patients hospitalized for a suicide attempt, I divided the sample into three groups: those who did not reattempt suicide in the 6

months after discharge (“no-reattempt group”, n = 467), those who reattempted between 8 and 30 days after discharge (“8-30 day reattempt group”, n = 7) and those who reattempted between 31 and 180 days after discharge (“31-180 day reattempt group”, n = 20).

Of the patients who experienced a hospitalization for a suicide attempt (N = 504), seven patients did not attend any appointments during the six-month post-discharge observation period. Six of these patients were in the group that did not experience a suicide reattempt. One patient who experienced a suicide reattempt between days 8-30 did not attend any post-discharge appointments. The reported results from Aim One included only those patients who attended any treatment in the six months after hospital discharge.

In order to conduct accurate comparisons between patients who did not reattempt suicide, and patients who reattempted suicide in the six months after discharge, analysis was limited to the behavioral health treatments delivered during two time intervals: seven days post-discharge and thirty days post discharge. This adjustment accommodated the varying observation periods experienced by the patients who reattempted suicide after discharge and allowed for comparison during the interval that all patients had an equal opportunity to attend appointments. In light of this adjustment, patients who reattempted between zero and seven days after discharge (n = 3) were not included in the description of post-discharge treatment.

The three patient groups described in Aim One experienced equal opportunities to participate in treatment during the first seven days of the observation period. Therefore, descriptions related to the first seven days of the observation period were conducted between the no-reattempt group and the 8-30 day reattempt group, as well as the no-reattempt group and the 31-180 day reattempt group. Statistical comparisons related to the first thirty days of treatment will be limited to the no-reattempt group and the 31-180 day reattempt group. The 8-30 day reattempt group will not be included in the thirty-day comparisons, since the observation period for this group is truncated when the reattempt occurs. As a result, patients in this group experienced unequal opportunity for participation in care and cannot be accurately compared to the no-reattempt group. Due to the

relatively small size of the 8-30 day reattempt group ($n = 7$), no statistical comparisons with this group were generated as part of this analysis.

Duration, Timing, and Intensity of Behavioral Health Appointments

Descriptions of timing and intensity are limited to the first seven and first thirty days of the six-month interval after hospital discharge. Timing is described as the median number of days to the first appointment in each treatment category. Intensity is described as (1) the proportion of those who participated in any behavioral health appointment, in the first seven days and in the first thirty days post discharge from the index hospitalization and (2) as the median number of appointments attended in the first seven and the first thirty days after discharge. Descriptions of settings, modalities, and providers of treatment were limited to the appointments attended in the first seven and first thirty days after discharge.

Duration. The duration of behavioral health care is described by the number of days between the first and last behavioral health appointments during the observation period. Patients in the no-reattempt cohort participated in behavioral health care for a median of 137 days during the 180-day observation period, IQR = 95-161. Duration was only described for the no-reattempt group since all patients in this group were observed for six months after discharge.

Timing. Timing of the initial behavioral health appointment after discharge for the index suicide attempt was described as the number of days between the index hospital discharge and the first outpatient behavioral health appointment. The median number of days between discharge and the first behavioral health appointment for patients in the 31-180 day reattempt group was zero days, IQR = 0-2, Min = 0, Max = 9. This was two days less than that for patients in the no-reattempt group, $z = 2.85$, $p = .004$, for whom the median time to the first appointment was two days, IQR = 0-6, Min = 0, Max = 136. Appointments reported on day zero reflect an appointment attended less than 24 hours of hospital discharge. The median time to the first behavioral health appointment, for patients in the 8-30 day reattempt group, was five days, IQR = 0-8, Min = 0, Max = 20.

Intensity. One approach to describing the intensity of care is the median number of appointments completed during a fixed time interval, such as the first seven days and first thirty days after discharge. As seen in table 4.7, the median number of appointments attended by patients who did not reattempt suicide was 2 appointments in the first week of discharge and 6 appointments in the first 30 days after discharge. A statistically significant difference in the median number of appointments attended in the first thirty days after hospital discharge was noted between patients in the no-reattempt group and the 31-180 day reattempt group. There were no statistically significant differences found in the median number of appointments attended in the first 7 days after discharge between these groups. The median number of appointments attended in the first seven days after discharge, by patients in the 8-30 day reattempt group, was one appointment, IQR = 1-3, Min = 1, Max = 4. Due to the relatively small size of this group (N=7), no comparisons were generated as part of this analysis.

Table 4.7

Comparison of Appointments Attended in the First Seven and the First Thirty Days after Hospital Discharge

Number of Appointments	No-Reattempt n = 467	31-180 day Reattempt n = 20	z	p
	Median (IQR, min, max)	Median (IQR, min, max)		
First Seven Days	2 (1-3, 1,46)	3 (2-5, 1,7)	-1.83	.067
First Thirty Days	6 (4-9, 1,197)	8 (5-13, 1,86)	-2.18	.029

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum.

Table 4.8

Proportion of Patients who Attended Behavioral Health Appointments in the First Seven and First Thirty Days after Hospital Discharge

	No-Reattempt N=467	8-30 day Reattempt N=7	31-180 day Reattempt N=20
	n (%)	n (%)	n (%)
	Any Seven-Day Appointment	396 (84.8)	5 (71.4)
Any Thirty Day Appointment	449 (96.1)	--	20 (100.0)
Four or More Appointments in Thirty Days	341 (73.0)	--	18 (90.0)

Note. Proportions for thirty-day appointment attendance were not calculated for the 8-30 day reattempt group.

Table 4.8 describes the proportion of patients who attended behavioral health appointments during specific intervals after discharge from the index hospitalization. These intervals reflect VA recommendations for clinical care of veterans recently hospitalized for a suicide attempt.

Providers of Behavioral Health Treatments

Table 4.9 describes the median number of providers delivering behavioral health appointments to two patient groups: those who did not reattempt suicide (n = 473), and those who reattempted in days 31-180 (n = 20). These results reflect only the patients who participated in treatment during the seven-day and thirty-day interval after hospital discharge. There were no statistically significant differences found in the median number of providers delivering treatment between the no-reattempt group and the 31-180 reattempt group.

Patients who reattempted suicide in 8-30 days after discharge, and received treatment in the first seven days (n = 7), were treated by a median of one provider during this interval, IQR = 1-2, Min = 1, Max = 2.

Table 4.9

Comparison of the Number of Treating Providers, per Patient, in the First Seven and First Thirty Days after Discharge

Provider Count	No-Reattempt n = 467	31-180 day Reattempt n = 20	z	p
	Median (IQR, min, max)	Median (IQR, min, max)		
Seven Day	2 (1-3, 1,11)	2 (2-3, 1,5)	-1.54	.123
Thirty Day	3 (2-5, 1,16)	3 (3-5, 1,9)	-0.19	.851

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum.

Timing and Intensity of Treatment by Type, Modality, and Setting

In the following sections, I will describe the timing and intensity of care according to the type, the modality, and the setting of treatment. As in the previous sections, these descriptions will be limited to the first seven and first thirty days after discharge, for the no-reattempt, the 8-30 day reattempt, and the 31-180 day reattempt groups. Statistical comparisons were limited to the no-reattempt group and the 31-180 day reattempt group.

Treatment Type. This section will describe the timing and intensity of care delivered to three patient groups: those who did not experience a suicide reattempt, those who reattempted in 8-30 days and those who reattempted in 31-180 days. In this section, the type of treatment is the focus of description. In the present study, treatment is categorized into seven types: Mental Health, Suicide Prevention, Substance Use, Psychology, PTSD, Homeless Care, and Vocational Treatment. Treatment type categories are informed by VA clinic stop codes, which are assigned to clinics based upon the procedures performed in the clinics or the clinical population that is the focus of treatment (e.g. PTSD or Substance Use Treatments). Treatment category assignments are mutually exclusive.

Table 4.10 describes the number of median days to first appointment, by treatment type, for the no-reattempt group and the 31-180 day reattempt group. Any appointment that occurs in zero days reflects an appointment that occurred on the day of hospital discharge. For patients in the 8-30 day reattempt group, the median time to the first Mental Health appointment was five days, IQR = 2-13, Min = 0, Max = 20. Suicide Prevention appointments were completed by two patients in the 8-30 day reattempt group, on day seven and on day eight, respectively. One patient in this group attended a Substance Use appointment one day after discharge, and one patient attended a Homeless Care appointment on the day of hospital discharge. There are no results to report for Psychology, PTSD, or Vocational treatment types in the 8-30 day reattempt group, because no patient in this group participated in these treatments. Due to the small number of patients in the 8-30 day reattempt group I did not provide conclusions about statistically significant differences between these two groups.

As shown in Table 4.10, statistically significant differences in the number of median days to the first Mental Health and Suicide Prevention appointments were found between the no-reattempt group and the 31-180 day reattempt group. For Mental Health appointments, median time from discharge to first appointment was one day for the 31-180 day reattempt group, compared to five days for the no-reattempt group. Median time to the first Suicide Prevention

appointment was approximately six days for the 31-180 day reattempt group, and eight days for the no-reattempt group. In both of these treatment types, patients in the 31-180 reattempt group are participating in Mental Health and Suicide Prevention care sooner, when compared to the no-reattempt group. There were no statistically significant differences in the median days to Substance Use, Psychology, PTSD, Homeless Care or Vocational treatments, when comparing the no-reattempt group with the 31-180 day reattempt group.

Table 4.10

Comparison of Time to First Appointment, by Treatment Type

Treatment Type	No-Repeatment n = 467	31-180 day Repeatment n = 20	z	p
	Median (IQR, min, max)	Median (IQR, min, max)		
Mental Health	5.0 (1-12, 0,154)	1.0 (0-4, 0,80)	-2.24	.025
Suicide Prevention	8.0 (4-55, 0,167)	5.5 (0-15, 0,84)	-2.04	.041
Substance Use	10.0 (3-37, 0,162)	9.5 (1-14, 0,23)	-0.92	.356 ^b
Psychology	20.0 (11-55, 0,142)	46.5 (21,72) ^a	-0.92	.357 ^b
PTSD	19.0 (6-69, 0,159)	15.5 (3,28) ^a	-0.65	.516 ^b
Homeless Care	27.0 (3-64, 0,162)	8.0 (1-128, 0-153)	-0.12	.908 ^b
Vocational	44.5 (12-112, 0,149)	45.0 (45,45) ^a	0.00	1.000 ^b

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; PTSD = Post Traumatic Stress Disorder.

^a Median (Min, Max) reported due to too few cases to generate IQR. ^b 31-180 Repeatment group contained fewer than 10 cases for these comparisons.

Tables 4.11 and 4.12 describe the number of patients who attended appointments, by treatment type, in the first 7 and first 30 days after hospital discharge. In each table, I provided the number of patients who attended appointments in the 7-day or 30-day interval, as well as the 180-day interval. This allows for proportion calculations by column, or by row. Direct comparisons between patient groups were not conducted.

Table 4.11

Frequency of Patients who Attended a Behavioral Health Appointment within Seven and 180 Days of Discharge, by Treatment Type

Treatment Type	No-Reattempt n = 467		8-30 day Reattempt n = 7		31-180 day Reattempt n = 20	
	7 Days	180 Days	7 Days	180 Days	7 Days	180 Days
Mental Health	291	439	4	5	16	19
Suicide Prevention	195	407	1	2	10	16
Substance Use	58	137	1	1	6	6
Psychology	11	73	0	0	2	2
PTSD	18	57	0	0	2	2
Homeless Care	4	91	0	1	5	5
Vocational	6	32	0	0	1	1

Note. PTSD = Post Traumatic Stress Disorder

Table 4.12

Frequency of Patients who Attended a Behavioral Health Appointment within Thirty and 180 Days of Discharge, by Treatment Type

Treatment Type	No-Reattempt n = 467		31-180 day Reattempt n = 20	
	30 Days	180 Days	30 Days	180 Days
Mental Health	403	439	18	19
Suicide Prevention	283	407	14	16
Substance Use	96	137	6	6
Psychology	47	73	1	2
PTSD	34	57	2	2
Homeless Care	39	91	3	5
Vocational	11	32	0	1

Note. PTSD = Post Traumatic Stress Disorder

Tables 4.13 through 4.15 describe the median number of appointments completed, by treatment type, in the first 7 and first 30 days of the six-month observation period. Due to the small number of patients in the 8-30 day reattempt group who participated in treatment (n = 7), I did not compare the median number of appointments completed during the seven-day post-discharge period. The number of thirty-day appointments completed by patients in the 8-30 day reattempt group was not described, since these patients did not have an equal opportunity to complete these appointments. Comparisons related to the median number of seven-day and thirty-day appointments between the no-reattempt group and the 31-180 day reattempt group are reported in tables 4.14 and 4.15. When comparing the no-reattempt group and the 31-180 day

reattempt group, there were no statistically significant differences in the median number of appointments attended, by treatment type, in the first seven and first thirty days after hospital discharge.

Table 4.13

Description of the Number of Appointments Completed in the First Seven days after Hospital Discharge, by Treatment Type

Treatment Type	No-Reattempt n = 467	8-30 day Reattempt n = 7
	Median (IQR, min, max)	Median (IQR, min, max)
Mental Health	1.0 (0-2, 0,13)	1.0 (1-2, 0,2)
Suicide Prevention	0.0 (0-1, 0,6)	0.5 (0,1) ^a
Substance Use	0.0 (0-1,0,46)	1.0 (1,1) ^a
Psychology	0.0 (0-0, 0,1)	--
PTSD	0.0 (0-1, 0,12)	--
Homeless Care	0.0 (0-0, 0,1)	0.0 (0,0) ^a
Vocational	0.0 (0-0, 0,2)	--

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; PTSD = Post Traumatic Stress Disorder.

^a Median (Min, Max) reported due to too few cases to generate IQR.

