A STUDY OF THE HABITUATION AND ACUTE RISK MEASURE AS A PREDICTOR OF TREATMENT DECISION MAKING AND READMISSION STATUS IN AN EMERGENCY DEPARTMENT SETTING

by

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(Under the Direction of Brian Glaser)

ABSTRACT

Internationally, suicide has become an increasingly common phenomenon occurring with greater frequency over the past 50 years. This trend is especially troublesome given that the impacts of suicide are far reaching. For example, the healthcare system has been negatively impacted by this trend, with patient suicide becoming a frequent "occupational hazard" for mental health practitioners and other medical providers charged with providing care for at risk individuals. In an effort to address this issue, clinicians and researchers alike have attempted to identify and implement assessment techniques aimed at the early detection of individuals at increased risk of suicide. Improved methods of risk assessment will help to prevent unnecessary deaths, ensure that others will not lose their loved one to suicide, and that mental health clinicians will not suffer the personal and professional consequences of patient suicide. This study explores the predictive validity of the Habituation and Acute Risk Measure (HARM), a self-report suicide risk assessment questionnaire, in understanding treatment disposition outcomes (e.g. inpatient and outpatient) and readmission status for patients evaluated within an Emergency

Department (ED) setting. A measure with encouraging theoretical underpinnings and psychometrics, the HARM was initially administered to patients presenting in one of four ED's found within a large non-profit healthcare system in the southeastern United States. Data were collected by administrators as part of a system-wide quality improvement initiative mandated by Behavioral Health leadership. Archival data were compiled into a secure database and analyzed at a later date for purposes of this study. Logistic regression and chi square analyses were used to determine the variables most predictive of treatment disposition and readmission status. Correlations amongst all HARM subscales were also explored. Between-group comparisons were conducted via independent t-test and ANOVA analyses to determine whether significant differences existed between demographic groups on any of the HARM subscales. ROC curves, as well as measures of sensitivity and specificity were also utilized to ascertain the predictive properties of the final treatment disposition and readmission models. Several variables were found to significantly predict outcome and readmission including: Agitated Depression, Suicidal Intent, age, ethnicity/race, education level, and relationship status.

INDEX WORDS: suicide, risk assessment, risk factors, psychological assessment, treatment outcomes

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DEDICATION

To my family and friends, who have continuously provided me with encouragement and support throughout the course of my educational journey.

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CHAPTER 1

Introduction

Throughout history many have attempted to explain the complex phenomenon of suicide. Despite the fact that numerous theories have attempted to explain this concept, no single model has been found capable of identifying at risk individuals with complete certainty (Maris, Berman & Maltsberger, 1992). One of the main points regarding this issue is that some theories have attempted to determine risk based solely upon the examination of independent risk factors (American Association of Suicidology, 2005). While an understanding of risk factors and their impacts on suicide is helpful, assessing one's level of risk is not that straightforward and can in fact fluctuate over time (Rudd, 2008). Therefore, the difficulty inherent in understanding the overall concept of suicide is likely due in part to the complex interaction between various factors (i.e. sociological, biological, psychological, environmental, and cultural variables) (Zivin et al., 2007). Because the significance and weight of these factors vary widely from person to person, it has been difficult for suicidologists to create and implement an all-encompassing theory likely to identify individuals at risk (Goldstein, Black, Nasrallah & Winokur, 1991).

With this being said, efforts to better understand the phenomenon continue due to the negative and devastating impacts of suicide. Not only is suicide "death caused by self-inflicted injurious behavior with any intent to die as a result of the behavior", each act has the potential to become a significant event with far reaching consequences

(Centers for Disease Control and Prevention [CDC], 2011b; Fleischmann & Bertolote, 2003). Unfortunately, a growing number of the world's population continues to be exposed to the negative impacts of suicide (World Health Organization [WHO], 2012). In many cases, suicide has been shown to significantly impact loved ones surviving in the wake of a friend or family member's death (Fleischman & Bertolote, 2003). Additionally, the impacts of suicide can stretch far beyond immediate family and friends to other individuals who have had contact with the deceased. For example, suicide has become an all too common "occupational hazard" for the mental health and medical professionals charged with providing care for at risk individuals (McAdams & Foster, 2000). The burden placed on these professionals to assess and manage suicidal individuals has become a significant strain both personally and professionally (Kleespsies, Deleppo, Gallagher & Niles, 1999). There are also larger societal implications stemming from sustained rates of suicide in the context of increasing populations, typically ranging from financial burden and increased healthcare costs to policy issues implemented by state and Federal agencies (Fleischman & Bertolote, 2003).

With this being said, clinicians routinely attempt to assess suicide through less than optimal means (Granello, 2010). Currently, many clinicians attempt to determine suicide risk by over relying upon the clinical interview, thereby creating the possibility of Type I and II errors. For these reasons, clinicians and researchers alike have attempted to identify and implement assessment techniques aimed at the early detection of individuals at increased risk of suicide. Along these same lines, when employed, suicide risk assessment does much to inform clinical treatment and case management of at risk patients by fostering early detection and prevention strategies (Granello, 2010). This

study explores the effectiveness of the Habituation and Acute Risk Measure (HARM), a multi-factor self-report assessment tool, in predicting treatment decision making and readmission in an Emergency Department setting.

Statement of the Problem

Suicide is a growing public health problem that continues to impact individuals from a variety of cultures and backgrounds. It has been suggested that at least one third of the general population has had suicidal thoughts at some point in their lives (Meichenbaum, 2005). At an international level, researchers estimate that l million deaths per year can be attributed to suicide (WHO, 2012). This is the equivalent of 16 deaths per 100, 000 people or one death from suicide every 40 seconds. It should be noted that these numbers do not include suicide attempts which are approximately 20 times higher than completed suicides. Additionally, data has shown that death from suicide has increased approximately 60% over the past 45 years (WHO, 2012). In the United States, suicide is the tenth leading cause of death (CDC, 2011). Recent data suggests that more than 36,000 or 11.77 per 100,000 deaths per year occur via suicide in the United States alone. While this percentage may not appear significant in relation to other causes of death, it is the equivalent of 94 suicides per day or one suicide every 15 minutes (CDC, 2011). In addition, there are significant economic burdens associated with suicide. For instance, within the United States estimates of financial burden total $111.3 billion yearly (Nademin et al., 2008).

Purpose of the Study

One of the most debated questions within the realm of suicidality involves the various methods employed by researchers and clinicians in identifying those at increased

risk (Rudd, 2006). While it has been determined that the clinical interview is not enough, a significant obstacle to devising a uniform standard of care is that no one method has been found to be superior in determining an individual's risk level with complete certainty (Maris, Berman & Maltsberger, 1992). One of the most notable factors complicating this process is that an individual's suicide risk level is variable, fluid and state-dependent (Rudd, 2006). Some have even proposed that the sheer number and variability of risk factors cannot be accurately captured by one single measure (Simon, 2009). One may ask why bother then? "While prediction appears unlikely at this stage, clinicians are nonetheless responsible for assessing suicide risk, and for providing treatment to decrease risk (APA, 2003)." While an individual's risk of suicide cannot be identified with 100% certainty, sound assessment is the only tool that can be utilized to help discern individuals in danger and to guide treatment decision making.

Suicide risk assessment comprises a complex set of clinical skills which includes knowledge, training, and experience (Granello, 2010). Accurate risk assessment is helpful in assisting clinicians to identify treatable risk factors and devise specific interventions likely to assist clients in better managing their lives (Simon, 2002). Additionally, it is important to keep in mind that the most important goal of suicide risk assessment is to avoid the issue of "false negatives", or failing to identify those individuals at greatest risk (Packman, Marlitt, Bongar & Pennuto, 2004). As one can imagine, any degree of error within the area of assessing suicide risk can quickly become a life or death situation.

Westen and Rosenthal (2005) found that clinicians who relied solely on a more qualitative, subjective analysis of data made more errors than individuals who followed a

more quantitative, objective approach to assessing suicide risk. Bryan and Rudd (2006) suggested that the best method of suicide risk assessment combines a qualitative approach (in-depth clinical interview) with a quantitative approach using some form of psychological assessment or screener. The problem for clinicians often lies with identification of an appropriate measure to use when applying the latter approach. One important caveat to remember is that a single construct risk assessment measure should never be employed solely as the only means of determining suicide risk, and should be used in collaboration with other data. In other words, sound clinical practice should employ the use of quantitative measures with other methods. The purpose of this study is to determine the extent to which the Habituation and Acute Risk Measure (HARM) (Breshears, 2008) can be used to predict treatment decision making and readmission status in an Emergency Department setting.

Definition of Terms

A uniform set of definitions typically utilized to define terms related to suicide has long been absent from the field of suicidology (Brenner et al., 2011). Failure to clarify the meanings of basic terms such as suicide, suicidal behavior, and suicidal ideation, can often complicate the application of research findings to other studies or clinical settings (Breshears, 2008). In addition, the lack of a consistent nomenclature can interfere with making reliable decisions regarding diagnosis, assessment, and treatment of suicide (Maris, 2002). Due to the fact that there is often inconsistency when attempting to define common terms related to suicide, the information found below is provided to clearly delineate the meanings of several relevant terms utilized in this particular study.