Table 4.14

Comparison of the Number of Appointments Completed in the First Seven Days after Hospital Discharge, by Treatment Type

Treatment Type	No-Reattempt n = 467	31-180 day Reattempt n = 20	z	p
	Median (IQR, min, max)	Median (IQR, min, max)		
Mental Health	1.0 (0-2, 0,13)	1.0 (1-3, 0,4)	-1.80	.072
Suicide Prevention	0.0 (0-1, 0,6)	1.0 (0-3, 0,4)	-1.55	.122
Substance Use	0.0 (0-1,0,46)	0.0 (0-2, 0,6)	-0.42	.676 ^b
Psychology	0.0 (0-0, 0,1)	0.0 ^a (0,0)	-0.59	.555 ^b
PTSD	0.0 (0-1, 0,12)	0.5 ^a (0,1)	-0.49	.625 ^b
Homeless Care	0.0 (0-0, 0,1)	0.0 ^a (0,0)	-0.48	.634 ^b
Vocational	0.0 (0-0, 0,2)	0.0 ^a (0,0)	-0.47	.639 ^b

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; PTSD = Post Traumatic Stress Disorder.

^a Median (Min, Max) reported due to too few cases to generate IQR. ^b 31-180 Reattempt group contained fewer than 10 cases for these comparisons.

Table 4.15

Comparison of the Number of Appointments Completed in the First Thirty Days after Hospital Discharge, by Treatment Type

Treatment Type	No-Reattempt n = 467	31-180 day Reattempt n = 20	z	p
	Median (IQR, min, max)	Median (IQR, min, max)		
Mental Health	3.0 (1-4, 0,26)	3.0 (1-5, 0,7)	-0.55	.583
Suicide Prevention	1.0 (0-4, 0,11)	2.5 (1-6, 0,10)	-1.87	.061
Substance Use	1.0 (0-4, 0,196)	8.5 (1-39, 1,84)	-1.58	.114 ^b
Psychology	1.0 (0-1, 0,6)	0.5 (0,1) ^a	-0.64	.525 ^b
PTSD	1.0 (0-3, 0,25)	2.0 (1,3) ^a	-0.67	.500 ^b
Homeless Care	0.0 (0-2, 0,6)	2.0 (0-3, 0,3)	-1.02	.306 ^b
Vocational	0.0 (0-1, 0,4)	0.0 (0,0) ^a	-0.69	.489 ^b

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; PTSD = Post Traumatic Stress Disorder.

^a Median (Min, Max) reported due to too few cases to generate IQR. ^b 31-180 Reattempt group contained fewer than 10 cases for these comparisons.

Modality. This section will describe the timing and intensity of care delivered to three patient groups: those who did not experience a suicide reattempt, those who reattempted in 8-30 days and those who reattempted in 31-180 days. In this section, the modality of treatment is the focus of description. The treatment modality describes the format of the interaction during the clinical appointment and is categorized as either “individual”, “group”, or “phone”. Modality category assignments are mutually exclusive.

Table 4.16 describes the number of median days to first appointment, by modality in the no-reattempt group and the 31-180 day reattempt group. Any appointment that occurs in zero days reflects an appointment that occurred on the day of discharge. Patients in the 31-180 day reattempt group experienced individual appointments and telephone appointments earlier than patients in the no-reattempt group. The median time to the first individual appointment, in the 8-30 day reattempt group, was five days, IQR = 0-8, Min = 0, Max = 20. Group appointments were attended by one patient in the 8-30 day reattempt group; this appointment occurred one day after hospital discharge. The interval between the date of hospital discharge and the first phone

appointment could not be described in the 8-30 day reattempt group, because no patients in the 8-30 day reattempt group participated in any phone appointments.

Table 4.16

Comparison of Time to First Appointment, by Treatment Modality

Treatment Modality	No-Repeattempt n = 467	31-180 day Repeattempt n = 20	z	p
	Median (IQR, min, max)	Median (IQR, min, max)		
Individual	5.0 (1-8, 0,36)	1.0 (0-5, 0,9)	-2.72	.006
Group	11.0 (5-43, 0,177)	6.5 (1-12, 0,23)	-1.85	.051
Telephone	6.0 (1-27, 0-154)	1.5 (0-7, 0,111)	-1.95	.064

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum.

As shown in Table 4.18, statistically significant differences in the number of median days to the first individual and first group appointments were found between the no-repeatattempt group and the 31-180 day reattempt group. For individual appointments, median time from discharge to first appointment was one day for the 31-180 day reattempt group and five days for the no-repeatattempt group. Median time to an initial phone appointment was also approximately 4 days sooner for the 31-180 day reattempt group than for the no-repeatattempt group. There were no statistically significant differences between the no-repeatattempt group and the 30-180 day reattempt group in the median days to the first phone appointment.

Tables 4.17 and 4.18 describe the number of patients who received care, by modality, in the first 7 and first 30 days after hospital discharge. In each table, I provided the number of patients who attended appointments in the 7-day or 30-day interval, as well as the 180-day interval. This allows for proportion calculations by column, or by row. Direct comparisons between patient groups were not conducted.

Table 4.17

Frequency of Patients who Attended a Behavioral Health Appointment within Seven and 180 Days of Discharge, by Treatment Modality

Treatment Modality	No-Reattempt n = 467		8-30 day Reattempt n = 7		31-180 day Reattempt n = 20	
	7 Days	180 Days	7 Days	180 Days	7 Days	180 Days
Individual	335	459	5	7	19	20
Group	67	169	1	1	10	16
Telephone	200	369	0	0	13	16

Table 4.18

Frequency of Patients who Attended a Behavioral Health Appointment within Thirty and 180 Days of Discharge, by Treatment Modality

Treatment Modality	No-Reattempt n = 467		31-180 day Reattempt n = 20	
	30 Days	180 Days	30 Days	180 Days
Individual	429	459	20	20
Group	117	169	10	16
Telephone	284	369	14	16

Tables 4.19 and 4.20 describe the number of appointments attended by patient groups in the first seven days after hospital discharge. As seen in Table 4.21, comparison between patients in the no-reattempt group and the 31-180 day reattempt group did not result in statistically significant differences in the median number of individual appointments or the median number of group appointments completed in the first seven days after discharge. The difference in the median number of phone appointments completed in the first seven days was found to be statistically significant. It was noted that the median value is equal when comparing the no-reattempt group with the 31-180 day reattempt group, and the interquartile ranges did not overlap.

Table 4.19

Description of the Number of Appointments Completed in the First Seven days after Hospital Discharge, by Treatment Modality

Treatment Modality	No-Reattempt n = 467	8-30 day Reattempt n = 7
	Median (IQR, min, max)	Median (IQR, min, max)
Individual	1 (0-2, 0,17)	1 (0-1, 0,4)
Group	0 (0-1, 0, 40)	1 (1, 1) ^a
Telephone	1 (0-1, 0, 5)	0 (0,0) ^a

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum.

^a Median (Min, Max) reported due to too few cases to generate IQR.

Table 4.20

Comparison of the Number of Appointments Completed in the First Seven Days after Hospital Discharge, by Treatment Modality

Treatment Modality	No-Reattempt n = 467	31-180 day Reattempt n = 20	z	p
	Median (IQR, min, max)	Median (IQR, min, max)		
Individual	1.0 (0-2, 0,17)	1.5 (1-2, 0,4)	-1.29	.198
Group	0.0 (0-1, 0, 40)	0.5 (0-1, 0,6)	-0.29	.773
Telephone	1.0 (0-1, 0, 5)	1.0 (1-2, 0,4)	-2.07	.039

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum.

The difference between the no-reattempt group and the 31-180 day reattempt group, in the number of phone appointments completed in the first 30 days, was found to be statistically significant (Table 4.21). Patients in the 31-180 day reattempt group experienced approximately three median phone appointments in the first 30 days, IQR = 1-6, and the no-reattempt group experienced one phone appointment, IQR = 1-2. There were no statistically significant differences between the two groups in the median individual appointments and median group appointments in the first thirty days after discharge.

Table 4.21

Comparison of the Number of Appointments Completed in the First Thirty Days after Hospital Discharge, by Treatment Modality

Treatment Modality	No-Reattempt n = 467	31-180 day Reattempt n = 20	z	p
	Median (IQR, min, max)	Median (IQR, min, max)		
Individual	4.0 (2-6, 0, 56)	4.0 (3-6, 1,10)	-0.71	.481
Group	2.0 (0-4, 0,150)	2.5 (1-17, 1,75)	-1.39	.166
Telephone	1.0 (1-2, 0-10)	2.5 (1-6, 0,7)	-2.33	.020

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum.

Setting. This section will describe the timing and intensity of care delivered to three patient groups: those who did not experience a suicide reattempt, those who reattempted in 8-30 days and those who reattempted in 31-180 days. In this section, the setting of treatment is the focus of description. In the present study, setting is categorized into three types: VA Medical Center, Community-Based Outpatient Clinic (CBOC), and Residential. Setting category assignments are mutually exclusive.

Table 4.22 compares the number of median days to appointment, by setting, for the no-reattempt group and the 31-180 day reattempt group. Any appointment that occurs in zero days reflects an appointment that occurred on the day of hospital discharge. The median time to the first appointment in a medical center, for patients in the 8-30 day reattempt group, was five days, IQR = 0-14, Min = 0, Max = 20. One patient in the 8-30 day reattempt group attended an appointment in a CBOC, eight days after discharge. No patient in the 8-30 day appointment group attended any appointment in a residential setting.

As shown in Table 4.22, a statistically significant difference in the number of median days to the first appointment attended in a medical center was found between the no-reattempt group and the 31-180 day reattempt group. For appointments attended in a medical center, median time from discharge to the first appointment was zero days for the 31-180 day reattempt group and three days for the no reattempt group. There were no statistically significant

differences between the no-reattempt and the 31-180 day reattempt group in the median days to the first appointments attended in a CBOC or Residential setting.

Table 4.22

Comparison of Time to First Appointment, by Treatment Setting

Treatment Setting	No-Reattempt n = 467	31-180 day Reattempt n = 20	z	p
	Median (IQR, min, max)	Median (IQR, min, max)		
Medical Center	3 (0-7, 0,167)	0 (0-3, 0,10)	-2.81	.005
CBOC	7 (4-19, 0,177)	5 (4-30, 1,124)	-0.24	.808
Residential	27 (2-85, 0,169)	17 (0,28) ^a	-0.91	.396 ^b

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; CBOC = Community-Based Outpatient Clinic.

^a Median (Min, Max) reported due to too few cases to generate IQR. ^b 31-180 Reattempt group contained fewer than 10 cases for these comparisons.

Tables 4.23 and 4.24 describe the number of patients who received care, by setting, in the first seven and first thirty days after hospital discharge. In each table, I provided the number of patients who attended appointments in the seven-day or thirty-day interval, as well as the 180-day interval. This allows for proportion calculations by column, or by row. Direct comparisons between patient groups were not conducted.

Table 4.23

Frequency of Patients who Attended a Behavioral Health Appointment within Seven and 180 Days of Discharge, by Treatment Setting

Treatment Setting	No-Reattempt n = 467		8-30 day Reattempt n = 7		31-180 day Reattempt n = 20	
	7 Days	180 Days	7 Days	180 Days	7 Days	180 Days
	Medical Center	348	443	5	7	18
CBOC	96	175	0	1	6	10
Residential	17	57	0	0	1	3

Table 4.24

Frequency of Patients who Attended a Behavioral Health Appointment within Thirty and 180 Days of Discharge, by Treatment Setting

Treatment Setting	No-Reattempt n = 467		31-180 day Reattempt n = 20	
	30 Days	180 Days	30 Days	180 Days
Medical Center	407	443	20	20
CBOC	144	175	8	10
Residential	30	57	3	3

Tables 4.25 through 4.27 describe the median number of appointments completed, by treatment setting, in the first seven and first thirty days of the six-month post-discharge observation period. As seen in Table 4.26, no statistically significant differences were found between the no-reattempt group and the 31-180 day reattempt group in the median number of appointments attended in each setting within seven days after discharge. There were no statistically significant differences in the number of thirty-day appointments attended in a medical center, CBOC or residential setting between the no-reattempt group and the 31-180 reattempt group.

Table 4.25

Description of the Number of Appointments Completed in the First Seven days after Hospital Discharge, by Treatment Setting

Treatment Setting	No-Reattempt n = 467	8-30 day Reattempt n = 7
	Median (IQR, min, max)	Median (IQR, min, max)
Medical Center	2 (1-3, 0,26)	1 (0-2, 0,4)
CBOC	1 (0-1, 0,4)	0 (0,0) ^a
Residential	0 (0-1, 0,45)	--

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; CBOC = Community-Based Outpatient Clinic.

^a Median (Min, Max) reported due to too few cases to generate IQR.

Table 4.26

Comparison of the Number of Appointments Completed in the First Seven Days after Hospital Discharge, by Treatment Setting

Treatment Setting	No-Reattempt n = 467	31-180 day Reattempt n = 20	z	p
	Median (IQR, min, max)	Median (IQR, min, max)		
Medical Center	2 (1-3, 0,26)	2 (1-4, 0,7)	-1.20	.230
CBOC	1 (0-1, 0,4)	1 (0-1, 0,3)	-0.24	.812
Residential	0 (0-1, 0,45)	0 (0,0) ^b	-0.15 ^a	.883 ^a

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; CBOC = Community-Based Outpatient Clinic.

^a 31-180 Reattempt group contained fewer than 10 cases for these comparisons. ^b Median (Min, Max) reported due to too few cases to generate IQR.

Table 4.27

Comparison of the Number of Appointments Completed in the First Thirty Days after Hospital Discharge, by Treatment Setting

Treatment Setting	No-Reattempt n = 467	31-180 day Reattempt n = 20	z	p
	Median (IQR, min, max)	Median (IQR, min, max)		
Medical Center	4 (2-8, 0,54)	5.5 (2-9, 1,20)	-0.81	.420
CBOC	2 (1-4, 0,10)	2.0 (1-5, 0,8)	-0.04	.971
Residential	1 (0-4, 0,195)	22.0 (3,79) ^b	-2.00 ^a	.056 ^a

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; CBOC = Community-Based Outpatient Clinic.

^a 31-180 Reattempt group contained fewer than 10 cases for these comparisons. ^b Median (Min, Max) reported due to too few cases to generate IQR.

In summary, statistically significant differences were found between the no-reattempt group and the 31-180 day reattempt group in the timing and intensity of behavioral health treatment. The interval between hospital discharge and the first behavioral health appointment was shorter for patients in the 31-180 day reattempt group, when compared to the no-reattempt group. The intensity of treatment in the first thirty days after hospital discharge was greater for patients in 31-180 day reattempt group, as evidenced by attending a greater number of appointments during this interval, compared to patients in the no-reattempt group. When specifying the setting, modality or type of treatment, patients in the 31-180 day reattempt group attended medical center, group, individual, mental health and suicide prevention appointments earlier than patients in the no-reattempt group. When examining the first thirty days after

discharge, the median number of telephone appointments in the 31-180 day reattempt group, compared to the no-reattempt group.

Aim Two Results

Aim Two of this study was to “describe associations between factors related to patient characteristics, prior health utilization, index admission and the timing of post-discharge behavioral health care”. The analysis for Aim Two determined whether patient demographics, clinical characteristics, prior health utilization, and factors relevant to the inpatient hospitalization were associated with the number of days between inpatient discharge and attendance of the first behavioral health appointment. These analyses included only patients who participated in treatment after discharge (n = 496).

The completion of the first specialty mental health appointment was measured in days, from the date of discharge, to the date of the first completed behavioral health appointment. The number of days to the first behavioral health appointment was not evenly distributed. Therefore, a Mann-Whitney test was used to determine differences between dichotomous groups. In comparing categorical variables, a Kruskal-Wallis test was used to determine if there are differences in days to appointment among categories in the variable. Finally, to compare continuous variables to the number of days until the first appointment, a Spearman’s rank correlation was used.

Tables 4.28 and 4.29 summarize the number of days to first behavioral health appointment and patient demographic and clinical characteristics. The variable for race contains a category of 16 missing values. The statistics shown in the table reflect a comparison among all three groups via Kruskal-Wallis test. I also conducted a Mann-Whitney test, omitting the “missing” cases. There was no statistically significant difference in the number of days to first behavioral health appointment between white and non-white patients ($z = -1.77, p = .077$).

Table 4.28

Associations Between Patient Demographic Characteristics and the Time to First Completed Post-Discharge Behavioral Health Appointment (N=496)

Patient Demographic Characteristic			Time to First Behavioral Health Appointment (Days)			
			r_s	df	p	
Age			0.02		.704	
n (%)			Median (IQR, min, max)	χ^2	p	
Gender				1.68	1	.195
	Male	449 (90.5)	2.0 (0-6, 0,136)			
	Female	47 (9.5)	3.0 (1-6, 0,65)			
Race				3.10	2	.212
	White	408 (82.3)	2.0 (0-6, 0,136)			
	Non-white	72 (14.5)	1.0 (0-5, 0,99)			
	Missing	16 (3.2)	2.0 (0-11, 0,38)			
Marital Status				3.11	4	.539
	Divorced/Separated	243 (49.0)	2.0 (0-6, 0,136)			
	Married	142 (28.6)	2.5 (0-5, 0,97)			
	Never Married	92 (18.5)	2.0 (0-6, 0,98)			
	Widowed	18 (3.6)	1.0 (0-4, 0,61)			
	Unknown	1 (0.2)	6.0 (6,6) ^a			
Service Period				4.25	4	.373
	Persian Gulf	201 (40.5)	2.0 (0-6, 0,136)			
	Post-Vietnam	122 (24.6)	1.0 (0-5, 0,199)			
	Vietnam Era	152 (30.6)	3.0 (0-6, 0,135)			
	WWII-Post Korea	13 (2.6)	2.0 (0-8, 0,91)			
	Other	8 (1.6)	4.5 (0-11, 0,11)			
SCD Rating				0.98	2	.614
	50-100%	180 (36.3)	2.0 (0-5, 0,65)			
	<50%	86 (17.3)	2.0 (0-5, 0,100)			
	No SCD Rating	230 (46.4)	2.0 (0-6, 0,136)			
Lives in County w VA				z		p
	Yes	249 (49.8)	2.0 (0-6, 0,99)	-0.31		.756
	No	247 (50.2)	2.0 (0-6, 0,136)			

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; SCD = Service Connected Disability.

^aMedian (Min, Max) reported due to too few cases to generate IQR.

Table 4.29

Associations Between Patient Clinical Characteristics and the Time to First Completed Post-Discharge Behavioral Health Appointment (N=496)

	n (%)	Time to First Behavioral Health Appointment (Days)			
		Median (IQR, Min,Max)	<i>z</i>	<i>p</i>	
History of Attempts			-1.16	.247	
Yes	219 (44.2)	3.0 (0-6, 0,99)			
No	277 (55.8)	2.0 (0-6, 0,136)			
Secondary SUD			-0.93	.351	
Yes	181 (36.5)	3.0 (0-5, 0,136)			
No	315 (63.5)	2.0 (0-6, 0,135)			
Secondary PTSD			-0.98	.328	
Yes	105 (21.2)	2.0 (0-5, 0,99)			
No	391 (78.8)	2.0 (0-6, 0,136)			
			χ^2	<i>df</i>	<i>p</i>
Primary Diagnosis			10.47	11	.488
Alcohol Disorder	84 (16.9)	1.0 (0-6, 0,135)			
Drug Disorder	71 (14.3)	2.0 (0-7, 0,62)			
PTSD	41 (8.3)	2.0 (0-7, 0,136)			
Adjustment Disorder	32 (6.5)	1.0 (0-5, 0,100)			
Bipolar Disorder	50 (10.1)	4.0(0-6, 0,98)			
Major Depressive Disorder	144 (29.0)	3.0 (0-6, 0,99)			
Other Depressive Disorder	41 (8.3)	2.0 (0-6, 0,91)			
Personality Disorder	2 (0.4)	0.5 (0,1)			
Schizophrenia	24 (4.8)	1.5 (0-5, 0,15)			
Other Psychosis	2 (0.4)	3.0 (2,4)			
Dementia	4 (0.8)	3.5 (1-7, 0,8)			
Anxiety Disorder	1 (0.2)	0.0 (0,0) ^a			
Number of Comorbidities			2.38	3	.497
Zero	135 (27.2)	2.0 (0-5, 0,97)			
One	152 (30.6)	3.0 (0-6, 0,136)			
Two	113 (22.8)	2.0 (0-6, 0,135)			
Three or more	96 (19.4)	2.0 (0-6, 0,99)			

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum; SUD = Substance Use Disorder; PTSD = Post-Traumatic Stress Disorder.

^aMedian (Min, Max) reported due to too few cases to generate IQR.

As seen in Table 4.30, a statistically significant correlation was determined between the number of days since the last behavioral health appointment, prior to the index admission, and the number of days to the first post-discharge appointment. The direction of the coefficient indicates

a positive correlation between these two variables. However, the strength of the coefficient is weak (0.13).

Table 4.30

Associations Between Prior Healthcare Utilization and the Time to First Completed Post-Discharge Behavioral Health Appointment (N = 496)

Interval between index hospital admission and last:	Time to First Behavioral Health Appointment (Days)		
	Median (IQR, min,max)	r_s	p
Behavioral Health Appointment	44 (8-343, 0,730)	0.13	.004
Primary Care Appointment	143 (48-512, 0-730)	0.09	.087
Psychiatric Hospitalization	730 (275-730, 0,730)	0.06	.169
Medical Hospitalization	730 (730-730, 0,730)	-0.04	.405

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum.

Table 4.31

Associations between Factors Related to Hospitalization and the Median Time to First Completed Post-Discharge Behavioral Health Appointment (N = 496)

Hospitalization Factors	Time to First Behavioral Health Appointment (Days)					
	Yes			No		
	n (%)	Median (IQR, min, max)	n (%)	Median (IQR, min, max)	z	p
Site Transfer	39 (7.9)	1.0 (0-3, 0,8)	457 (92.1)	2.0 (0-6, 0,136)	-2.17	.030
Consult Initiation	125 (25.2)	2.0 (0-7, 0,135)	371 (74.8)	2.0 (0-6, 0,136)	-1.21	.226
High Risk Flag	475 (95.8)	2.0 (0-6, 0,136)	21 (4.2)	1.0 (0-5, 0,13)	-1.01	.311
Psychiatric Admission	346 (69.8)	2.0 (0-6, 0,136)	150 (30.2)	3.0 (0-6, 0,98)	-0.93	.354 ^a
Medical Admission	37 (7.5)	6.0 (1-10, 0,98)	459 (92.5)	2.0 (0-6, 0,136)	-2.67	.008 ^a
Med-Psych Transfer	113 (22.8)	2.0 (0-5, 0,91)	383 (77.2)	2.0 (0-6, 0,136)	-0.66	.511 ^a

Note. IQR = Interquartile Range; Min = Minimum; Max = Maximum.

^a Adjusted $\alpha = .017$ for post-hoc comparisons among admit types $X^2(2) = 7.19, p = .027$.

As seen in Table 4.31, the two statistically significant associations related to factors relevant to the inpatient hospitalization were associated with the location of inpatient admission. First, the median time to first behavioral health appointment for patients hospitalized at a different inpatient site than the patients “home” site was shorter compared to those who did not experience a facility transfer. For the 457 patients who did not experience a facility transfer, the

median number of days was two (IQR = 0-6); for those who did experience a facility change (n = 39), the median number of days to first appointment was one (IQR = 0-3). Second, patients who experienced the entirety of their inpatient admission on a medical unit demonstrated a longer median time to the first post-discharge appointment. For patients with a medical admissions (n = 37), the median time to the first post-discharge appointment was 6 days (IQR = 1-10). Those who experienced a psychiatric admission (n = 348) and those who experienced a transfer between a medical and psychiatric unit (n = 113) attended the first behavioral health appointment in a median time of two days after discharge.

To compare median days to first appointment among admit types, I first conducted a Kruskal-Wallis analysis with all three admit groups. This analysis revealed statistically significant differences among the three groups, $X^2(2) = 7.19, p = .027$. I dummy coded each admit type and ran a post-hoc Mann-Whitney on each dummy coded admit variable. These results are reflected in Table 4.31. The difference in median days to first post-discharge appointment between those who were medically admitted compared to those who were not was statistically significant, even after adjusting the alpha (.017) to accommodate three post-hoc comparisons, $z = -2.65, p = .008$.

The median length of inpatient stay for patients who received outpatient treatment (n = 496) was five days, IQR = 3-9. Length of stay was not associated with the number of days between discharge and the first behavioral health appointment, $r_s = -0.20, p = .660$.

In summary, statistically significant associations with the timing of the first post-discharge behavioral health appointment were related to prior health care utilization and factors related to the hospital admission. Although I determined a statistically significant association between prior behavioral health utilization and the days to the first post-discharge appointment, this association was very weak. Factors related to site transfer and medical admissions were associated with the timing of post-discharge care.

CHAPTER V

DISCUSSION

In the following sections I have related the findings of the present study to results from prior research on suicide behavior and behavioral health treatment delivery to high-risk populations. In some cases comparisons cannot be made since there is no existing literature on the topic. This study used previously unexplored data sources that had not been used to describe treatment delivered to patients who have recently attempted suicide. Implications and recommendations for methods related to the use of these data sources will be discussed. Potential areas for improvement in clinical care are also discussed. Limitations included the relatively rare occurrence of suicide behavior, which precluded an adjusted analysis of associations between treatment delivery and suicide reattempt. Limitations related to the inconsistent availability of VA data elements and how they inform future research in this area will conclude this chapter.

Participants

Sample Characteristics

A substantial proportion (27%) of veterans were not admitted to VA at time of index suicide attempt (N = 690). Veterans who were not admitted to VA were younger (mean 43 years vs. 48 years old), healthier (82% with zero medical comorbidities vs. 27%), less likely to reside in a county with a VA facility (38% live in county with VA vs. 50%), and more likely to have served during the Persian Gulf engagements (61% served in Persian Gulf vs. 41%). There was no difference in the proportion of veterans who experienced a suicide reattempt within six months between the non-VA admit group and the group that was admitted to VA (4% vs. 6%,

respectively). It was beyond the scope of this study to determine whether the non-VA admissions were reported to VA for continuity or reimbursement purposes.

The demographic characteristics of age, gender, and service connected disability rating of the cohort under study (N = 504) were compared to VISN 9 reports of these characteristics in verified VA enrollees, for FY2011. Frequencies for these patient characteristics are compared in Table 5.1. Proportions of male patients and of service connected disability ratings are comparable between the VISN 9 Enrollees and the cohort of patients who experienced a VA hospitalization for a suicide attempt. Differences were noted in age categories. Notably, there appears to be larger proportions of veterans in the age categories for under 60 years in the cohort under study (2010-2012) when compared to the VISN 9 Enrollee group. Veterans aged 60 and older are represented as larger proportions in the VISN 9 Enrollee group, when compared to the cohort under study.

When describing the VISN 9 hospitalized attempt cohort and FY 2011 VA statistics on nationwide reported suicide attempts, the distribution of cases across age groups appears similar. For example, the greatest proportion of patients, in both groups, is in the 50-59 age group. In both groups, the majority of patients were male. There were no data available on service connected disability ratings from the VA suicide data report.