For the purposes of this study, terms pertaining to suicide will be defined utilizing the Self-Directed Violence Classification System (SDVCS) recently created by the Centers for Disease Control and Prevention (CDC) and the Department of Veterans Affairs (DVA). This system defines common terms typically associated with both suicidal and non-suicidal forms of self-directed violence and is based upon prior research within the field (Brenner et al., 2011). According to the SDVS, suicide is defined as "death caused by self-inflicted injurious behavior with any intent to die as a result of the behavior (CDC, 2011b)." A suicide attempt is any "non-fatal self-inflicted potentially injurious behavior with any intent to die as a result of the behavior." Suicidal ideation is "thoughts of engaging in suicide-related behavior." Suicidal intent is defined as "past or present evidence (implicit or explicit) that an individual wishes to die, means to kill him/herself, and understands the probable consequences of his/her actions or potential actions." Finally, preparatory acts are "acts or preparation towards making a suicide attempt, but before potential for harm has begun." These definitions regarding self-directed violence will be utilized throughout the course of this study.

Research Questions

Question 1

Are there significant between-group differences found on the HARM scales regarding various demographic variables such as age, ethnicity, and gender?

Question 2

Are there notable relationships between various scales of the HARM?

Question 3

Can the HARM be used to predict treatment disposition outcomes in a medical Emergency Department (ED) setting?

a) Can the HARM be used to accurately identify those who will receive treatment versus those who will not receive treatment?
b) Can the HARM be used to accurately identify patients who will be seen on an inpatient versus outpatient basis?

Question 4

To what extent does the HARM predict whether a patient will be readmitted for further treatment within 30 days of their initial ED discharge?

Delimitations

The primary study aim is to explore the predictive validity of the HARM for understanding disposition outcomes (e.g. treatment vs. no treatment and inpatient vs. outpatient) and readmission status within 30 days post-ED discharge. Primary analyses will include logistic regression and chi square analyses to explore predictive properties of the HARM. Secondary analyses will employ descriptive, t-test and ANOVA, correlational, and ROC statistical procedures to further examine the data.

CHAPTER 2

Review of the Literature

Suicide Risk Factors

Any risk assessment system acknowledges and accounts for the fact that there are a plethora of factors related to increased suicidality (Joiner, 2005). This is a tall order given that assessing a person for suicide risk should always include a thorough review of specific risk factors and warning signs (Granello, 2010). The American Association of Suicidology, the American Foundation for Suicide Prevention, and the American Psychological Association have identified over seventy-five factors contributing to suicide risk (Wingate, Joiner, Walker, Rudd & Jobes, 2004). Trying to devise risk assessment procedures likely to capture and integrate all of these factors is next to impossible given the variety of limitations inherent in most clinical settings.

Suicide is a complex occurrence resulting from a combination of factors including biological, psychological, social, economic, and environmental contributors (Zivin et al., 2007). Some of these factors are more acute or sudden in nature, while others may be more chronic or long-term. Therefore, some of the specific factors identified as being related to suicide risk, include: previous suicidal behavior, the nature of current suicidal symptoms, precipitant stressors, a general symptomatic presentation, impulsivity and self-control, other predispositions, and protective factors (Joiner, Walker, Rudd & Jobes, 1999). A family history of suicide is also an important contributing factor when evaluating one's level of risk (Fleischmann and Bertolote, 2003). Previous suicidal

behaviors, gun ownership, poverty, employment status, geographical location, perceived social support, recent life stressors, and mental illness have also been identified as particularly telling risk factors (Joiner, 2005). In addition, other risk factors have been found to include: male gender, non-married status, relationship difficulties, legal and financial problems, and poor coping skills (Nademin et al., 2008).

In the following pages some of the most relevant demographic variables linked to increased suicide risk will be explored. This will be followed by an overview of dispositional and situational factors also known to increase suicide risk. Please keep in mind that an exhaustive review of every proposed risk factor exceeds the scope of this paper. Despite this fact, some of the more commonly known risk factors, especially those directly relevant to the theoretical premises of the HARM will be discussed. This section will then conclude with a brief overview of commonly known protective factors.

Geographical Location

Determining suicide rates based solely on geographical location can be difficult to ascertain from a worldwide perspective due to significant discrepancies in reporting between various countries (WHO, 2011). Of those countries reporting suicide rates, higher numbers are typically found in Eastern European nations. Countries reporting the lowest suicide rates include those typically found in Latin America, the Middle East, and some Asian countries. In comparison to other countries, suicide rates in the United Sates (11.77 per 100,000 people) are typically classified within the moderate range (CDC, 2011). On a regional level, suicide rates in the United States are highest for individuals living in the western and northwestern regions of the country (CDC, 2009).

Age

In addition to specific geographical differences, suicide rates also tend to vary across a variety of demographic groups. Some demographic variables found to increase one's risk of suicide include: age, race, and gender. In 2009, suicide was the third leading cause of death for individuals 10-14 and 15-24 years of age, with 259 and 4,371 deaths respectively (CDC, 2009). That same year, suicide was the second leading cause of death for individuals in the 25-34 age range with 5,320 deaths reported. Suicide was the fourth leading cause of death for those ages 35-44 (6,677 deaths) and 45-54 (8,598 deaths). Finally, suicide was the eighth leading cause of death for those in the 55-64 age group with 5,808 deaths annually. In 2006, population statistics revealed that rates of suicide for individuals in the 10-24 age group was 7.01 per 100, 000. Individuals in the 65+ age range were next with 14.22 suicides per 100,000. An interesting discovery (in light of commonly-held assumptions) made from this data was that the suicide rate for individuals in the 25-64 age group actually surpassed that of individuals in the 65+ age group with 14.88 deaths per 100,000. Another source of data suggests that suicide risk begins to rise above the national average between the ages of 25-34 (12.4 per 100,000) and remains elevated until individuals reach the 50-54 range (16.4 per 100,000) (WHO, 2011). After reaching the 55-64 age range, one's risk falls steadily until arriving at the 75+ range. In fact, the most up to date statistics published by the World Health Organization identify individuals in the 75+ age group as having the highest suicide incident rates of 16.8 per 100,000.

The inverse of this relationship holds true for suicidal behaviors, with youth tending to engage in more risky behaviors vs. more completed suicides. Recent data

suggests that individuals in the 15 to 19 year age demographic display the highest rates of suicidal behaviors when compared with all other groups (CDC, 2009). Following closely behind are individuals in the 20 to 24 age group. Individuals 65 and older have the second lowest rates of suicidal behavior, following only those individuals in the youngest age group. Based upon these findings, Joiner (2005) proposed that with increased age suicidal behaviors lessen but become more lethal. One important caveat to mention is that while suicide rates for older individuals remain steady, rates for younger age groups are on the rise (De Leo, 2002). Furthermore, it is important to note that until recently, there has been unclear operationalization of the term suicidal behavior (Brenner et al., 2011). As such, both suicidal and non-suicidal forms of self-directed violence (SDV) have likely been included in the data. This makes it difficult to accurately surmise whether it is truly "suicidal behavior" that decreases with age, or only non-suicidal acts of SDV.

Gender

Males have been found to commit suicide at four times the rate of females, accounting for approximately 80% of all suicides in the United States (CDC, 2011). In fact, suicide has been found to be the seventh leading cause of death for males and the fifteenth leading cause for females. China is the only country in the world where suicide rates are higher for females than males (De Leo, 2002). Recent international data comparing rates of suicide between males and females revealed that males account for 17.7 deaths per 100,000 in contrast to 4.5 per 100,000 for females (WHO, 2011). For males aged 75 years and older, suicide rates are the highest at 37.8 per 100,000. Suicide rates for males are second highest between the ages of 45 to 54 (25.2), followed by 35 to

44 (23.0), 65 to 74 (22.7), 55 to 64 (22.2), 25 to 34 (19.9), and 15 to 24 (16.1 per 100,000) respectively. For males, suicide rates rise steadily before gradually tapering off between the ages of 55 and 74. Then at age 75, suicide rates increase significantly for males, representing the highest rates amongst any age group. Throughout the course of a typical lifespan, however, suicide rates for females are highest between the ages of 45 to 54 (8.0 per 100,000). Subsequently, suicide rates for females are second highest between the ages of 35 to 44 (6.8), followed by 55 to 64 (6.1), 25 to 34 (4.7), 65 to 74 (4.0), 75 and above (4.0), and 15 to 24 (3.5 per 100,000) respectively. As was the case with males, suicide rates for females also increase steadily until reaching the 55 to 64 age group. Unlike males, however, female suicide rates do not recover after this point and actually continue to decrease steadily after attaining the highest rate of 8.0 per 100,000 as seen within the 45 to 54 age group. Suicide rates are lowest for both males and females between the ages of 5 to 14 (1.0 and 0.3 per 100,000).