Table 5.1

Percentages of VA Patient Characteristics

Characteristic	VISN 9		All VISNs ^a
	Verified Enrollees	Suicide Attempts	Suicide Attempts
	FY 2011 N=245,124	(2010-2012) N=504	FY 2011 N=12,309
	n (%)	n (%)	n (%)
Male Gender	232482 (94.8)	456 (90.5)	10796 (87.7)
Age Category			
≤29	8662 (3.5)	61 (12.1)	1804 (14.7)
30-39	12630 (5.2)	74 (14.7)	1664 (13.5)
40-49	23653 (9.6)	106 (21.0)	2337 (19.0)
50-59	41287 (16.8)	174 (34.5)	3643 (29.6)
60-69	86763 (35.4)	73 (14.5)	2137 (17.4)
70-79	40675 (16.6)	12 (2.4)	3333 (2.7)
80-89	31454 (12.8)	4 (0.8)	^b
No SC	133613 (54.5)	233 (46.2)	--
<50% SC	50973 (20.8)	88 (17.5)	--
50%-100% SC	60538 (24.7)	183 (36.3)	--

Note. VA = Veterans Affairs; VISN = Veterans Integrated Service Network; FY = Fiscal Year.

^aAdapted from “Suicide Data Report”, by J. Kemp and R. Bossarte, 2012, *Department of Veterans Affairs, Mental Health Services, Suicide Prevention Program*, p. 58. ^bCategories with fewer than 20 cases were suppressed.

The rate of six-month suicide reattempt in this cohort was approximately 6%. It is difficult to compare this finding to other studies since the present study only examined patients who were hospitalized for a suicide attempt. Furthermore, most studies report much longer observation periods to detect repeat suicide events. VA investigators Kemp and Bossarte (2012) used the same data source (SPAN) to conduct a non-research based analysis to detect 12-month non-fatal reattempt rates from 2009 to 2011. Of this nationwide veteran sample, 15% of patients reattempted suicide in 12 months. In other studies of the prevalence of suicide reattempt over a 12-month period, rates of 14-16% have been reported (Kapur, et al., 2006; D. Owens, et al., 2002)

There were few differences between the group that did not experience a suicide reattempt and the group that did experience a suicide reattempt. While the differences were very small, they were statistically significant. The proportion of personality disorders was slightly higher in reattempt group, consistent with literature reporting that patients with personality disorders

demonstrate elevated risk for repetition of suicide behavior (Haw, et al., 2007). The proportion of other psychoses, dementia, and anxiety disorders were slightly higher in the group that did not experience a suicide reattempt. Although statistically significant, these differences are likely due to the lack of any cases with these diagnoses in the reattempt group. This precludes meaningful comparison between the two groups. The absence of a difference in the proportion of cases with depressive symptoms, alcohol use disorders is inconsistent with reports that cases with these diagnoses are associated repetition of suicide behavior (Kapur, et al., 2006).

The present study demonstrated that the interval between the index suicide attempt and the most recent past psychiatric hospitalization was shorter for patients who reattempted suicide, compared to those who did not. The association between recent psychiatric hospitalization and suicide reattempt or suicide completion is well established in the literature (Appleby, et al., 1999; Desai, et al., 2005; Hunt, et al., 2009; Valenstein, et al., 2009). Although every patient in the present study experienced a psychiatric hospitalization, those who had a history of recent psychiatric hospitalization prior to the index attempt were more likely to experience a suicide reattempt in the six months after the index attempt. Frequent psychiatric hospitalization may be associated with an unmeasured risk factor that both increased the likelihood of hospitalization and increased the risk for suicide reattempt.

Aim One Findings

Aim One described, for patients who did and did not experience a suicide re-attempt in six months after the index attempt, the setting, provider, type, timing, duration and intensity of behavioral health care to veterans recently hospitalized for a suicide attempt.

Comparison with Other Studies

In the following paragraphs, I will compare the findings related to Aim One of this study, to those of other published works.

Interval between last healthcare contact and suicide attempt. The present study evaluated the interval between the most recent behavioral health and primary care contacts and the index suicide attempt. In the thirty days prior to the index suicide attempt, 41% of patients experienced a behavioral health encounter and 18% experienced a primary care encounter.

Of patients who reattempted suicide ($n = 31$), 28 participated in outpatient behavioral health care during the interval between the index hospital discharge and the suicide reattempt. Of these 28 patients, 15 (54%) experienced a behavioral health appointment in the seven days prior to the reattempt. An additional eight patients (29%) experienced a behavioral health appointment within 30 days of the reattempt. Overall, 82% of patients who experienced a suicide reattempt participated in behavioral healthcare within 30 days of the repeat attempt. The greater proportion of patients who participated in behavioral health care prior to the repeat attempt, compared to the proportion of those patients who participated in behavioral health care prior to the index attempt (82% vs. 41%, respectively) is likely a reflection of the assertive treatment delivered to these veterans after the index attempt, by way of the suicide prevention program.

Three studies set in VA have investigated the interval between a suicide event and the most recent clinical contact prior to the suicide event. In the only study examining the nationwide prevalence of suicide attempts in Veterans, 80% of suicide attempts occurred within four weeks of any contact with VA (Kemp & Bossarte, 2012). Furthermore, 50% of those seen within a year of their suicide attempt were seen in primary care, and another 40% were seen in a behavioral health clinic in the year prior to the suicide attempt. A study of suicides in veterans with a substance use disorder reported that the majority of the nation-wide sample (95%) had some contact with VA in the year prior to death, and 55% had VA contact in the month before death (Ilgen, et al., 2012). A smaller study, set in Oregon, examined the last VA clinical contact of 112 veterans who completed suicide. In the year prior to death, 63% had one or more primary care contacts, and 48% had one or more behavioral health contacts (Denneson, et al., 2010).

Consistent with these findings, the present study found that a large proportion of suicide attempts

(index and repeat) were preceded by a clinical contact in mental health or primary care in the 30 days prior to the index attempt and the repeat attempt.

Timing and intensity of behavioral health treatment after psychiatric discharge. The present study determined that 84% of patients completed a behavioral health follow-up visit within seven days, surpassing the proportion of seven-day behavioral health follow up in other studies. Pfeiffer and colleagues found that only 39% of VA patients hospitalized for depression received behavioral health within seven days (Pfeiffer, et al., 2012). In the present study, completion of a behavioral health encounter within 30 days was determined for 95% of the cohort that did not experience a suicide reattempt. Other studies have investigated 30-day behavioral health follow up after VA psychiatric hospitalization in specific clinical populations. For example, in patients diagnosed with depression, the proportion of patients completing 30-day appointments was 76% (Pfeiffer, et al., 2012). In VA patients with comorbid psychiatric and substance use disorder, 71% received psychiatric treatment, SUD treatment, or both within 30 days of discharge (Ilgen, Hu, Moos, & McKellar, 2008).

In its evaluation of follow-up delivered to VA patients hospitalized for a psychiatric condition, RAND investigators determined seven-day and 30-day post-discharge behavioral health follow-up attendance for all diagnostic groups (Watkins & Pincus, 2011). The VHA national average for seven-day appointment attendance was 48%, ranging from 38% to 61% among VISNs. The proportion of patients who attended a behavioral health follow-up appointment in 30 days was 78% for all of VHA, ranging from 71% to 84% among VISNs. The proportions of those in the present study who completed a seven-day appointment (84%) exceeded the national average and meet the upper end of the range among VISNs. The proportion of those in the present study who completed any 30-day behavioral health appointment was 95%, far exceeding the national VHA average and the range of proportions among VISNs.

The present study found that for reattempt and no-reattempt groups, the median time to any behavioral health follow-up was one and two days, respectively. This interval is much shorter

than that reported by the RAND evaluation, which determined that for those with any follow-up, the mean number of days to the first visit was approximately 27 days. Among the VISNs, this interval ranged from 20 days to 35 days (Watkins & Pincus, 2011).

The present study was the only one to examine whether patients completed four behavioral health appointments in the 30 days after discharge from psychiatric hospitalization. With the implementation of its suicide prevention program, VA required this intensity of behavioral health care when veterans were identified as a “High Risk of Suicide”. Of those without a suicide reattempt and who completed any behavioral health encounters in the first 30 days (n = 449), 73% of patients completed 4 or more encounters. Currently, there is no clinical standard of care to determine the acceptable proportion of patients who should complete four or more behavioral health encounters in the month after discharge. However, VA performance measurement standards mandate that 85% of patients identified as a high risk of suicide receive this intensity of behavioral health care in the month after discharge. Therefore, those who did not reattempt did not meet this standard.

A relatively greater proportion of patients in the 31-180 day reattempt cohort exceeded the performance of the no-reattempt cohort on the two VA post-discharge follow-up requirements. Of the twenty patients in this reattempt cohort, 19 (95%) completed the requirement for a behavioral health contact with one week of discharge. The requirement for the High Risk of Suicide patients, to complete four behavioral health appointments in the first 30 days after discharge, was fulfilled by 18 (90%) of the 20 patients in the 31-180 day reattempt cohort. In comparison, of the patients in the no-reattempt cohort, 84% completed a seven-day appointment and 72% completed four appointments in the first 30 days after discharge.

The present study determined that the proportion of patients who received timely and intense post-discharge behavioral health follow-up met or exceeded proportions reported in other studies of VA psychiatric populations. It should be noted that the sample in the present study was the only one to be exposed to the VA suicide prevention program. The efforts of the suicide

prevention program to facilitate behavioral health appointment scheduling and patient engagement likely contributed to the robust performance on the quality indicators for post-discharge follow-up in this sample.

The present study determined that, compared to the group that did not experience a reattempt, patients who experienced a suicide reattempt in days 31-180 after discharge experienced more timely and more intense behavioral health care. Specifically, greater proportions of patients who reattempted suicide in days 31-180 received care in the seven-day (95% vs. 85%) and 30-day (100% vs. 96%) post discharge period. A greater proportion of patients in the reattempt group completed 4 behavioral health appointments in the 30 days after discharge (90% vs. 73%). When comparing the total number of completed behavioral health appointments in the immediate post-discharge interval, patients who reattempted suicide in days 31-180, experienced more appointments in the first seven days and the first 30 days after hospital discharge than patients who did not reattempt suicide. These results suggest that patients, who experienced a reattempt within six months of discharge, not only received more behavioral health appointments but also received them sooner and with greater intensity, compared to the group that did not experience a reattempt. These findings are counterintuitive to the recommendations of suicide prevention strategies, which promote timely and intense care for psychiatric patients after hospital discharge.

The notion that “more care is better” for high-risk psychiatric patients has been challenged in prior research. A 2000 study examined the number and types of appointments delivered to Medicaid recipients in Massachusetts after psychiatric discharge and the risk for psychiatric readmission. The investigator concluded that patients who received any behavioral health care were less likely to experience a 30-day psychiatric readmission, compared to those who received no behavioral health care. However, patients who received above the median number of appointments were more likely to experience a readmission in 30-days. Findings were significant even when adjusting for severity of illness and functional status (Huff, 2000). This

lends support to the recommendation for determining additional confounding risk factors that may be contributing to the delivery of behavioral health treatment and the risk for a new episode of acute psychiatric symptoms or suicide reattempt.

Provider of treatment. In the present study, all behavioral health treatments in the first thirty days after discharge were delivered by a median of three providers to the no-reattempt group, IQR = 2-5, and by a median of three providers to the 31-180 day reattempt group, IQR = 3-5. A study of Medicaid recipients in Massachusetts reported that 38% of patients discharged from a psychiatric hospitalization contacted four to nine providers in the 30 days after discharge (Huff, 2000).

Setting and modality of treatment. A review of the literature did not yield any works describing variation in the setting of behavioral health treatment in the post-discharge period and risk for suicide attempt. When examining the modality of appointments in the first 30 days after discharge, patients in the 31-180 reattempt group attended more phone appointments than the no-reattempt group (median 2.5 appointments vs. one appointment, respectively). In a case-control study of suicides that occurred within two weeks of hospital discharge, patients who completed suicide were less likely to experience the last clinical encounter by face-to-face appointment than telephone, O.R. = 0.18, $p = .030$. Investigators concluded that a face-to-face visit was slightly protective against suicide, when compared to telephone visits (Bickley, et al., 2013)

Type of treatment. The present study determined no differences in the intensity of care, by treatment type, when comparing the no-reattempt group, and the 31-180 day reattempt group. As it relates to the timing of care, by treatment type, patients who reattempted suicide attended mental health and suicide prevention appointments sooner, when compared to the no-reattempt group.

It was noted that there was a difference in the number of patients with a primary or secondary substance use disorder or post-traumatic stress disorder, and the number of patients who participated in Substance Use or PTSD care. In the sample of patients who were admitted to

a VA inpatient unit at the time of the index suicide attempt (N = 504), 342 patients had a primary or secondary diagnosis of a substance use disorder, and 144 patients attended any Substance Use appointment during the six-month observation period. In other words, approximately 40% of those with a diagnosed substance use disorder received specified treatment. A similar trend was identified among patient with PTSD. Of the 151 patients with a primary or secondary diagnosis of PTSD, 59 attended any PTSD appointment in the post-discharge period (39%). These results suggest that much of the treatment delivered in the most immediate post discharge period does not target the disorder under treatment during the index hospitalization.

Prior studies have suggested that there is variation in the receipt of evidence-based treatment for PTSD. Evaluations of VA mental health services determined that evidence-based psychotherapy for PTSD was inadequately delivered to veterans with the disorder (Rosen, et al., 2004). As a result, VA has made changes to increase the availability of evidence-based PTSD treatment. For example, since 2006 VA has increased its mental health workforce capacity, and provided ongoing systematic training of clinicians in evidence-based psychotherapies for PTSD (Karlin, et al., 2010). In a recent RAND evaluation of VHA mental health services, investigators reported that evidence based treatments for PTSD were implemented in 98% of facilities. However, in spite of these efforts to increase access to evidence-based psychotherapies for PTSD, only 20% of PTSD patients received evidence-based psychotherapy for these conditions (Watkins & Pincus, 2011).

Similar differences in the delivery of SUD treatments in VA have also been reported. In the aforementioned RAND investigation of VHA mental health care delivery, treatments such as intensive outpatient treatment and psychosocial interventions, were implemented at more than 90% of VA facilities; approximately 80% of facilities had implemented opiate agonist therapy and integrated dual diagnosis therapy by 2009. However, the capacity of VHA facilities to provide these services had not translated into patient-level receipt of targeted care for SUD. Only 22% of SUD patients identified in this evaluation received the indicated treatment (Watkins &

Pincus, 2011). The present study echoes the finding that veterans with these psychiatric disorders may not be receiving targeted treatment, and that this is not related to the organizational capacity to provide such treatments.

Approximately 15% of patients who participated in treatment (N=496) attended psychology appointments. At first glance, it appears that relatively few patients attended psychology appointments in the six months after discharge. It is possible that more than the 15% of patients who attended psychology appointments were exposed to psychotherapeutic interventions, during other types of behavioral health appointments. Without CPT codes, it was not possible to determine whether patients were exposed to psychotherapeutic procedures in other behavioral health clinics outside of the psychology stop codes. Therefore, the proportion of appointments categorized in the present study as psychology treatments likely underestimate the extent of psychotherapy procedures delivered to this population, by non-psychologist healthcare providers.

Aim Two Findings

Aim Two set out to describe associations between factors related to patient characteristics, prior health utilization, index admission and the timing of post-discharge behavioral health care.

Comparison with other Studies

Transitions of care and timing of the first post-discharge appointment. The analysis for Aim Two determined whether factors relevant to the inpatient hospitalization were associated with the number of days between inpatient discharge and completion of the first behavioral health appointment. One statistically significant association was between the number of days to first behavioral health appointment and whether the patient was hospitalized at a different inpatient site than the patients “home” site. For the 457 patients who did not experience a facility change,

the median time to the first appointment was two days, IQR = 0-6. For patients who experienced a facility change (n = 39), the median time to the first appointment was one day, IQR=0-3. This finding was surprising, since it was expected that patients who experienced a facility change would be exposed to more opportunities for disruptions in continuity of care during the transition from inpatient to outpatient care. However, this did not appear to be the case. It is possible that knowledge of the patient's facility change generated heightened scrutiny of the discharge plan and greater vigilance in communicating the discharge plan to the staff at the "home" site. Additionally, the difference of one day is not clinically insignificant since many suicide events can occur within one day of contact with a healthcare provider (Hunt, et al., 2009).

A second finding related to this aim was the relationship between experiencing a medical admission for the index hospitalization and the number of days to the first post-discharge appointment. Although the number of patients that experienced a medical admission to manage the sequelae of the suicide attempt was relatively small (n = 37), this group attended the first post-discharge appointment a median of four days later than those who did not. A potential explanation for this finding may be the lack of specialized knowledge of medical unit staff regarding the recommendations for post-discharge care for "High Risk of Suicide" patients. Since these staff may not typically schedule behavioral health post-discharge care, there is likely more variation in these processes compared to the discharge planning that occurs on a psychiatric unit. This aspect of care was not measured in the present study and will likely inform future research.

Few studies have examined transitions of patients with psychiatric disorders from non-psychiatric units, into outpatient mental health treatment. One multi-site study, conducted at VA facilities, examined the effect of a care coordination intervention for patients during a medical or surgical admission, with comorbid symptoms of depression, anxiety and/or alcohol abuse. Efforts to proactively manage the discharge of these patients and to coordinate post-discharge mental health treatment resulted in reduced costs (associated with fewer inpatient bed days) for the group who received the intervention. Patients who were exposed to the care management intervention

also attended more outpatient appointments in the 12 months post discharge, compared to patients who received usual care (Kominski, et al., 2001). These results underscore the need to address challenges associated with transitions of care for patients with psychiatric conditions who experience medical admissions.

Recommendations for Future Research

Leveraging Health Information Technology

Future research should leverage information technology to enhance surveillance of at-risk populations and to capture the effects of dual use of VA and non-VA services. The development of health information exchanges between VA and non-VA healthcare facilities is currently underway (Weiner & Haggstrom, 2013). Exchanges should be designed with consideration for suicide behavior surveillance, which will allow for the study of non-VA care and its impact on risk for future suicide behavior. The development of health information exchanges between VA and DoD is also in development has the potential to provide longitudinal data for observation of the onset of risk factors and the impact of healthcare services on these factors. These enhancements will be crucial to the study of suicide prevention in active duty and veteran populations. *A priori* consideration for suicide surveillance should be included in the development of these VA initiatives.

VISN-Level Comparisons of Healthcare Delivery and Suicide Behavior Outcomes

The present study found that variation of suicide attempt outcomes, within one VISN, was not sufficient to conduct robust analyses for describing the association between patient-level risk factors and the repetition of a suicide attempt. Future study will require multi-VISN or national samples of cases in order to conduct multivariate analyses towards determining the association between healthcare delivery and future suicide behavior.

The majority of patients in the present study received some sort of behavioral health treatment after hospitalization for a suicide attempt and most of these met seven-day and 30-day performance standards set by VA. Sources of variation that can be linked to suicide behavior outcomes require evaluation beyond merely the occurrence of an appointment, but on the procedures that took place during the appointment, the quality of those procedures, or the extent to which the appointment specifically addressed the recent suicide behavior.

Investigate Potential Differences in Healthcare Delivery to PTSD and SUD Patients

Treatment of an underlying mental health condition is a necessary component of caring for a patient after a suicide attempt. The scope of the present study did not include an examination of PTSD and SUD treatments delivered to patients with PTSD and SUD diagnoses. It was noted, however, that the numbers of patients who did receive these treatments were not equivalent to those who were diagnosed with PTSD or SUD during their index hospitalization. Further study should determine whether veterans with these disorders are receiving the evidence-based care indicated for these conditions.

Populations with PTSD and SUD are of particular interest to VA due to the prevalence of these disorders in VA and the associated risk for suicide behaviors. Enhanced access to evidence-based PTSD and SUD treatment has recently been emphasized in light of rising rates of veteran suicides. Contemporary perspectives in suicide prevention assert that identifying and treating underlying psychiatric conditions, such as PTSD or SUD, will reduce the risk of future suicide (US Department of Health and Human Services (HHS) Office of the Surgeon General and National Action Alliance for Suicide Prevention).

Establish Methods for Evaluating Quality of Behavioral Health Appointments

Simply counting the number of attended appointments does not provide the depth of variation required to target areas for intervention. Additionally, counting the number of appointments only reinforces the potential fallacy that more appointments are directly associated with a risk for future reattempt. Indeed, at first glance, it appears that patients in this study who

reattempted suicide received more behavioral health appointments, than those that did not reattempt suicide. Further risk adjustment is required to determine if more appointments are completed in patients who reattempt suicide because of an underlying clinical or interpersonal need for care (as indicated by a measure of illness severity, or other psychosocial characteristic) and not because clinical appointments in and of themselves contribute to suicide reattempt risk.

Clinical Recommendations

This study found an unexpected relationship between the frequency and intensity of behavioral health appointments and suicide reattempt in days 31-180 after psychiatric discharge for a suicide attempt. The finding that patients who reattempted also experienced more frequent and intense care contradicts a commonly held view that quality of behavioral health care can be measured through appointment attendance. This contradiction challenges health policy initiatives that emphasize accountability for appointment attendance. Without accurate quality measures, health care providers cannot begin to improve their clinical practice. For example, the delivery of evidence-based treatments, especially to patients with PTSD or substance use disorder, may improve the quality of care delivered during behavioral health appointments.

Behavioral health appointment attendance is necessary but not sufficient for a comprehensive systems-based suicide prevention strategy. Systems of care should be developed around a bundle of services that can readily accommodate fluctuations in acuity for clinical populations at high risk of suicide (e.g. patients with depression). Some examples of this are: 24-hour crisis intervention, advanced access clinic schedules, and consultation with support for non-mental health providers who encounter suicidal patients. These efforts have been adopted by healthcare systems that have subsequently demonstrated reductions in suicide rates (Coffey, 2007). Patient sub-populations, defined by clinical characteristics such as a diagnosis of PTSD or

a substance use disorder, should be readily identified and targeted for specialized, evidence-based treatment.

The broader use of phone or group-based care to maximizes efficient use of resources, acknowledges patient preference for modality, and encourages peer support from group encounters. The delivery of psychotherapeutic interventions via phone or videoconferencing has been validated in clinical settings (Mohr, Burns, Schueller, Clarke, & Klinkman, 2013). Such interventions have not been studied in a veteran population determined to be at high risk of suicide. However, the systematic implementation and evaluation of interventions to improve access to care are supported by national suicide prevention strategies (US Department of Health and Human Services (HHS) Office of the Surgeon General and National Action Alliance for Suicide Prevention).

It was found that multiple providers were involved in an individual's behavioral health treatment. It was not possible to determine if providers functioned as a team in caring for this high-risk population. Emphasis on team-based clinical care can potentially minimize disruptions to continuity of care. High functioning clinic teams are another component of a clinical culture that supports effective suicide management strategies.

Implications for Research Methods and Tools

This is the first known study to combine SPAN and VA administrative data for investigation of behavioral health treatment delivery to veterans who have experienced a suicide-related event. Access to these data sources has created opportunities for observational study of a notoriously elusive study population. Due to the nascence of the SPAN data source, and the lack of published works using SPAN data, many of the implications of using SPAN data for observational study were discovered during the present study.

At this time, there is no single source of VA data to describe the delivery of any health treatment to a cohort of patients who have recently attempted suicide. SPAN data must be combined with VA administrative data in order to glean accurate demographic and utilization information. Even with successful merging of these two data sources, there is not an established method for combining these data with information from community providers, in the event that the veteran received care in the community.

Although the ability to study suicide behavior in VHA surpasses that of other healthcare systems, there are limitations in methods when studying the effect of treatments on suicide behavior in any population. These limitations are related to the scarcity of ethical methods and study designs that would allow for comparison between treatment and control groups, precluding the use of randomized controlled trials. The state of the science in suicide behavior surveillance and prevention is characterized by the observation and measurement of variation in treatment and risk exposure. To further compound these challenges, the delivery of treatment to this population is informed by mandated frequency of appointments. As a result there is little variation to study, as was the case in the present study.

To capture a more comprehensive representation of care experienced by veterans, it will be necessary to establish linkages to community data sources in order to determine behavioral health delivery to veterans who do not receive care at VHA. Such initiatives are in pilot stages at some VA facilities.

SPAN is currently designed to provide information for clinical quality improvement activities, not research. Efforts to improve the quality of data entered into SPAN and validation of SPAN data elements will enhance the reliability of this data source for research. Evaluation of data entry training to suicide prevention coordinators should be part of this improvement effort. Access to real-time data collection for observational study of treatment delivery will resolve some limitations of the current study, specifically those that related to data elements that could not be captured retrospectively.

One immediate improvement to the SPAN data source could be the identification of hospitalization in VA or non-VA facility. This modification will potentially streamline case finding for future studies. If this option had been available in the present study, it would have reduced the number of patients included in the original data request, thus reducing the risk of a breach of confidentiality through exposure to unneeded protected health information.

Finally, data that accurately reflects the care that was delivered during the clinical encounter will enhance future investigations of behavioral health treatment delivery to this vulnerable population. The development and use of procedural coding for specific evidence based therapies would allow for detection of these therapies in administrative data, eliminating the need for chart abstractions.

Limitations

Findings related to the timing and intensity of care, by treatment type, setting or provider, should be interpreted with caution due to limitations related to the sample. Specifically, the outcome of interest for aim one—suicide reattempt—was a rare event. This sample was not large enough to capture enough events to conduct the planned regression analysis.

The observation period (six months after discharge from a psychiatric unit) was shorter than many other studies investigating repetition of suicide behavior. Other studies cite reattempt rates in twelve or more months. In the present study, extending the observation period to one year or more would have reduced the number of cases to include in the sample. Studies examining changes in the rate of suicide over time, after a psychiatric discharge, found that the highest rate of suicide occurs within the six months after discharge. Therefore, it is unlikely that a higher rate of reattempted suicide would have occurred during the unobserved period between six and twelve months. The rate of reattempt in the present study was approximately 6% in six months, whereas other studies report reattempt rates between 14% and 16% in 12 months after discharge.

A substantial proportion of veterans in this cohort were not hospitalized at VA for the index admission. These could not be included for analysis, since many data elements relied on discharge date for variable creation. As a result, these cases could not be included in analysis, reducing sample size. Because veterans who were not hospitalized at a VA medical center were excluded, the results of the present study can only be generalized to veterans who experienced a VA medical center admission for a suicide attempt.

There were several limitations associated with the availability of certain data elements in the VA administrative data. For example, some data elements related to demographic information could not be captured retrospectively. Variables such as “residing in county with VA facility”, “Service Connected Disability %”, and “Marital Status” reflect the veteran’s status at the time of the data request (February, 2013) and not at the time of the index suicide attempt.

Data related to encounter information was also limited. In the present study, only completed encounters were captured. As a result, I was unable to describe the extent of no-show or cancelled appointments. This detracts from generating conclusions about the efforts made by the healthcare organization versus patients towards participation in behavioral healthcare. Limitations in describing treatments that occurred during encounters were due to the inability to obtain CPT codes for this investigation. As a result, the procedures conducted during the patient encounter are not part of the description of “treatment”. Only VA stop codes were used to inform “treatment”, which limits assumptions regarding the therapeutic value of the encounters included in the study. This also limits comparison with other studies, which have used CPT codes to differentiate among services delivered within the clinic types.

Finally, there was little variation in treatment exposure. Almost all of the veterans in the present study received some sort of behavioral health treatment during the observation period. The majority received the recommended standard of care mandated by VA policies. There may be unmeasured variation in the quality of care that is contributing to the difference in reattempt rates between the two groups.

Conclusion

The study of post-discharge healthcare utilization for veterans who have recently attempted suicide is relatively nascent. The ability to study large cohorts of patients who have recently attempted suicide is possible due to the surveillance and data collection efforts of VHA. Future study in this area will be enhanced through ongoing efforts to improve the quality of data included in these surveillance tools.