Despite increased suicide rates, females attempt suicide two to three times more often throughout the course of their lives when compared to males (CDC, 2011). With this being said and as noted before, the lack of a uniform classification of suicidal behaviors makes any attempts to categorize and compare data related to engaging in self-harm extremely difficult (Brenner et al., 2011). One reason for the discrepancy between males and females may be that females tend to choose less lethal means of suicide such as poisoning and suffocation, while males are inclined to use more violent means including firearms (WHO, 2011). As a result, females may be less likely to die from these "less lethal" methods. This may be a unique trait of males in the United States, as the most common method of suicide in most parts of the world is hanging (De Leo,

2002). In contrast, roughly 60% of suicides by males in the United States have been shown to occur via firearm (CDC, 2009).

Ethnicity

Continued examination of the relationship between suicide and race/ethnicity also provides greater insight into the phenomenon of risk as a whole. With regard to ethnicity, American Indian/Alaskan Natives have the highest suicide rates (16.25 per 100,000) of any other group, followed closely by Non-Hispanic Whites (15.02 per 100, 000) (CDC, 2009). Other ethnic groups such as Hispanics (6.56 per 100,000), Asians/Pacific Islanders (6.47 per 100,000), and Non-Hispanic Blacks (6.25 per 100,000) have significantly lower rates in comparison.

When examining suicide rates in conjunction with ethnicity and gender, some interesting differences emerge. More specifically, the trend for males across various racial/ethnic groups closely follows that of the overall combined data highlighted above, with American Indian/Alaskan Native males representing the group with the highest suicide rates (26.18 per 100,000) (CDC, 2009). As before, suicide rates of Non-Hispanic White males follow closely with 24.69 deaths per 100,000. If simply considering suicide rates based on ethnicity alone, one might expect Hispanic males to be third highest on the list, however data suggests that Non-Hispanic Blacks fill this slot with 11.24 suicides per 100,000 people. This group is then followed by Hispanic (11.08 per 100,000) and Asian/Pacific Islander (9.36 per 100,000) males.

When comparing ethnicity and gender for females, American Indian/Alaskan Natives and Non-Hispanic Whites continue to exhibit the top two highest suicide rates of any other ethnic group (6.70 and 6.15 per 100,000 respectively) (CDC, 2009).

Asian/Pacific Islander females have the third highest rate of suicide (3.87 per 100,000) followed by Hispanics and Non-Hispanic Blacks (2.13 and 2.02 per 100,000). Suicide rates based on age, gender and ethnicity revealed that Non-Hispanic White males over 65 years of age have the highest rates of suicide at 33.16 per 100,000. While a better understanding of the intersection between race/ethnicity and suicide can be helpful, it is important to remember that the available data often neglects to account for intra-group differences.

Marital Status

While marital status can be an important protective factor when determining suicide risk, the quality of one's connection with their partner or significant other can also prove to be a negative factor depending upon the nature of the underlying relationship (Stack, 2000). Along these same lines, research has shown that suicide risk may increase as one's sense of integration with family members is perceived to decrease. Higher rates of suicide have also been found amongst divorced and widowed persons in comparison to married individuals. Being married can reduce the risk of suicide because partners may provide a greater sense of social support, discourage risk taking behaviors, and foster a sense of duty and obligation (Umberson, 1992). With this being said, there is conflicting information in the literature regarding the specific differences between males and females in relation to marital status and suicide risk. For example, an increase in suicide risk following divorce has been shown for both males and females, while other studies show an increased risk primarily for males (Stack, 1990); (Kposowa, 2000). This is consistent with the finding that being widowed significantly increases the risk of suicide for males but not females (Cutright, Stack & Ferquist, 2007). These assertions

support prior research suggesting that marriage encourages greater health benefits for men than women, particularly because women are often tasked with the responsibility of being the primary caregiver for other family members.

Socioeconomic Status

Other factors including educational attainment, employment, and higher socioeconomic status have been associated with better health outcomes overall (Waite, 2006). More generally, these factors have been shown to minimize overall risks associated with increased mortality. Higher levels of education have been proposed to reduce suicide risk by increasing access to social groups, promoting marriage, improving employment prospects, and facilitating a better sense of self-control. Increased levels of education may also improve an individual's strategies for managing stressful social situations (Krueger and Chang, 2008). Stack (2000) suggested that for each year of education completed by non-Hispanic white males, their risk of suicide decreased significantly. It should be noted that this relationship has been shown to hold true for males only, and there is little research exploring the influence of education on females.

Individuals with lower levels of intelligence and educational attainment are less competitive for the job market, earn less income, and have lower overall status (Gunnell, Magnusson & Rasmussen, 2005). One important exception may occur for individuals with higher educational attainment. For example, individuals in this category may experience significant levels of suicidal distress if there is a mismatch between level of educational attainment, employment status, and higher income (Stack, 2000). Higher rates of income and employment status have also been associated with lower rates of suicide. Stack (1982) proposed that financial security reduces suicide risk by making life

more worthwhile. Along these same lines, unemployment has been found to increase suicide risk especially for males who tend to view employment status as an important aspect of their self-worth.

Military Status

Some studies indicate that veteran status alone is a significant risk factor for suicide. McCarthy et al. (2009) observed the differences present in suicide rates among Veterans Health Administration patients compared with the general U.S. population. Results of this study found that suicide rates for veterans were 66% higher than the overall population (adjusted for age and gender). Additionally, when male and female groups were analyzed separately, both veteran samples were found to have significantly higher suicide rates when compared to males and females in the general population. Kaplan, Huguet, McFarland & Newson (2007) utilized data from the National Death Index and the U.S. National Health Interview Survey to determine that veterans were twice as likely to die of suicide when compared to males from the general population. Data suggests that suicide is the second leading cause of death among active duty military (CDC, 2009).

In recent years the United States government has sponsored legislation mandating the implementation of various prevention measures and techniques aimed at identifying reducing suicide risk in veteran populations (Brenner et al., 2011). There are several risk factors that have been found to contribute to increased risk of suicide specifically within the veteran population. For example, suicide risk has been shown to increase after exposure to military related work and stressors (Ritchie, Keppler, & Rothberg, 2003). In addition, a clear link has been found between suicide rates and the experience of stressors

related to deployment (Posey, 2009). Recent research has found greater risk of suicide for individuals who have experienced both combat trauma and PTSD, further fueling the need for precautionary measures to be taken. According to Joiner (2005), veterans are often exposed to more violence through combat experiences and therefore are more habituated to the behaviors necessary to commit suicide. In addition, concerns have been raised in association with the recent influx of Operation Iraqi Freedom/Operation Enduring Freedom veterans returning from active duty military campaigns, who may be experiencing concurrent symptoms of PTSD and suicidal ideation/behavior (Posey, 2009). With regard to older veterans serving in prior military campaigns, research suggests they may be experiencing other risk factors including: membership in an older male population, a significant history of medical issues, high rates of substance abuse and mental illness, and access to firearms (McCarthy et al., 2009).

Firearm Access

Another factor that has been linked to increased risk of suicide in both general and veteran populations is gun ownership/access and firearm training. At some point in their training, all military personnel are instructed in firearm use. A study by Desai, Dausey, and Rosenheck (2008), attempted to explore the impact of firearm ownership on suicide rates. A nationwide sample of psychiatric inpatients discharged from Department of Veteran Affairs medical centers were followed from the time of their discharge over a period of several years. The results indicated that Caucasian males with a previous psychiatric diagnosis of substance abuse or PTSD, who also owned a firearm, where significantly more likely to die by suicide. In the United States, suicide via firearm is the

preferred method for males across all age groups as well as females ages 65 and up (CDC, 2009).

Mental Health Diagnoses

Accurate DSM diagnoses can provide important information about a patient's suicide risk (Black & Winokur, 1990). Qin and Nordentoft (2005) found that patients diagnosed with affective or psychotic disorders were at an increased risk of suicide and that the risk was particularly high immediately following discharge from psychiatric care. Along these same lines, psychiatric patients regardless of inpatient or outpatient status have also been found to be at an increased risk of suicide (Zivin et al., 2007). Research has shown that the most predictive psychiatric diagnoses include depression and other co-occurring disorders such as alcohol abuse and PTSD. Fleischmann and Bertolote (2003) found that major depression, alcohol and drug abuse, other mood disorders, schizophrenia, anxiety disorders, and personality disorders are some of the most common psychological conditions associated with suicide.

Patients with a known affective disorder diagnosis with depressed or mixed states are at the highest risk of suicide (Tondo, Isacsson & Baldessarini, 2003). This is consistent with prior research stating that the most common diagnosis in individuals with the highest rates of suicide is major depressive disorder (Baumeister, 1990). According to the DSM-IV-TR, approximately 15% of individuals diagnosed with symptoms meeting criteria for a severe major depressive episode commit suicide (American Psychiatric Association, 2000). In fact, two thirds of people who commit suicide are depressed at the time of their deaths, and one out of every sixteen individuals diagnosed with depression will commit suicide (American Association of Suicidology, 2009).

As previously implied, combinations of a major affective disorder and alcohol abuse have also been found to contribute significantly to suicide risk (Waller, Lyons, and Constantini-Ferrando, 1999). Following a diagnosis of major depressive disorder, alcohol dependence and bipolar disorder are the diagnoses most commonly associated with rates of completed suicide (Canapary, Cleary & Bongar, 2002). Panic attacks and other anxiety disorder diagnoses have also been found to increase suicide risk (Fawcett, Clark & Busch, 1993). While any of these diagnoses may impact suicide risk in and of themselves, Waller, Lyons, and Constantini-Ferrando (1999) examined the impact of comorbid affective and alcohol use disorders on suicidal ideation and attempts. Their sample consisted of 307 participants. Approximately 59% met DSM III-R criteria for depression and 68% met criteria for alcohol abuse disorder. They found that the impacts of comorbid affective disorder and alcohol abuse were additive. Each factor contributed individually to suicide risk, but when combined risk increased substantially.

Cognition

Individual beliefs about suicide are also important factors to consider when conducting a thorough risk assessment (Schechter & Lineberry, 2011). In other words, the concept of suicide may mean different things to different people. Pollack and Williams (1998) asserted that individuals with cognitive deficits may be at increased risk of engaging in suicidal behaviors due to the fact that they oftentimes do not fully understand the consequences of their actions. Furthermore, these individuals may be unaware of the permanence of death, thereby negating the personal significance of their behaviors. Along these same lines, patients with an apparent lack of problem solving skills or impulse control issues may become easily overwhelmed and unable to devise

solutions to potential concerns, further fueling increased levels of psychological stress. As a result, these individuals may be more likely to see suicide as an acceptable solution to their concerns because they are unable to readily consider other viable options. Personality characteristics such as impulsivity, aggression, and perfectionistic tendencies have also been shown to increase risk (Packman et al., 2004). Excessive levels of impulsivity can be an especially dangerous from a suicide risk perspective as individuals may not have the capability to carefully consider the gravity of their actions prior to engaging in potentially fatal behaviors. Yen et al. (2009) also found that the personality traits of negative affectivity and disinhibition were significant predictors of suicide risk.

Significant Life Events

Significant life events have also been found to correlate with increased suicide risk. These events range from being more recent in nature to occurring in the person's distant past. Some examples of the types of events likely to increase risk include sexual abuse or other forms of violence, divorce, intense humiliation, and interpersonal loss (Paykel, Prusoff & Meyers, 1975). Additionally, patients who have suffered personal or psychological losses such as loss of employment or the death of a loved one are at increased risk of suicide (Fleischman & Bertolotte, 2003; (Beautrais, Joyce & Mulder, 1997). Other historical factors such as a family history of suicide have also been shown to increase risk of suicide.

Health-Related Problems

Patients diagnosed with significant health issues such as cancer and chronic pain conditions have also been identified as at risk populations (Motto, 1992). For example, a patient's perception of their pain and overall pain tolerance can be viewed as factors to

consider when assessing suicide risk (Packman et al., 2004). Relative to a healthy population, chronic pain patients' risk of death by suicide is doubled (Tang & Crane, 2005). Cancer diagnoses have also been linked to a two-fold increase in both overall suicide risk and suicide attempts when compared with rates of the general population (Allebeck & Bolund, 1991). Patients with GI conditions are 2 to 3 times more likely to report a history of suicide attempts or to have a completed suicide when compared to the general population (Miller, Hopkins, & Whorwell, 2004). Additionally, suicide rates for individuals experiencing a traumatic brain injury (TBI) are between 2.7 and 4.0 times higher than the general population (Teasdale & Engberg, 2001). Rates of suicide attempts for patients with an HIV/AIDS diagnosis are similar to other populations with long term, life-threatening medical conditions, however direct comparisons between subgroups are difficult to make as most research in this area has been conducted exclusively with homosexual populations (Komiti et al., 2001).

Protective Factors

Protective factors have been explained as specific variables which act to safeguard the individual from engaging in suicidal behavior (Sanchez, 2001). It is also important to note that protective factors can help to mitigate or negate the impact of risk factors (Granello, 2010). In fact, adding protective factors may be more beneficial than attempting to eliminate risk factors when trying to intervene with a suicidal individual (De Leo, 2002). Some of the protective factors found to prohibit individuals from engaging in life-threatening behaviors include social connectedness, problem-solving confidence, and an internal locus of control (Donald, Dower, Correa-Velez & Jones, 2005). Other factors include connectedness with family and friends, parenthood,

marriage, religion, and high self-esteem (Fleischmann & Bertolote, 2003). Bonner (1992) posited that a sense of social support serves as a significant "buffer" to suicide risk. A review of the literature conducted by Sanchez (2001) revealed that relationship status, employment status, being responsible for children under the age of 18, perceived social support, participation in leisure activities, and involvement in mental health treatment were all factors acting to mitigate suicide risk. Additionally, Wingate et al. (2006) proposed that an increased sense of interpersonal connectedness and personal effectiveness act to buffer individuals from engaging in suicidal behaviors. When creating the Reasons for Living Inventory, a risk assessment measure examining factors likely to prohibit an individual from considering suicide, Linehan (1983) devised six general categories of protective factors likely to dissuade individuals from engaging in suicidal behaviors. These factors included: fear of suicide, fear of social disapproval, moral objections, responsibility to family, child related concerns, and survival and coping beliefs.

While knowledge regarding the specific risk and protective factors of suicide can have significant clinical utility, it should also be remembered that knowledge of individual traits are not in and of themselves sufficient to determine suicide risk (Brenner et al., 2008). Two individuals with similar risk factors can realistically be at different levels of threat (Granello, 2010). In addition, it can be challenging for mental health clinicians when trying to weigh the relevance of each individual risk factor, as some tend to be more predictive than others given their interactions with other variables (Donald, Dower, Correa-Velez & Jones, 2006). One must also consider the risks of false positive and false negative errors, in other words thinking that a patient is suicidal when they are

not or classifying a patient as non-suicidal when they in fact are (Maris, 2002). As healthcare providers, the most deadly type of error occurs when someone is classified as low risk when they are in fact suicidal. For this reason, it is important to gather as much information about the individual as possible and to carefully weigh all relevant factors in an attempt to ascertain their true risk for suicide (Granello, 2010). Evaluating each individual's level of risk thereby allows clinicians to apply the treatment decision-making process on a case by case basis. Therefore, suicide risk assessment measures are tools which can be utilized with great efficiency when attempting to gather all relevant information needed to make the determination concerning overall suicide risk level and treatment decision-making.

Theories of Suicide

Numerous theories have been proposed to help explain the complex phenomenon of suicide. Freud proposed his own theory of "death drive" or the drive of individuals to engage in self-destructive and aggressive behaviors (Kernberg, 2009). Shneidman's (1996) theory of suicide focuses on the concept that human beings have a natural tendency to engage in goal-directed behaviors aimed at avoiding pain. Similarly, Shneidman proposed that suicide results from intense "psychache" or a combination of psychological pain and frustrated psychological needs. Psychological pain or "perturbation", is best characterized as intense disturbance, anguish, and tension (Shneidman, 1984). Psychological needs are organized into four basic categories including: "love, acceptance, belonging; control, autonomy, achievement, order; atonement to repair feelings of shame, failure or embarrassment; and succorance, affiliation, and nurturance" (Shneidman, 1999). When an individual experiences intense

levels of psychache directly resulting from psychological pain and frustrated psychological needs, they are at greater risk of suicide (i.e. increased lethality) if they view death as the only acceptable way to avoid discomfort.

Beck's Hopelessness Theory

Feelings of hopelessness can also be a strong predictor of suicidal risk. Baumeister (1990) defined hopelessness as the inability to conceive a positive future, to imagine oneself in that future, and to respond to obstacles with insight and consider a better future. Therefore, hopelessness is related to cognitive inflexibility, or the inability to perceive alternative solutions to life's problems (Maris, 2002). This concept is closely related with prior research describing hopelessness as a specific cognitive schema contributing to the sense of vulnerability typically present during a suicide attempt (Beck, Steer, Kovacs, &Garrison, 1985). Furthermore, Yufit and Bongar (1992) posed that a reduced sense of agency or perceived sense of lacking control can increase a patient's sense of hopelessness, thereby triggering a desire to end one's life. While depression and hopelessness are both associated with increased suicide risk, hopelessness has been found to be a more significant predictor (Beck et al., 1985).

According to Beck, suicide is associated closely with the concepts of depression and hopelessness (Beck, 1993). Suicidal individuals tend to see themselves and their futures in an overly pessimistic light. They are overly critical of themselves, and feel that their situations will never improve and that they will likely worsen over time. In this way, the person's tendency to engage in distorted thinking further perpetuates the cognitive error that this pattern is the only valid way of conceptualizing their current issues. In turn, their basic level of distorted cognitive thinking prevents them from seeing

other alternative solutions to their concerns. This issue of becoming "stuck" in one's own pattern of distorted thinking fosters feelings of hopelessness.