In describing the care delivered to patients after a suicide attempt, Kane's treatment essentials (timing, duration, intensity, provider, and setting), contributed some explanation for variation in the outcome of interest (suicide reattempt). Some of these explanations were surprising; trends that would typically be associated with more ideal treatment delivery were more prevalent in the group with the undesirable outcome: suicide reattempt. However, Kane's treatment factors, as operationalized in the present study, were not able to capture aspects of quality care specific to treating a veteran after a suicide attempt. Future work should attempt to determine other sources of variation in quality in order to glean potential associations with suicide behavior outcomes.

Future study of suicide prevention and healthcare utilization will rely on continued surveillance of suicide behaviors in large patient cohorts. The VHA, as the largest integrated health system in the US, will be a key player in this research. As VHA continues to work towards extending its reach into the community, its surveillance and prevention strategies will include larger and potentially more diverse veteran groups.

APPENDIX A

DOCUMENTATION OF ACTIVATING THE CATEGORY II PATIENT RECORD FLAG: HIGH RISK OF SUICIDE

Flag Name: HIGH RISK OF SUICIDE

Assignment Narrative:

Problem: This veteran has been determined to be at high risk for suicide.

If you are the primary Mental Health provider for this veteran the following procedure must be followed:

**Over the next 30 days this veteran needs to be monitored weekly by appointment or phone.

**After 30 days the veteran needs to be monitored at least monthly for the next 2 months. All contacts need to be documented.

**Assure that patient's diagnoses and care plan are reviewed in light of this identified risk.

**Develop a safety plan that is documented in CPRS with a copy given to the veteran. The safety plan should assist the veteran in identifying times when he/she is at increased risk and specific steps to take to preserve his or her own life.

Make sure this veteran has the National Suicide Hotline: 1-800-273-TALK (8255).

**Include SPCs [REDACTED] as additional signers to ALL weekly/monthly MH provider progress notes and no-show phone calls.

Flag Type: CLINICAL

Flag Category: II (LOCAL)

Assignment Status: Active

Initial Assigned Date: [REDACTED]

Approved by: [REDACTED]

Next Review Date: [REDACTED]

Owner Site: TENNESSEE VALLEY HCS (TENNESSEE VALLEY HCS)

Originating Site: TENNESSEE VALLEY HCS (TENNESSEE VALLEY HCS)

Figure A1. Sample alert for the Category II Patient Record Flag: High Risk of Suicide. This alert, in the form of a pop-up box, is made visible to the viewer of the medical record when the electronic health record is accessed. When the flag is deactivated, this pop-up box no longer appears.

PRF HIGH RISK FOR SUICIDE PLACED ON CHART

Veteran has been placed on the facility's high risk for suicide list, and a Category II Patient Record Flag, High Risk for Suicide has been placed on Veteran's chart. The status of the PRF will be reviewed at least every 90 days, with documentation associated with that review to be posted in the medical record.

Comment: [REDACTED]

ALL MEDICAL PROVIDERS: Please be alert to veteran making any threats of harm to self, seeking access to means to harm self such as extra medications or firearms, or talking or writing about death, dying or suicide. Contact veteran's principal mental health provider, the facility suicide prevention coordinator, or the psychiatrist on duty if you notice any of these signs.

Principal MH Provider: [REDACTED]

Suicide Prevention Coordinator: [REDACTED]

TO ALL STAFF: Please be attentive, friendly, supportive and respectful of veteran's privacy. If veteran is exhibiting any of the warning signs for suicide, or if you have concerns for any reason, please contact a provider.

THE PRINCIPAL MENTAL HEALTH PROVIDER or case manager for veteran should initiate the following procedures: Please ensure Suicide Safety Plan has been completed.

For the first 30 days after placement on the high risk list suicide risk needs to be evaluated weekly. After 30 days, suicide risk status needs to be evaluated at least monthly. Placement on high risk list must be evaluated at least every 90 days, and status updated/documented.

MISSED OR CANCELLED APPOINTMENTS should be followed by designated outreach procedures and appropriately documented.

Figure A2. Sample narrative that accompanies activation of the Category II Patient Record Flag: High Risk of Suicide. This documentation is a permanent entry in the patient's electronic medical record.

APPENDIX B

VARIABLE DEFINITIONS

Case Identification						
Variable	Description	Purpose	Output	Source	Level of Measurement	Limitations
Suicide Event Type	Suicide attempt since 1/1/2009	Case-finding	Attempt Completion Ideations Undetermined	SPAN: Event Type	nominal	suicide completions are underreported and are not verified by medical examiner, therefore, these data will not be gathered from SPAN documented suicide attempts only represent those that are treated by or reported to the healthcare organization In general, suicide completions and ideations are likely underrepresented in SPAN data.
Event Outcome	Disposition resulting from suicide event; this item will be used to discern suicide attempts that resulted in hospitalization, from attempts that did not result in this outcome.	Case-Finding Patients who are hospitalized for a suicide attempt are exposed to a similar standard of care, post-discharge.	Hospitalization Outpatient Treatment No Treatment Sought Other	SPAN: Outcome	nominal	Hospitalization may have been non-VA, and therefore may not be captured by administrative data. Non-VA admissions will be described but will not be included in analysis, since the date of discharge cannot be accurately ascertained
Study ID	randomly generated 4 digit number, assigned to case for identification purposes.	Case identification	1000-9999	SPSS	nominal	
Demographics						
Variable	Description	Purpose	Output	Source	Level of Measurement	Limitations
Date of Birth	patient's date of birth; can be used to determine age at time of event.	Case Identification to calculate age at time of suicide attempt	mm/dd/yyyy	VHA Medical SAS Dataset: PTF	date	

Age	age in years, at the time of the suicide event	Demographic Description to adjust for utilization behaviors (i.e. older patients more likely to be hospitalized) and for risk of suicide behavior (i.e. higher risk associated with certain age groups)	age in years	SPAN VHA Medical SAS Dataset: PTF	continuous	calculated from event date (SPAN) and date of birth (SAS)
Sex	Sex identified during index hospital admission	Case identification Demographic Description to adjust for gender differences in suicide behavior.	male female	VHA Medical SAS Dataset: PTF	nominal	transgendered individuals are labeled as male or female according to their preference, however this change in the medical record is initiated in collaboration with the patient's physician.
Race & Ethnicity	race and ethnicity identified at time of index hospital admission	Demographic Description to adjust for racial differences in suicide behavior.	Hispanic, White Hispanic, Black American Indian Black Asian White Unknown	VHA Medical SAS Dataset: PTF	nominal	"unknown" race less than 1% of all VA data % of usable race values increases with inpatient data % of usable race values increases with multiple time frames % of usable race values increases with multiple data sources
Marital Status	patient's marital status identified during index hospital admission	Demographic Description to adjust for marital status differences in suicide behavior.	Never married Married Separated Divorced Widowed Unknown	VHA Medical SAS Dataset: PTF	nominal	
Psychiatric Diagnosis	the primary ICD-9-CM listed in "discharge diagnosis" from index hospital admission. In the event that the primary diagnosis is not a psychiatric condition, i.e. If the ICD-9-CM instead reflects the injury sustained secondary to the suicide event, the first listed psychiatric condition will be used.	Demographic Description to adjust for differences in suicide behavior and utilization.	One primary and up to nine secondary ICD-9-CM codes per discharge. Accepted Psychiatric ICD-9-CM codes per VAMH-12 index.	VHA Medical SAS Dataset: PTF	nominal	Reliability of ICD-9-CM data is affected by multiple factors: failure to correctly list diagnoses, omitting procedures (especially OR procedures), coding variation, and keypunch errors (Lloyd, 1999). Diagnoses for suicidal behavior determined from (vancott, 2010)

Medical Comorbidities	number of medical conditions treated in VHA, as evidenced by presence of diagnosis code in encounter information of 2 outpatient medical encounters >30 days apart, or one inpatient hospitalization for the diagnosis.	Risk adjustment: Elixhauser + high risk of suicide comorbidities will be used to guide identification of medical comorbidities	One primary and up to nine secondary ICD-9-CM codes per discharge/encounter	VHA Medical SAS Dataset: OPC		
Service Connected Rating	determination of disability that is attributable to medical or psychiatric conditions that arose during military service	Demographic Description to adjust for differences in utilization patterns by service connectedness	Not Service Connected 0-100% in 10% increments	VHA Medical SAS Dataset: PTF	continuous	"Not service connected" is different than 0% service connected; the former indicates the patient does not have a condition that arose during military service, or has not sought a disability determination rating. The latter indicates that the patient may have a condition that is attributable to military service, but this condition does not result in a disability. As a result, a veteran described as "not service connected" may have a condition that has not yet been identified by the VA disability determination process. This does not affect the purpose of this variable, since it will only be used to adjust for enhanced access to healthcare services
Combat Veteran	A combat veteran is a veteran who served on active duty in a theater of combat operations during a period of war after the Persian Gulf War or in combat against a hostile force during a period of hostilities after November 11, 1998.	Demographic Description to adjust for differences in utilization patterns by combat status	yes/no	VHA Medical SAS Dataset: PTF	binary	Combat veteran status imparts additional benefits for 5 years after discharge from military service, including waiver of copays for inpatient care, outpatient care, outpatient medications and extended care services. Combat status will be used in this study to adjust for enhanced access to care as a result of increased level of benefits for this population.
Address	County will be used to determine proximity to care, i.e. whether veteran lives in same county as VA facility.	Demographic Description to adjust for differences in utilization patterns by proximity to care	Street address or PO BOX City State ZIP code County Country	VHA Medical SAS Dataset: PTF	nominal	Address data cannot be accessed retrospectively at the time of the event. Address information corresponds with the patient's status at the time of the data request, and not the time of the event.

Proximity to treating outpatient facility	Whether veteran lives in the same county as a VA facility or CBOC	This will be determined by ascertaining whether there is a VA facility in the same county of residence, by using county information from the veteran's listed address (see above).	VA facility in county of residence? Yes/no	CBOC county data: TVHS Public Relations	binary	Proximity to VA services as measured by determining the presence of any VA facility in the county of residence, has demonstrated predictive power for mental health service utilization, even when controlling for distance to the nearest VA facility (Weissman, Rosenheck, & Essock, 2002).
Episode of Care: Prior to Index Attempt						
Variable	Description	Purpose	Output	Source	Level of Measurement	Limitations
Prior Attempts	Number of prior suicide attempts Presence of prior attempts		0-99 yes/no	SPAN	continuous binary	Subject to recall bias and variability in SPC chart review to determine number of previous attempts This variable will be compressed into dichotomous variable: "prior suicide attempt-yes/no"
Prior outpatient mental health treatment	mental health treatments in the two years prior to index admission as evidenced by an encounter in a mental health stop code for a psychiatric diagnosis listed in VAMH-12, and psychiatric procedure code.		days since last treatment	VHA Medical SAS Dataset: Outpatient Care Files (OPC)	continuous	reliability of administrative data in capturing care delivery is enhanced (up to 92% in SUD population) when using mental health stop code or bed section, mental health diagnosis code, and mental health procedure code to identify outpatient encounters. does not capture non-VA treatment
Prior outpatient primary care treatment	primary care encounters in the two years prior to admission	Ascertain utilization of medical services prior to index attempt. Determine presence of medical comorbidities treated at VHA	days since last treatment	VHA Medical SAS Dataset: Outpatient Care Files (OPC)	continuous	does not capture non-VA treatment
Prior psychiatric hospitalizations	psychiatric hospitalization as indicated by inpatient admission characterized by a primary discharge diagnosis of a psychiatric condition (VAMH-12) or ICD-9-CM code reflecting self-injurious behavior (E950-E958, E980-E989) and psychiatry bed section in the two years prior to attempt	Ascertain prior healthcare utilization	days since last psychiatric admission	VHA Medical SAS Dataset (PTF)	continuous	does not capture non-VA treatment

Prior medical hospitalizations	medical hospitalization as indicated by inpatient admission characterized by a primary discharge diagnosis other than a psychiatric condition (VAMH-12) or ICD-9-CM code reflecting self-injurious behavior (E950-E958, E980-E989) and non-psychiatry bed section in the two years prior to attempt	Ascertain prior healthcare utilization Determine medical comorbidities by discharge diagnoses	days since last medical admission			does not capture non-VA treatment
Location code, to cboc level	this will indicate the location where outpatient mental health treatment was delivered.		64 possible locations	VHA Medical SAS Dataset: OPC	nominal	
Episode of Care: Inpatient Index Admission						
Variable	Description	Purpose	Output	Source	Level of Measurement	Limitations
Index Event date	Date that suicide event occurred	Case-finding	mm/dd/yyyy	SPAN: Event Date	date	
Index Admit date	Date of hospital admission that was a result of suicide event	Case-finding Calculate LOS	mm/dd/yyyy	VHA Medical SAS Dataset: Patient Treatment File (PTF)	date	
Index Discharge date	Date of hospital discharge, precipitated by suicide attempt	Case-finding This date will be used to calculate, LOS, the six month post-discharge observation period, as well as factors related to timing, duration and intensity of treatment	mm/dd/yyyy	VHA Medical SAS Dataset: PTF	date	

Facility of index admission	The VA facility where the index admission occurred	To determine where inpatient care occurred; this may not be the same facility where veteran will receive outpatient treatment.	581-Huntington 596-Lexington 603-Louisville 614-Memphis 621-Mountain Home 626-Tennessee Valley HCS	VHA Medical SAS Dataset (PTF)	nominal	
Index Admission LOS	Length of stay for index admission, calculated as the number of days between the admission date and the date of discharge from the psychiatric unit.		number of days	VHA Medical SAS Dataset	continuous	
Facility Change	is the inpatient facility affiliated with the medical center where Veteran receives treatment/will receive treatment upon discharge?		yes/no	VHA Medical SAS Dataset/SPAN	binary	
Bed Section	The bed section is the specialty code of the physician who manages the patient's care during all or a portion of the inpatient stay bed sections used during inpatient stay. Will be used to determine whether any bed section, other than psychiatry, was used during the index admission.		number of bed sections utilized during inpatient admission or, was a bed section utilized that was not psychiatry?	VHA Medical SAS Dataset (PTF)	continuous binary	Reliability of bed section information is variable, depending on the bedsection; agreement between administrative bedsection data (citing 20 most commonly recorded bed sections) and the medical record were best for orthopedics (kappa=0.852), medical ICU (kappa=0.846), and Neurology (kappa = 0.820); worst for Hematology/oncology (kappa = 0.009), Intermediate Medicine (kappa=0.248), Substance Abuse (kappa=0.259) and Ear, Nose, Throat (kappa=0.290). (Kashner, 1998)
Consult Initiation	whether inpatient provider initiated consult for PTSD, SUD or mental health treatment.	Will be used in analysis to determine if consult initiation is associated with the length of time (in days) until first PTSD, SUD or mental health treatment.	yes/no	VHA Medical SAS Dataset: PTF	binary	
Episode of Care: Post-Discharge Aftercare						
Variable	Description	Purpose	Output	Source	Level of Measurement	Limitations
Suicide Prevention Staff	Name of suicide prevention staff member at VISN 9 facility.	Will be used to identify care that was delivered by suicide prevention staff, distinct from other types of mental health treatment	name	VISN 9 Lead SPC	nominal	

time to first outpatient behavioral health appointment	number of days between index discharge and first qualifying mental health encounter	this will inform management plan continuity measure, and the treatment factor of timing	number of days	VHA Medical SAS Dataset: OPC	continuous	non-VA treatment information is not available
Patient Record Flag Activation	was a PRF: High Risk of Suicide completed after the suicide event date? This will be used to determine if the recommendations for post-discharge aftercare were available to the inpatient treatment team.	this will inform information continuity measure	yes/no	VHA Medical SAS Dataset: OPC	binary	this is a measure of continuity that can be determined without any input from the patient.
Concentration of Care	Number of providers with whom the patient had contact during first 7 and first 30 days after discharge Measure based on the assumption that a greater concentration of care with one provider (or care site) signifies stronger relationships, more consistent care plans, and/or smoother transfers of information.	this will inform measure of concentration of care, as it pertains to the involvement of mental health providers in the patient's treatment.	Range 0 to ∞	VHA Medical SAS Dataset: OPC	continuous	non-VA treatment information is not available
Treatment: Type	type of outpatient behavioral health treatment		Mental Health Suicide Prevention Psychology Substance Use Treatment PTSD Homeless Care Vocational Treatment	VHA Medical SAS Dataset: OPC	nominal	determined by VA Clinic Stop Code non-VA treatment information is not available
Timing	# of days between discharge and first MH treatment		Range 0 to 180	VHA Medical SAS Dataset: OPC	continuous	non-VA treatment information is not available
Duration	# days between first and last observed behavioral health appointment		Range 0 to 180	VHA Medical SAS Dataset: OPC	continuous	non-VA treatment information is not available
Intensity	# any mental health treatments in first 7 and first 30 days		Range 0 to ∞	VHA Medical SAS Dataset: OPC	continuous	non-VA treatment information is not available

Setting of outpatient treatment	name of setting where outpatient behavioral health treatment occurred		Medical Center CBOC Residential	VHA Medical SAS Dataset: OPC	nominal	non-VA treatment information is not available
Modality of outpatient treatment	name of modality by which outpatient behavioral health treatment occurred		Face-to-Face (Individual) Group Telephone	VHA Medical SAS Dataset: OPC	nominal	non-VA treatment information is not available

APPENDIX C

BEHAVIORAL HEALTH ENCOUNTER STOP CODES AND CORRESPONDING VARIABLE CATEGORIES

	TREATMENT TYPE CATEGORIES (ALL APPTS)	13785	(% OF ALL APPTS)	TREATMENT TYPE CATEGORIES (ALL APPTS)	13785	(% OF ALL APPTS)
	HOMELESS CARE TOTAL	511	3.71%	HOMELESS CARE TOTAL	511	3.71%
511	GRANT & PER DIEM-IND	40	0.29%	Homeless Care Individual	411	2.98%
511	GRANT & PER DIEM	42	0.30%			
522	HUD-VASH	75	0.54%			
522	HUD-VASH-IND	54	0.39%			
529	HCHV/HCFI	85	0.62%			
529	HCHV/HCFI-IND	115	0.83%			
507	HUD/VASH-GRP	2	0.01%	Homeless Care Group	12	0.09%
508	HCHV/HCFI-GRP	10	0.07%	Homeless Care Telephone	88	0.64%
528	TELEPHONE HCFI	28	0.20%			
530	TELEPHONE/HUD-VASH	60	0.44%			
	MENTAL HEALTH TOTAL	4418	32.05%	MENTAL HEALTH TOTAL	4418	32.05%
502	MENTAL HEALTH-IND	1700	12.33%	Mental Health Individual	3522	25.55%
503	MEN HLTH RESID CARE-IND	57	0.41%			
509	PSYCHIATRY-IND	748	5.43%			
512	PSYCHIATRY CONSULTATION	91	0.66%			
571	SERV-MH IND	72	0.52%			
573	MH INCEN THER-FACE TO FACE	8	0.06%			
582	PRRC IND	2	0.01%			
576	PSYCHOGERIA CLIN/INDV	247	1.79%			
588	RRTP AFTERCARE IND	1	0.01%			
591	INCARCERATED VETS REENTRY	7	0.05%			
534	MH INTGRTD CARE IND	63	0.46%			

552	MHICM INDIVIDUAL	492	3.57%			
564	MH TEAM CASE MGT	19	0.14%			
596	RRTP ADMISSION SCREENING SRVCS	15	0.11%			
550	MENTAL HEALTH-GRP	250	1.81%	Mental Health Group	337	2.44%
553	DAY TRMT-GRP	5	0.04%			
566	MH RISK FAC RED EDU GRP	7	0.05%			
572	SERV-MH GRP	2	0.01%			
583	PRRC GRP	15	0.11%			
595	RRTP AFTERCARE GRP	58	0.42%			
546	TELEPHONE/MHICM	39	0.28%	Mental Health Telephone	559	4.06%
527	TELEPHONE/GENERAL PSYCHIATRY	513	3.72%			
597	TELEPHONE RRTP	7	0.05%			
	PSYCHOLOGY TOTAL	286	2.07%	PSYCHOLOGY TOTAL	286	2.07%
510	PSYCHOLOGY-IND	176	1.28%	Psychology Individual	210	1.52%
524	ACT DUTY SEX TRAUMA	30	0.22%			
538	PSYCHOLOGICAL TESTING	4	0.03%			
558	PSYCHOLOGY-GRP	76	0.55%	Psychology Group	76	0.55%
	PTSD TOTAL	625	4.53%	PTSD TOTAL	625	4.53%
519	SUBST USE DIS/PTSD TEAMS	11	0.08%	PTSD Individual	396	2.87%
540	PTSD CLINICAL TEAM PTS IND	234	1.70%			
580	PTSD DAY HOSP	101	0.73%			
562	PTSD-IND	50	0.36%			
516	PTSD GROUP	107	0.78%	PTSD Group	214	1.55%
561	PCT PTSD-GRP	107	0.78%			
542	TELEPHONE/PTSD	15	0.11%	PTSD Telephone	15	0.11%
	SUBSTANCE USE TOTAL	5516	40.01%	SUBSTANCE USE TOTAL	5516	40.01%
513	SUBST USE DISORDR IND	1417	10.28%	Substance Use Individual	1643	11.92%
514	SUBST USE DISORDR HOME VST	17	0.12%			

523	OPIOID SUBSTITUTION	12	0.09%			
548	INTNSE SUB USE DSRDR IND	197	1.43%			
547	INTNSE SUB USE DSRDR GRP	596	4.32%	Substance Use Group	3741	27.14%
560	SUBST USE DISORDR GRP	3145	22.81%			
545	PHONE SUBSTANCE USE DSORDR	132	0.96%	Substance Use Telephone	132	0.96%
	VOCATIONAL TOTAL	133	0.96%	VOCATIONAL TOTAL	133	0.96%
535	MH VOCAT ASSIST-IND	1	0.01%	Vocational Individual	129	0.94%
568	MH CWT/SE FACE TO FACE	63	0.46%			
569	MH CWT/SE NON-F TO F (MASNONCT)	1	0.01%			
574	MH CWT/TWE FACE TO FACE	64	0.46%			
575	MH VOCAT ASSIST-GRP	1	0.01%	Vocational Group	1	0.01%
536	TELEPHONE/MH VOC ASSIST	2	0.01%	Vocational Telephone	3	0.02%
537	TELEPHONE PSYC/SOC REHAB	1	0.01%			
	SUICIDE PREVENTION (CLINIC + SPC) TOTAL	2296	16.66%	SUICIDE PREVENTION (CLINIC + SPC) TOTAL	2296	16.66%
502	MENTAL HEALTH-IND	1206	8.75%	Suicide Prevention Individual	1212	8.79%
509	PSYCHIATRY-IND	3	0.02%			
510	PSYCHOLOGY-IND	1	0.01%			
571	SERV-MH IND	1	0.01%			
591	INCARCERATED VETS REENTRY	1	0.01%			
550	MENTAL HEALTH-GRP	190	1.38%	Suicide Prevention Group	195	1.41%
558	PSYCHOLOGY-GRP	4	0.03%			
560	SUBST USE DISORDR GRP	1	0.01%			
527	TELEPHONE/GENERAL PSYCHIATRY	889	6.45%	Suicide Prevention Telephone	889	6.45%

APPENDIX D:

ELIXHAUSER COMORBIDITY DIAGNOSES AND CATEGORIES (N = 791)

ICD-9-CM Code	Description	N (%)	Elixhauser Category n (%)
ALL	ALL Diagnoses	791 (100.0)	
250.00	Diabetes Mellitus without Mention of Complication, Type II, or Unspecified Type, not Stated as Uncontrolled	80 (10.1)	Diabetes, uncomplicated 82 (10.4)
250.02	Diabetes Mellitus without Mention of Complication, Type II, or Unspecified Type, Uncontrolled	1 (0.1)	
250.22	Diabetes with Hyperosmolarity, Type II or Unspecified Type, Uncontrolled	1 (0.1)	
250.60	Diabetes with Neurological Manifestations, Type II or Unspecified, not Stated as Uncontrolled	5 (0.6)	Diabetes, complicated 8 (1.0)
250.62	Diabetes with Neurological Manifestations, Type II or Unspecified, Uncontrolled	1 (0.1)	
250.50	Diabetes with Ophthalmic Manifestations, Type II or Unspecified, not Stated as Uncontrolled	2 (0.3)	
531.70	Chronic Gastric Ulcer without mention of Hemorrhage or Perforation, without mention of Obstruction	1 (0.1)	Peptic ulcer disease 8 (1.0)
532.90	Duodenal Ulcer, Unspecified as Acute or Chronic, without mention of Hemorrhage or Perforation, without mention of Obstruction	1 (0.1)	
533.90	Peptic Ulcer of Unspecified Site, Unspecified as Acute or Chronic, without mention of Hemorrhage or Perforation	5 (0.6)	
V12.71	Personal History of Peptic Ulcer Disease	1 (0.1)	
493.90	Asthma, Unspecified	10 (1.3)	Chronic pulmonary disease 73 (9.1)
490.00	Bronchitis, not Specified as Acute or Chronic	4 (0.5)	
496.00	Chronic Airway Obstruction, not Elsewhere Classified	43 (5.4)	
493.20	Chronic Obstructive Asthma, Unspecified	4 (0.5)	
493.00	Extrinsic Asthma, Unspecified	1 (0.1)	
491.21	Obstructive Chronic Bronchitis, with (Acute) Exacerbation	5 (0.6)	
491.20	Obstructive Chronic Bronchitis, without Exacerbation	2 (0.3)	
492.80	Other Emphysema	3 (0.4)	
491.90	Unspecified Chronic Bronchitis	1 (0.1)	

344.90	Paralysis Unspecified	2 (0.3)	Paralysis 7 (0.9)
344.10	Paraplegia	3 (0.4)	
342.90	Unspecified Hemiplegia& Hemiparesis affecting Unspecified Side	2 (0.3)	
42.00	Human Immunodeficiency Virus (HIV) Disease	5 (0.6)	AIDS/HIV 5 (0.6)
201.90	Hodgkin's Disease, Unspecified Type, Unspecified Site, Extranodal, and Solid Organ Sites	1 (0.1)	Lymphoma 5 (0.6)
202.30	Malignant Histiocytosis, Unspecified Site, Extranodal and Solid Organ Sites	1 (0.1)	
203.00	Multiple Myeloma with mention of Remission	1 (0.1)	
202.11	Mycosis Fungoides Involving Lymph Nodes of Head, Face and Neck	1 (0.1)	
202.80	Other Malignant Lymphomas, Unspecified Site, Extranodal and Solid Organ Sites	1 (0.1)	
571.00	Alcoholic Fatty Liver	1 (0.1)	
70.54	Chronic Hepatitis C without mention of Hepatic Coma	35 (4.4)	Liver disease 42 (5.3)
70.32	Chronic Viral Hepatitis B without mention of Hepatic Coma, without mention of Hepatitis Delta	1 (0.1)	
456.00	Esophageal Varices with Bleeding	1 (0.1)	
456.10	Esophageal Varices without mention of Bleeding	1 (0.1)	
572.80	Other Sequelae of Chronic Liver Disease	1 (0.1)	
572.30	Portal Hypertension	2 (0.3)	
278.00	Obesity, Unspecified	41 (5.2)	
276.20	Acidosis	8 (1.0)	Fluid and electrolyte disorders 39 (4.9)
276.30	Alkalosis	1 (0.1)	
276.51	Dehydration	6 (0.8)	
276.00	Hyperosmolality and/or Hypernatremia	2 (0.3)	
276.80	Hypopotassemia	8 (1.0)	
276.10	Hyposmolality and/or hyponatremia	9 (1.1)	
276.52	Hypovolemia	1 (0.1)	
276.40	Mixed Acid-Base Balance Disorder	2 (0.3)	
276.50	Volume Depletion, Unspecified	2 (0.3)	
424.10	Aortic Valve Disorders	2 (0.3)	
397.00	Diseases of Tricuspid Valve	1 (0.1)	
V43.3	Heart Valve Replaced by other Means	1 (0.1)	