Joiner's Interpersonal Psychological Theory (IPT)

Feeling as if one has become a burden to loved ones has been shown to contribute to overall level of risk (Brenner et al., 2008). Joiner, Pettit, Walker, Voelz, and Cruz (2002) qualitatively analyzed two samples of suicide notes, one from suicide completers and the other from suicide attempters. More specifically, the notes were examined along the dimensions of burdensomeness, desire to control one's own feelings, desire to control others, emotional pain, and hopelessness. Results indicated that a sense of burdensomeness was the most significant variable correlated with "completer" vs. "attempter" suicide status. In addition, individuals with a higher sense of burdensomeness were increasingly likely to engage in more lethal forms of suicidal behavior. According to Joiner (2005) feelings of burdensomeness, stem from one's perceptions that they are incompetent, ineffective, and an encumbrance on others, thereby increasing their risk of suicide.

Individuals who are more integrated into their family and other social relationships may feel a greater sense of belonging and purpose than those who are less connected (Denny, Rogers, Krueger & Wadsworth, 2009). Belonging to a group not only provides a sense of connection and obligation to others, it can also offer a sense of support, pushing those in distress to continue living their lives in spite of adversity. This desire to overcome negative emotions for the greater good of the group can reduce the risk of suicide for those deemed to be at increased risk. For individuals without this sense of connection to others, they may feel isolated, alone, and ill-equipped to deal with

stressors. When negative life events occur, these same individuals may perceive that they have inadequate social support to sufficiently cope with their current distress. Joiner's (2005) theory further explains the concept of belongingness by highlighting that the suicidal individual perceives a lack of interpersonal connection and that meaningful relationships with others are threatened. Based upon this reasoning, a sense of failed-belongingness can contribute to an increased risk of suicide by fostering feelings of isolation and interpersonal inefficiency (Brenner et al., 2008).

As the best predictor of future behavior is past behavior, previous suicide attempts increase both an individual's risk of future suicide attempts and completions (Joiner, Walker, Rudd & Jobes, 1999). "Currently, the strongest risk factor for predicting suicide and suicide-related behavior is the history of suicide attempts (Fowler, 2012)." A history of suicide attempts can also be tied directly to the concept of acquired capability. Joiner (2005) described acquired capability as a heightened sense of fearlessness and tolerance for pain. According to this line of reasoning, the individual gradually works up to or habituates to the idea of ending their life by progressively engaging in behaviors/activities triggering increasingly significant levels of fear and pain. Therefore, individuals are able to habituate to the act of suicide by becoming accustomed to experiencing levels of distress typically associated with engaging in suicidal behaviors. In other words, by the time an individual has gained the acquired capability to end their life, they have repeatedly endured numerous painful and provocative life events which act to habituate them to the fear and pain associated with suicide.

In his Interpersonal Psychological Theory Joiner (2005) proposes that suicide risk is related to the presence or absence of three variables: burdensomeness, failed

belongingness, and habituation/acquired ability. More specifically, suicidal individuals perceive that they have become a burden to loved ones (burdensomeness), feel that efforts to foster social connections with others have repeatedly been unsuccessful (failed belongingness), and have acquired the lethal ability to inflict serious self-harm through exposure to specific events (habituation). Those who are considered to be at the greatest risk of suicide are individuals who have acquired the ability to engage in suicidal behaviors, and experiencing current feelings of burdensomeness and failed belongingness. According to this theory, all three variables must be present for an individual to engage in a suicide attempt. Additionally, if an individual is already reporting feelings of burdensomeness and belongingness, acquired ability acts as a limiting factor to determine which individuals will die by suicide. Joiner proposes that repeated contact with aversive stimuli can contribute to the acquired ability to engage in suicidal behavior. In other words, level of habituation is proportionally related to overall risk.

Fluid Vulnerability Theory

Rudd (2006) explained the phenomenon of suicide risk by proposing the concept of Fluid Vulnerability Theory. This theory attempts to distinguish acute versus chronically suicidal individuals by conceptualizing overall suicide risk on a continuum. According to Rudd, all individuals have a pre-existing level of risk resulting from a variety of personal "static" factors. The baseline for this level of risk is different for each person, with individuals who have already attempted suicide having a more elevated baseline than those who have not. In addition, the theory suggests that one's level of risk may remain fairly static or could fluctuate over time, depending upon the presence or

absence of various life stressors. In addition, level of risk is sensitive to time, meaning that some factors may require rapid and brief interventions while others may indicate the need for sustained longer-term treatment.

Suicide Risk Assessment

Simon (2009) explained suicide risk assessment as the "process of analysis and synthesis that identifies, prioritizes, and integrates acute and chronic risk and protective factors" into an overall picture of threat. More simply, as clinicians engage in suicide risk assessment they are attempting to predict which individuals are most likely to engage in suicidal behavior. This process also informs treatment decision making, as the identification of at risk individuals helps to ensure that appropriate interventions will be provided to those most in need. Therefore, the implications of identifying a valid and reliable measure of suicide risk assessment are far reaching.

As previously mentioned, suicide has become a problem throughout the world (WHO, 2012). In the United States alone, it is one of the leading causes of death within various demographic groups and has cost the healthcare system over 1 billion dollars per year (Fleischman & Bertolote, 2003). In addition to becoming a larger societal issue, suicide also impacts those left behind by the victims themselves. More specifically, friends and family of the victim oftentimes experience significant distress over the sudden, unexpected death of a loved one. In addition, mental health clinicians can also be deeply affected by patient suicide (Kleespsies, Deleppo, Gallagher & Niles, 1999). Roughly one-fourth of mental health practitioners have experienced the loss of a patient to suicide (McAdams & Foster, 2000). As mental health clinicians, we are often the last hope for patients experiencing heightened and imminent risk for suicide. One important

tool we can utilize in our work with suicidal patients is a dependable and accurate risk assessment measure.

The dilemma of how to identify individuals at increased risk of suicide has been studied for several years. In the past, individual methods of assessment have focused on various categorical classifications or demographic variables to better appraise suicide risk (Range & Knott, 1997). While membership in specific demographic groups has been shown to correlate strongly with increased suicide risk, this is not a fool-proof method one should utilize solely by itself. In fact, over reliance on demographic variables has not been found to be especially helpful in predicting suicide risk (American Psychiatric Association, 2003). In an attempt to avoid committing errors in clinical decision making, suicide risk assessment has evolved to encompass additional sources of information. Therefore, in order to promote a comprehensive evaluation, many theorists advocate utilizing clinical judgment based upon the combination of a variety of tools including structured interviews, checklists, and standard psychological instruments (Granello, 2010).

Within this context there are a wide variety of measures that have been created to assess suicide risk. Due to the wide variety of available options, there is oftentimes more divergence than consistency between the various measures (Simon, 2009). In fact, there are dozens of assessments available for children, adults, and other specialized populations (Granello, 2010). Range and Knott (1997) found five major categories of suicide risk measures including: clinician-rated suicide instruments, self-rated suicide instruments, self-rated safeguards from suicide, child and adolescent focused instruments, and special purpose measures. Self-rating measures have been found to have several benefits

including standardization and anonymity which help to ensure a more thorough and complete determination of suicide risk (Kaplan, Asnis, Sanderson, Keswani, Lecuone & Joseph, 1994).

Some of the more common assessment measures utilized to assess suicide risk are the Beck Hopelessness Scale, the Beck Depression Inventory, the Hamilton Rating Scale for Depression, the Beck Suicide Ideation Scale, the Inventory of Depressive Symptomatology, and Linehan's Reasons for Living Scale (Maris, 2002; Simon, 2009).

The Beck Depression Inventory version two (BDI-II) consists of 21 self-report items, and is rated on a four point scale ranging from 0 to3 (Beck, Steer & Brown, 1996). A score of 29 or above indicates severe depression. Reliability of the tool is high, ranging from r= 0.92 to 0.93 (Beck, Brown, Berchick, Stewart & Steer, 1990). While the overall measure is designed to globally assess levels of depression (found to be a strong correlate of depression), items 2 and 9 examine suicide risk directly and indirectly via examination of pessimism. It should be noted, however, that this measure was designed to assess level of depression and not suicide risk. When assessing suicide risk, Beck (1975) advocates for using his hopelessness scale as opposed to the BDI-II because it correlates more closely with suicidal intent (r=.68).

As such, research has demonstrated that the concept of hopelessness, more so than depression, has been identified as a significant predictor of suicide (Beck, Steer, Kovacs & Garrison, 1985). Significant correlations have also been found between suicide risk and overall levels of hopelessness (Milnes, Owens & Blenkiron, 2002). The Beck Hopelessness Scale measures negative attitudes about the future, as well as one's perceived inability to avoid negative life events (Beck & Steer, 1988). The measure is

comprised of 20 true/false, forced choice items and has a high internal reliability of 0.92 (Rudd & Rajab, 1995). These items examine various aspects of hopelessness including: negative feelings about the future, loss of motivation, and pessimistic expectations. When utilizing the measure to assess suicide risk, it has been found to have high predictive validity (Beevers & Miller, 2004). Brown, Beck, Steer and Grisham (2000), found that patients scoring a 9 or above on the BHS were four times more likely to attempt suicide within a year of follow-up than those scoring an 8 or below.

Beck's Scale for Suicidal Ideation (BSSI) measures intensity, duration, and specificity of a patient's desire to die by suicide (Beck, Kovacs & Weissman, 1979). The format of the measure is based on 19 items, each with three response choices. Each individual item score ranges from 0 to 2, with a total possible score ranging from 0 to 38. The BSSI has three factors: Active Suicidal Desire, Passive Suicidal Desire, and Preparation. Internal consistency of the scale is good (0.89) and it is one of the only measures found to demonstrate predictive validity regarding suicide (Holi et al., 2005; Brown, Beck, Steer & Grisham, 2000).

This measure is not to be confused with the Beck Suicide Intent Scale (SIS) a 15-item interviewer administered questionnaire examining the severity of suicidal intent immediately preceding an act of "deliberate self-harm (Beck, Schuyler & Herman, 1974)." Each item is assigned a score ranging from 0 to 2 with total scores from 0 to 30. The measure is also divided into two parts, one section examines the objective circumstances surrounding the act of self-harm and the other explores the individual's thoughts and feelings during the act. Those obtaining higher scores on the SIS are at greater risk of suicide. With an overall sample of 2,489 participants and using a cutoff

score of 10 for men and 14 for women, Harriss and Hawton (2005) found that the SIS was able to accurately predict suicide in 4% of cases. Other studies have shown that the measure is able to distinguish completed suicides from non-fatal attempts, in addition to having strong correlations with lethality of suicide attempt (Beck et al., 1974; Mieczkowski et al., 1993).

Linehan, Goodstein, Nielsen, and Chiles (1983) developed the Reasons for Living Inventory (RFL) based upon cognitive behavioral concepts. More specifically, it is designed to assess beliefs and expectations associated with an individual's reasons for not committing suicide. In other words, individuals with stronger reasons for living are more likely to resist negative pitfalls typically associated with increased risk of suicide. In this way the measure is significantly different from other instruments utilized in the field as it excludes known risk factors and focuses on protective factors. The measure contains several scales including: Survival and Coping Beliefs (SCB); Responsibility to Family (RF); Child-Related Concerns (CRC); Fear of Suicide (FS); Fear of Social Disapproval (FSD); and Moral Objections (MO). The measure is comprised of 48 6-point Likert-type scale items, with response options ranging from 1 (not at all important) to 6 (extremely important). Osman et al. (1993) found that suicide risk was significantly predicted by the Survival and Coping Beliefs, Fear of Suicide, and Fear of Social Disapproval subscales.

Other instruments include The Psychological Pain Assessment Scale which measures an individual's experience of negative emotions such as hopelessness, loneliness, shame, guilt, fear, anger, and despair (Shneidman, 1999). Reynolds and Mazza (1992) designed the Suicidal Behavior History Form to assist clinicians in systematically gathering information about previous suicidal behavior. While it is not a

specific self-report measure, it can be utilized by clinicians as a general suicide risk assessment measure. Other scales with sound psychometric properties include The Columbia Suicide History Form, which examines lifetime suicide attempts; the Suicide Intent Scale, which directly assesses an individual's desire to die; and the Harkavy Asnis Suicide Survey, which explores both suicidal ideation and behavior (Simon, 2009). The University of Washington Risk Assessment and Management Protocol (UWRAP) was designed to simultaneously assess and manage suicide risk (Linehan, Comtois, Ward-Ciesielski, 2012). "The UWRAP provides a complete, step-by-step protocol for evaluating suicidality and, if necessary, implementing appropriate strategies for responding to suicide risk." This measure is unique in that it facilitates assessment and management strategies for individuals found to be at risk. Personality measures including the Minnesota Multiphasic Personality Inventory-2 and the Personality Assessment Inventory have also been utilized by past researchers to assess for suicide risk, and do demonstrate some ability to predict suicidal behavior (Yen & Siegler, 2003; Breshears, Brenner, Harwood, Gutierrez, 2010).

Now that some of the most commonly utilized assessment instruments have been examined in greater detail, it is important to recognize that there is not one instrument designed to predict suicide risk with 100% certainty (Granello, 2010). This makes the task of assessing individual levels of suicide risk one of the most difficult and challenging experiences for clinicians. Suicide risk assessment also requires a highly specialized skill set consisting of relevant knowledge, training, and experience. In addition, the process combines a variety of concepts and techniques including the examination of risk and protective factors, as well as the integration of formal and informal assessment

procedures (Granello, 2010). Some important caveats to keep in mind, however, are that clinicians often exhibit a tendency to forego the administration of specific risk assessment instruments and solely rely on the clinical interview to help assist in their treatment decision making process. In addition, assessing an individual's potential for suicide based solely on the data gathered from one single scale is not considered an acceptable practice (Maris, Berman, Maltsberger, &Yufit, 1992). Other factors besides those highlighted in specific risk assessment measures should also be considered. Therefore, the best methods of risk assessment combine both the administration of a clinical interview as well as specific assessment measures.

While it is impossible to clearly identify which individuals will attempt suicide at some point in the future, interventions can still be introduced for those found to be at risk (American Association of Suicidology, 2005). Along these same lines, accurate assessment measure can help clinicians to identify those individuals most in need of mental health services so that resources for treatment can be allocated accordingly (Range & Knott, 1997). Therefore, the broad goal of suicide risk assessment is to identify individuals who are at an increased risk of suicide so that preventative measures can be enacted with the highest degree of efficacy and efficiency. Through more targeted research and practice, improved methods of risk assessment help to ensure that others will not suffer the negative impacts of suicide. Therefore, a significant component of improving overall risk assessment procedures includes the introduction of a reliable and effective suicide risk assessment measure.

Limitations of Suicide Research

Some of the limitations proposed regarding suicide research include the fact that there are fewer overall cases to study as the phenomenon does not occur often (Pokorny, 1983). Because suicide is a relatively rare occurrence in the general population, small differences in suicide rates can lead to significant fluctuations in the data itself (Eaton, Messer, Wilson & Hoge, 2006). The reality of suicide also dictates that subjects are not available for direct study after death (Pokorny, 1983). As such, many researchers try to use "suicide attempts" as a substitute for suicide- a problem that is exacerbated by two issues: (1) the lack of a uniform nomenclature pertaining to suicide and suicidal behavior; and (2) the reality that even high lethality suicide attempts might not serve as appropriate alternatives for death by suicide (Wortzel, Gutierrez, Homaifar, Breshears & Harwood, 2010). Additionally, most research on completed suicide is conducted with retrospective data which has the potential to become distorted. Along these same lines, another issue may be the bias that arises when classifying someone's death as suicide or accident (Eaton, Messer, Wilson & Hoge, 2006). For example, family members or loved ones of the deceased may try to conceal an individual's suicide for fear of encountering social stigma or judgment from others in the community. Along these same lines, those at risk may deny or minimize concerns, responding to assessment measures in a more "socially desirable" manner (Strosahl, Linehan & Chiles, 1984). In addition, some suicides may be misidentified as such and labeled as accidental deaths due to the ambiguous nature or lack of information related to the event. Finally, as mental health practitioners, we have an ethical duty to respond immediately when we encounter a strong indicator that an individual is about to harm themselves (Pokorny, 1983). During these instances we must

act to immediately prevent the individual from taking their own life. From a research standpoint, this threatens the relationship of predictor to outcome variables.

CHAPTER 3

Methods

This study is based on archival data collected as part of a system wide quality improvement initiative within a large multi-hospital setting located within the southeastern United States. The quality improvement initiative originated in light of Joint Commission requirements and National Patient Safety Goal 15, which states: "The organization identifies safety risks inherent in its patient population." More specifically, goal 15.01.01 states that healthcare providers should work to "identify patients at risk for suicide." This goal applies to patients receiving behavioral healthcare services, those in psychiatric hospitals, as well as patients being treated in general hospitals for emotional and behavioral disorders. Across four hospital Emergency Departments (ED) located within this healthcare system Mental Health evaluators assess on average 700-900 patients who present with various mental health problems, including suicidal thoughts and behaviors. To comply with the Joint Commission accrediting body, system administrators were tasked with the implementation of a standardized suicide risk assessment tool that would aid clinicians in treatment decision-making. As a critical implementation strategy, in November 2010, the system decided upon the utilization of the Habituation and Acute Risk Measure (HARM), a multi-factor self-report suicide risk assessment measure. Over a 120-day period, from January 1, 2011 through April 21, 2011, the HARM was administered to 494 ED patients.

Setting

This study was conducted within a non-profit five-hospital healthcare system located within a major metropolitan area of the southeastern United States. The Behavioral Health Department located within the system staffs four hospital EDs (24 hours per day, seven days a week). The Behavioral Health Department employs both Master's level trained licensed professional counselors and licensed clinical social workers (as Mental Health evaluators) to assess the psychological needs of patients within each of the four Emergency Departments (EDs). Patients present to the ED with a variety of issues, medical or otherwise, but specific presenting concerns may include psychological diagnoses such as psychosis, depression, anxiety, and substance abuse. It is within this setting that data for the study were initially gathered. IRB approval was subsequently granted by the University of Georgia and institutional approval was gained from the health system outlining the protocols for this study.