263.10	Malnutrition of Mild Degree	1 (0.1)	Weight loss 4 (0.5)
261.00	Nutritional Marasmus	1 (0.1)	
263.90	Unspecified Protein-Calorie Malnutrition	2 (0.3)	
426.70	Anomalous Atrioventricular Excitation	3 (0.4)	Cardiac arrhythmias 29 (3.7)
427.31	Atrial Fibrillation	8 (1.0)	
V45.02	Automatic Implantable Cardiac Defibrillator in Situ	1 (0.1)	
V45.01	Cardiac Pacemaker in Situ	2 (0.3)	
426.11	First Degree Atrioventricular Block	1 (0.1)	
427.00	Paroxysmal Supraventricular Tachycardia	1 (0.1)	
426.40	Right Bundle Branch Block	1 (0.1)	
785.00	Tachycardia Unspecified	12 (1.5)	
331.90	Cerebral Degeneration, unspecified	1 (0.1)	
348.30	Encephalopathy, unspecified	1 (0.1)	
345.90	Epilepsy, unspecified, without mention of Intractable Epilepsy	19 (2.4)	Other neurological disorders 30 (3.8)
345.10	Generalized Convulsive Epilepsy, without mention of Intractable Epilepsy	2 (0.3)	
345.40	Localization-Related (focal) (partial) Epilepsy Syndromes with Complex Partial Seizures, without mention of Intractable Epilepsy	1 (0.1)	
345.50	Localization-Related (focal) (partial) Epilepsy Syndromes with Simple Partial Seizures, without mention of Intractable Epilepsy	1 (0.1)	
340.00	Multiple Sclerosis	1 (0.1)	
332.00	Paralysis Agitans	4 (0.5)	
280.00	Iron Deficiency Anemia Secondary to Blood Loss (Chronic)	3 (0.4)	
285.90	Anemia, Unspecified	22 (2.8)	Deficiency Anemia 28 (3.5)
280.90	Iron Deficiency Anemia, Unspecified	5 (0.6)	
281.90	Unspecified Deficiency Anemia	1 (0.1)	
346.90	Migraine Unspecified without mention of Intractable Migraine	28 (3.5)	Migraine 28 (3.5)
401.10	Benign Essential Hypertension	3 (0.4)	Hypertension, uncomplicated 258 (32.6)
401.90	Unspecified Essential Hypertension	255 (32.2)	

720.00	Ankylosing Spondylitis	1 (0.1)	Rheumatoid arthritis and collagen vascular disease 2 (0.3)
720.20	Sacroilitis, not elsewhere classified	1 (0.1)	
244.90	Unspecified Acquired Hypothyroidism	19 (2.4)	Hypothyroidism 19 (2.4)
428.32	Chronic Diastolic Heart Failure	2 (0.3)	Congestive heart failure 16 (2.0)
428.22	Chronic Systolic Heart Failure	1 (0.1)	
428.00	Congestive Heart Failure Unspecified	12 (1.5)	
428.30	Unspecified Diastolic Heart Failure	1 (0.1)	
155.20	Malignant Neoplasm of Liver, not Specified as Primary or Secondary	1 (0.1)	
162.90	Malignant Neoplasm of Bronchus and Lung, Unspecified	1 (0.1)	Solid tumors w/o metastasis 14 (1.8)
162.20	Malignant Neoplasm of Main Bronchus	1 (0.1)	
185.00	Malignant Neoplasm of Prostate	3 (0.4)	
172.90	Melanoma of Skin, Site Unspecified	1 (0.1)	
V10.82	Personal History of Malignant Melanoma of the Skin	2 (0.3)	
V10.3	Personal History of Malignant Neoplasm of Breast	1 (0.1)	
V10.11	Personal History of Malignant Neoplasm of Bronchus and Lung	1 (0.1)	
V10.52	Personal History of Malignant Neoplasm of Kidney	1 (0.1)	
V10.53	Personal History of Malignant Neoplasm of Renal Pelvis	1 (0.1)	Peripheral vascular disorders 13 (1.6)
V10.83	Personal History of Other Malignant Neoplasm of Skin	1 (0.1)	
441.40	Abdominal Aneurysm without mention of Rupture	1 (0.1)	
441.90	Aortic Aneurysm of Unspecified Site without mention of Rupture	1 (0.1)	
440.10	Atherosclerosis of Renal Artery	1 (0.1)	
443.90	Peripheral Vascular Disease Unspecified	8 (1.0)	
557.90	Unspecified Vascular Insufficiency of Intestine	2 (0.3)	
286.30	Congenital Deficiency of Other Clotting Factors	1 (0.1)	Coagulopathy 11 (1.4)
296.90	Other an Unspecified Coagulation Defects	2 (0.3)	
287.50	Thrombocytopenia, Unspecified	8 (1.0)	
585.30	Chronic Kidney Disease, Stage III (Moderate)	1 (0.1)	Renal failure 10 (1.3)
585.90	Chronic Kidney Disease, Unspecified	8 (1.0)	
403.91	Hypertensive Chronic Kidney Disease, Unspecified, with Chronic Kidney Disease Stage V or End Stage	1 (0.1)	

	Renal Disease		
438.20	Late Effect of Cerebrovascular Disease, Hemiplegia Affecting Unspecified Side	2 (0.3)	Cerebrovascular disease 10 (1.3)
438.13	Late Effects of Cerebrovascular Disease, Dysarthria	1 (0.1)	
433.10	Occlusion & Stenosis of Carotid Artery, without Cerebral Infarction	2 (0.3)	
437.90	Unspecified Cerebrovascular Disease	1 (0.1)	
432.90	Unspecified Intracranial Hemorrhage	1 (0.1)	
435.90	Unspecified Transient Cerebral Ischemia	3 (0.4)	
416.80	Other Chronic Pulmonary Heart Diseases	1 (0.1)	Pulmonary circulation disorders 1 (0.1)
851.80	Other and Unspecified Cerebral Laceration and Contusion, without mention of Open Intracranial Wound, with state of...	1 (0.1)	Traumatic brain injury (TBI) 1 (0.1)

APPENDIX E

VA MH-12 PRIMARY PSYCHIATRIC DIAGNOSES AND CATEGORIES (N = 506)

ICD-9	Description	N (%)	Category	N (%)		
309.24	Adjustment Disorder with Anxiety	1 (0.2)	Adjustment Disorder	32 (6.3)		
309.00	Adjustment Disorder with Depressed Mood	20 (4.0)				
309.28	Adjustment Disorder with Mixed Anxiety and Depressed Mood	7 (1.4)				
309.40	Adjustment Disorder with Mixed Disturbance of Emotions and Conduct	2 (0.4)				
309.90	Unspecified Adjustment Reaction	2 (0.4)				
303.01	Acute Alcoholic Intoxication in Alcoholism, Continuous Drinking Behavior	11 (2.2)			Alcohol Disorder	85 (16.8)
303.00	Acute Alcoholic Intoxication in Alcoholism, Unspecified Drinking Behavior	3 (0.6)				
305.01	Alcohol Abuse, Continuous Drinking Behavior	6 (1.2)				
305.02	Alcohol Abuse, Episodic Drinking Behavior	1 (0.2)				
305.00	Alcohol Abuse, Unspecified Drinking Behavior	7 (1.4)				
291.81	Alcohol Withdrawal	12 (2.4)				
291.00	Alcohol Withdrawal Delirium	3 (0.6)				
303.91	Other and Unspecified Alcohol Dependence, Continuous Drinking Behavior	20 (4.0)				
303.92	Other and Unspecified Alcohol Dependence, Episodic Drinking Behavior	2 (0.4)				
303.90	Other and Unspecified Alcohol Dependence, Unspecified Drinking Behavior	7 (1.4)				
291.89	Other Specified Alcohol-Induced Mental Disorders	13 (2.6)				
304.41	Amphetamine and Other Psychostimulant Dependence, Continuous	1 (0.2)	Drug Disorder	72 (14.2)		
305.21	Cannabis Abuse, Continuous Use	1 (0.2)				
304.31	Cannabis Dependence, Continuous Use	1 (0.2)				
305.60	Cocaine Abuse, Unspecified	1 (0.2)				
305.61	Cocaine Abuse, Continuous Use	2 (0.4)				
304.21	Cocaine Dependence, Continuous Use	4 (0.8)				
304.80	Combinations of Drug Dependence Excluding Opioid Type Drug, Unspecified Use	1 (0.2)				
292.00	Drug Withdrawal	2 (0.4)				
292.81	Drug-Induced Delirium	1 (0.2)				

292.84	Drug-Induced Mood Disorder	38 (7.5)		
305.51	Opioid Abuse Continuous	2 (0.4)		
305.50	Opioid Abuse Unspecified	1 (0.2)		
304.01	Opioid Type Dependence Continuous	6 (1.2)		
304.00	Opioid Type Dependence Unspecified	4 (0.8)		
304.61	Other Specified Drug Dependence, Continuous Use	1 (0.2)		
305.91	Other, Mixed, or Unspecified Drug Abuse, Continuous Use	1 (0.2)		
305.40	Sedative, Hypnotic or Anxiolytic Abuse, Unspecified	1 (0.2)		
304.11	Sedative, Hypnotic or Anxiolytic Abuse, Continuous	2 (0.4)		
304.10	Sedative, Hypnotic or Anxiolytic Dependence, Unspecified	2 (0.4)		
300.01	Panic Disorder without Agoraphobia	1 (0.2)	Anxiety Disorder	1 (0.2)
296.80	Bipolar Disorder, Unspecified	7 (1.4)		
296.54	Bipolar I Disorder, Most Recent Episode (Or Current) Depressed, Severe, Specified as with Psychotic Behavior	1 (0.2)		
296.53	Bipolar I Disorder, Most Recent Episode (Or Current) Depressed, Severe, Without Mention of Psychotic Behavior	5 (1.0)		
296.50	Bipolar I Disorder, Most Recent Episode (Or Current) Depressed, Unspecified	9 (1.8)		
296.44	Bipolar I Disorder, Most Recent Episode (Or Current) Manic, Severe, Specified as with Psychotic Behavior	2 (0.4)		
296.43	Bipolar I Disorder, Most Recent Episode (Or Current) Manic, Severe, Without Mention of Psychotic Behavior	1 (0.2)		
296.40	Bipolar I Disorder, Most Recent Episode (Or Current) Manic, Unspecified	2 (0.4)		
296.63	Bipolar I Disorder, Most Recent Episode (Or Current) Mixed, Severe, Without Mention of Psychotic Behavior	2 (0.4)		
296.70	Bipolar I Disorder, Most Recent Episode (Or Current) Unspecified	3 (0.6)		
296.89	Other and Unspecified Bipolar Disorders, Other	2 (0.4)		
296.90	Unspecified Episodic Mood Disorder	16 (3.2)	Bipolar Disorder	50 (9.9)
294.11	Dementia in Conditions Classified Elsewhere with Behavioral Disturbance	1 (0.2)		
294.80	Other Persistent Mental Disorders due to Conditions Classified Elsewhere	1 (0.2)		
294.90	Unspecified Persistent Mental Disorders due to Conditions Classified Elsewhere	2 (0.4)	Dementia	4 (0.8)
296.31	Major Depressive Affective Disorder, Recurrent Episode, Mild Degree	1 (0.2)	MDD	147 (29.1)
296.32	Major Depressive Affective Disorder, Recurrent Episode, Moderate Degree	5 (1.0)		
296.34	Major Depressive Affective Disorder, Recurrent Episode, Severe Degree, Specified as with	19 (3.8)		

	Psychotic Behavior			
296.33	Major Depressive Affective Disorder, Recurrent Episode, Severe Degree, Without Mention of Psychotic Behavior	60 (11.9)		
296.30	Major Depressive Affective Disorder, Recurrent Episode, Unspecified Degree	27 (5.3)		
296.22	Major Depressive Affective Disorder, Single Episode, Moderate Degree	2 (0.4)		
296.24	Major Depressive Affective Disorder, Single Episode, Severe Degree, Specified as with Psychotic Behavior	2 (0.4)		
296.23	Major Depressive Affective Disorder, Single Episode, Severe Degree, Without Mention of Psychotic Behavior	6 (1.2)		
296.20	Major Depressive Affective Disorder, Single Episode, Unspecified Degree	25 (4.9)		
296.82	Atypical Depressive Disorder	1 (0.2)		
311.00	Depressive Disorder, Not Elsewhere Classified	37 (7.3)		
300.40	Dysthymic Disorder	7 (1.4)	Other Depressive Disorder	45 (8.9)
298.90	Unspecified Psychosis	2 (0.4)	Other Psychoses	2 (0.4)
301.83	Borderline Personality Disorder	1 (0.2)		
301.89	Other Personality Disorders	1 (0.2)	Personality Disorders	2 (0.4)
309.81	Post Traumatic Stress Disorder	41 (8.1)	PTSD	41 (8.1)
295.32	Paranoid Schizophrenia, Chronic State	1 (0.2)		
295.30	Paranoid Schizophrenia, Unspecified State	3 (0.6)		
295.72	Schizoaffective Disorder, Chronic	1 (0.2)		
295.74	Schizoaffective Disorder, Chronic with Acute Exacerbation	1 (0.2)		
295.73	Schizoaffective Disorder, Subchronic with Acute Exacerbation	1 (0.2)		
295.70	Schizoaffective Disorder, Unspecified	14 (2.8)		
295.63	Schizophrenic Disorders, Residual Type, Subchronic with Acute Exacerbation	1 (0.2)		
295.92	Unspecified Type Schizophrenia, Chronic State	1 (0.2)		
295.90	Unspecified Type Schizophrenia, Unspecified State	2 (0.4)	Schizophrenia	25 (4.9)

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