Sample

Adults (between the ages of 18 and 84), admitted to one of the four EDs, for whom a Mental Health Evaluation (MHE) was ordered by the attending physician, and who were administered the HARM as part of a comprehensive assessment, were included in the study. Data from individuals who were less than 18 years of age, those unwilling or unable to complete the HARM for any of the following reasons: cognitive impairment; acute psychosis; and patients experiencing acute substance intoxication were omitted.

Procedure

In an attempt to assess for suicide risk, patients initially entering through one of the Emergency Departments (EDs) were screened for necessity of a Mental Health

Evaluation (MHE). Attending physicians in the ED ordered an MHE based on the patient's presenting concerns. If a formal evaluation was deemed necessary, the patient was asked to independently complete the HARM as one component of the MHE. It should be noted that Mental Health evaluators did not use HARM data quantitatively to make their treatment decisions. They were simply instructed to administer the HARM and were unaware of how to score or interpret the measure. Clinicians were however, able to scan the items and use information gained from administration of the HARM qualitatively. Additionally, they were simultaneously administered the South Dakota Rating Scale, which was the tool they had been administering prior to the HARM. After carefully weighing all relevant information gained from the comprehensive risk assessment battery, including data gathered on the HARM, a determination was made by the assessor and other healthcare providers to admit or discharge the patient. A copy of each completed measure was then faxed to the healthcare system's Behavioral Health Call Center, where it was placed in a confidential location accessible to the researchers, so that it could be scored and entered into a secure computerized database within the Health Psychology Department. The Call Center's secure database was subsequently examined at a later date to determine each participant's case disposition, including readmission status within 30 days of ED discharge. Pertinent information from both the Call Center and Health Psychology databases were combined and all personal health information (PHI) including name, date of birth, date of admission, and date of assessment removed. Archival data located within the combined computerized database from all ED patients who met inclusion criteria were then analyzed.

Measure

In its original form, "the Habituation and Acute Risk Measure was designed following a review of the suicide literature to assess overt, covert and buffers to suicide risk (Breshears, 2008)." More specifically, the HARM is a multi-factor self-report measure of suicide risk. It was originally conceptualized with consideration of the theories of Beck and Joiner. The measure was initially piloted on 416 subjects from ED, ED diversion office, and outpatient counseling settings. The original version of the HARM contained 79 dichotomous items and was found to have high overall internal consistency (alpha=0.89). In its first iteration, the measure was conceptualized with six subscales, each of which were found to have adequate to high internal consistency (values ranging from 0.71 to 0.86). An exploratory factor analysis resulted in the identification of five latent factors which were assigned the following names: Hopelessness, Habituation to Suicidal Behavior, Agitated Depression, Substance Abuse, and Existential Resolution.

Since this research was conducted, the HARM has undergone its second iteration (Breshears, manuscript in progress). It has been modified to 59 items consisting of 15 dichotomous and 39 4-point likert style questions. Dichotomous items comprise two of the scales, whereas the remaining continuous items comprise 5 clinical scales. Apart from items comprising the Substance Abuse scale (which had the lowest internal consistency and statistically significant differences across various demographic variables), items from the original version were either included in the second iteration or modified in accordance with the literature to better accommodate clinical practice. New items were also added to enhance content validity.

In its second iteration, confirmatory factor analysis (CFA) was employed with respect to items comprising the 5 clinical scales via the maximum likelihood method. Promax rotation, an oblique method, was utilized due to the high likelihood of correlating factors, as is the case with regards to most social science research. A minimum item-loading coefficient of .32 was utilized. Items that cross-loaded on more than one factor were discarded unless there was a meaningful disparity between loadings. Determination of the appropriate number of factors was made via three methods: (1) eigenvalues > 1; (2) examination of the scree plot; and (3) analysis of item loadings. Although the eigenvalue > 1 rule suggested 6 factors, further analysis by the latter two means strongly indicated the presence of a 5-factor solution. Following qualitative analysis, factors were given the subsequent names: Agitation; Depression; Hopelessness; Failed Belongingness; and Suicidal Intent (Breshears, manuscript in process). Additionally, dichotomous items comprising the two remaining scales underwent CFA via the M-Plus software. The proposed scales were confirmed on the basis of scree plot and eigenvalue analysis and assigned the following names: Denial; and Habituation. For those scales included in the first iteration of the HARM, without exception, revision resulted in improved internal consistency, as noted in Table 1 below.

Table 1: Results of Confirmatory Factor Analysis

Scale	# Items	Cronbach	Mean	SD
Denial	7	.75	1.70	1.87
Habituation	8	.88		
Hopelessness	4	.90	4.03	3.83

Failed Belongingness	4	.86	6.04	3.96
Self-Loathing	5	.93	6.98	5.18
Agitated Depression	16	.95	20.92	14.25
Suicidal Intent	10	.94	4.05	6.76

The theoretical concepts and most recent psychometric data available for each scale will now be reviewed.

Denial

The HARM includes a social desirability scale to help minimize the likelihood of false-negative predictions resulting from an individuals' tendency to deny or minimize symptoms, attempting to portray themselves in a more favorable light. Included in the initial iteration of the HARM, it was originally dubbed the Validity Index.

Habituation

The Habituation scale (internal consistency 0.88) encompasses one's ability to enact lethal self-injury in relation to their acclimatization to painful stimuli. According to Joiner's (2005) theory, individuals gradually "work up" to the act of suicide through activities that decrease their sensitivity to pain or reduce their fear of self-injury. The scale contains items that assess an individual's history of suicide attempts as well as engagement in suicide related behaviors.

Hopelessness

The Hopelessness scale (internal consistency 0.90), is based largely on the work of Beck and relates to an individual's pessimistic outlook, lack of goal directedness, and lack of purpose in one's life. While this factor unmistakably emerged through analysis of the

original version of the HARM, additional items have since been added to the scale in order to ensure that the concept of hopelessness is adequately captured.

Failed Belongingness

Not included in the original version of the HARM, the Failed-Belongingness scale is also based upon Joiner's theory (2005) which posits that belonging to a group provides a sense of connection and obligation to others. When a sense of belonging is not felt, the individual is more likely to feel alone and isolated, therefore viewing suicide as an acceptable solution to an adverse situation.

Self-Loathing

The Self-Loathing scale assesses an individual's level of perceived personal ineffectiveness. The concept of self-loathing is related to Joiner's (2005) concept of burdensomeness, which stems from one's perceptions that they are incompetent, ineffective, and an encumbrance on others.

Agitated Depression

The Agitated Depression scale (internal consistency 0.95) has been found to correlate strongly with the Beck Depression Inventory-II (BDI-II) and relates to symptoms typically found during a depressive or mixed episode including: depressed mood, anhedonia, irritability, sleep difficulties, complaints of fatigue, psychomotor agitation, concentration difficulties, racing thoughts, and thoughts of death.

Suicidal Intent

The Suicidal Intent scale assesses an individual's resolve to end their life. The concept behind this scale reaches beyond passive suicidal ideation and attempts to capture the "commitment" to end one's life.

When considering the types of information able to be gleaned from the HARM, it is important to keep in mind that the measure "is not by itself exhaustive, but it does provide treatment relevant insights into the specific factors or problems that may be underlying an individual's suicidal thoughts or suicide related behaviors (Breshears, 2008)." It is also unlike many other measures used by clinicians to ascertain suicide risk, theoretically-derived from the work of several leading suicidologists.

Protection of Human Subjects

Archival data were electronically secured within a shared data network file established by the system's IT team. The file was further secured via password protection accessible only to the research team. Data found within the secure database were free of personal health information (PHI) including name, date of birth, date of admission, and date of assessment. During the data entry process, each patient was also assigned a randomized number, which was the sole means of identification for each patient's specific dataset. This randomized number was the only means of identification for each patient's individual dataset. Original hard copy data were located in a locked file cabinet and stored in a locked office within the Psychological Services Department. Additionally, research findings will be reported without the use of any identifying information.

Analyses

Demographic variables were compared via independent t-test and ANOVA (analysis of variance) statistical methods to determine whether significant differences existed amongst specific groups on any of the HARM scales. Correlational analyses were conducted to examine the degree of relationships between various HARM

subscales. Logistic regression and chi square analyses were used to determine which demographic variables and HARM subscales were most predictive of treatment outcomes comprising disposition and readmission status. Logistic regression analyses utilizing a backwards selection approach were subsequently employed to generate models from which predictions can be made concerning an individual's likelihood of receiving treatment or being readmitted within 30 days after ED discharge. ROC curves and measures of sensitivity and specificity were also utilized to ascertain the predictive power of these models.

CHAPTER 4

Results

Archival data collected from a large multi-hospital healthcare system's Behavioral Health Call Center and Health Psychology Department were combined within a secure database and subsequently examined for purposes of this study. Several analyses were performed on the data including: mean and standard deviation, frequency summary (categorical variables only), correlational, ANOVA and t-test, logistic regression, chi square, and ROC curve. With regard to descriptive statistics, it should be noted that any participants with missing data for a particular demographic variable were omitted from that particular analysis only. Additionally, subjects missing any responses for a particular item on any of the HARM scales were removed from the analysis for that specific scale only.

Descriptive Statistics

A total of 494 questionnaires were obtained. For those participants reporting gender, 185 (51.82%) were male and 172 (48.18%) were female. Of the total sample, 221 (64.43%) self-identified as Caucasian, while 94 (27.41%) identified as African American, 10 (2.92%) as Hispanic, 8 (2.33%) as Native American, 7 (2.04%) as Other, and 3 (0.87%) as Asian American. The mean age of participants was 37.88 years (SD=13.35), with a range of 18 years to 84 years. With regards to education, 23 (8.71%) of participants reported less than 12 years of education, while 133 (50.38%) indicated that they had completed 12^{th} grade or obtained a GED. Of the remaining participants who

provided responses to this question, 108 (40.91%) indicated having completed at least 13 years of formal education. Of the total sample 28 (9.15%) reported engagement in some type of military service historically (i.e. Army, Navy, Air Force) and 41 (13.71%) indicated having access to firearms. Of the total sample, 164 (46.86%) participants reported their relationship status as single or never married, 89 (25.43%) were divorced, 61 (17.43%) were married, 25 (7.14%) separated, and 11 (3.14%) were widowed. With regard to final treatment disposition, data were available for 343 of 494 patients, or 69.43%. Of those for whom data was available, 205 (58.74%) received inpatient psychiatric treatment, 120 (34.38%) were referred to outpatient services, and 24 (6.88%) left against medical advice or were not referred to treatment. When examining readmission rates, data was available for 363 patients (73.48%). Of those, 40 (11.02%) were readmitted within 30 days of discharge. See Table 2 below for descriptive statistics for each of the HARM subscales.

Table 2: Descriptive Statistics of HARM Subscales

Scale	Mean	SD	Min	Median	Max	N
Denial	1.71	1.90	0	1.00	7	331
Habituation	2.35	2.70	0	1.00	8	340
Hopelessness	4.07	3.96	0	3.50	12	334
Failed Belongingness	6.00	4.01	0	6.00	12	335
Self-Loathing	7.05	5.23	0	7.00	15	319
Agitated Depression	21.33	14.40	0	21.00	48	282
Suicidal Intent	4.15	6.85	0	1.00	30	310
Total	44.77	27.91	1	39.00	116	225

Inferential Statistics of Individual and Overall Scales

Analyses of Variance (ANOVA's) and t-tests were conducted to compare means of the various demographic variables in an attempt to determine whether significant differences existed between groups on any of the HARM scale scores. Results showed no significant differences existed between males and females across any of the seven scales or the total HARM score $t(223) = .31$, $p > .05$. When examining differences across racial groups, no significant results were found when comparing the scores of participants identifying as Caucasian, African American, or Other across all of the seven scales or the total HARM score $t(215) = .13$, $p > .05$. A One-way Analysis of Variance also failed to reveal significant differences between groups when comparing years of education, $F(165) = .83$, $p > .05$. Additional t-tests also neglected to demonstrate significant differences between groups when comparing both military status, $t(200) = .40$, $p > .05$, and gun ownership variables, $t(192) = .61$, $p > .05$. Significant differences were found based upon relationship status, with regards to Hopelessness ($F(327) = .00$, $p < .05$) and Agitated Depression ($F(275) = .01$, $p < .05$) scales. For this analysis, participants reporting relationship status were placed into one of five groups (Single, Divorced, Married, Separated, or Widowed). Using pairwise comparisons, significant differences existed between Married and Divorced groups on the Agitated Depression scale and between Divorced and Married and Divorced and Single on the Hopelessness scale. See Table 3 below for further summary of these results. Utilizing linear regression, a significant relationship was also found between participant age and scores on the Hopelessness scale. For each year one grows older, on average the Hopelessness score increases by 0.02 points. See Table 4 below for further summary of results.

Table 3: Analysis of Variance Results for Relationship Status

Scale	Category	Mean	N	F-Test	P-Value
Denial					
	Single	1.79	144	1.12	.35
	Divorced	1.52	87		
	Married	1.97	60		
	Separated	1.21	22		
	Widowed	1.27	9		
Habituation					
	Single	2.26	154	1.22	.30
	Divorced	2.82	88		
	Married	2.09	58		
	Separated	2.44	24		
	Widowed	1.30	9		
Hopelessness					
	Single	3.53	156	4.77	.00
	Divorced	5.60	84		
	Married	3.34	59		
	Separated	3.44	20		
	Widowed	5.40	8		
Failed Belonging					
	Single	5.55	152	1.82	.12
	Divorced	5.96	86		
	Married	7.21	58		
	Separated	6.04	21		
	Widowed	6.27	10		
Self -Loathing					
	Single	6.69	144	2.21	.07
	Divorced	8.31	83		
	Married	6.53	59		
	Separated	8.32	20		
	Widowed	5.00	8		
Agitated Depression					
	Single	20.47	128	3.21	.01
	Divorced	25.72	75		
	Married	17.86	49		
	Separated	25.43	15		
	Widowed	16.20	8		
Suicidal Intent					
	Single	3.79	145	1.96	.10
	Divorced	5.96	76		
	Married	3.39	56		
	Separated	3.73	20		
	Widowed	1.50	8		

Total Score					
	Single	42.32	99	2.41	.06
	Divorced	54.52	60		
	Married	41.03	40		
	Separated	45.88	15		
	Widowed	35.60	8		

Table 4: Linear Regression Results for Age

Scale	Parameter	Estimate	Std. Err.	T-Test	P-Value (T)
Denial					
	Intercept	2.20	0.31	7.06	.00
	Slope	0.01	0.01	-1.67	.10
		N = 331			
Habituation					
	Intercept	1.65	0.45	3.68	.00
	Slope	0.02	0.01	1.67	.10
		N = 340			
Hopelessness					
	Intercept	1.47	0.64	2.32	.02
	Slope	0.07	0.02	4.33	.00
		N = 334			
Failed Belonging					
	Intercept	6.11	0.66	9.25	.00
	Slope	-0.00	0.02	-0.18	.86
		N = 335			
Self -Loathing					
	Intercept	6.42	0.88	7.32	.00
	Slope	0.02	0.02	0.77	.44
		N = 319			
Agitated Depression					
	Intercept	17.20	2.59	6.64	.00
	Slope	0.11	0.06	1.69	.09
		N = 282			
Suicidal Intent					
	Intercept	2.23	1.17	1.92	.06
	Slope	0.05	0.03	1.74	.08
		N = 310			
Total Score					
	Intercept	35.82	5.48	6.54	.00
	Slope	0.24	0.14	1.74	.08
		N = 225			

Correlational Analysis

Due to the tendency of subscales found within the HARM to be highly related to one another (i.e. someone reporting higher levels of Agitated Depression will likely report higher levels of Hopelessness), the extent of those relationships were explored via correlational analyses. The correlational values capturing these relationships can range from -1 to 1. Table 5 below summarizes the extent and nature of these relationships. In light of the significant inter-scale correlations found between many of the subscales, it was determined that they should not be included simultaneously to create a final model for readmission and disposition outcomes, but added individually to determine individual contribution. For example a high correlational relationship exists between Self-Loathing and Agitated Depression (r = .83). This means that as one score increases, the other is likely to increase in value as well.

Table 5: Correlational Relationships between HARM Subscales

	Denial	Habituation	Hope	Failed Belonging	Self-Loathing	Agitated Depress	Suicidal Intent	Total
Denial	1	-.43	-.50	.11	-.52	-.50	-.30	-.53
Habituation		1	.54	-.12	.51	.51	.66	.68
Hopelessness			1	-.09	.57	.55	.61	.72
Failed Belonging				1	-.21	-.20	-.15	-.06
Self-Loathing					1	.83	.60	.86
Agitated Depression						1	.64	.93
Suicidal Intent							1	.81
Total Score								1

Treatment Disposition

When examining treatment disposition, logistic regression and chi square analyses were conducted to determine which variables best predicted the outcome of individual cases. Due to the fact that there were three possible outcomes (i.e. inpatient, outpatient, and no treatment); data were examined in two different ways for purposes of the logistic regression analyses. For instance, individuals who were not referred to treatment or who left against medical advice comprised the "no treatment" group. The first logistic regression analysis for treatment disposition status therefore examined the treatment vs. no treatment condition. A second analysis was subsequently conducted to explore inpatient vs. outpatient status.

The overall purpose of conducting a logistic regression analysis is to better assess the impact of several predictor variables on the dependent variable of treatment disposition. In this case the independent variables are continuous and the dependent disposition variables are categorical (i.e. treatment vs. no treatment, and inpatient vs. outpatient), hence the appropriate analysis is a logistic regression (Pallant, 2010). Therefore, the benefit of conducting a logistic regression is that it enables you to test models designed to predict categorical outcomes with two or more categories. This means that a prediction can be made based upon the likelihood that an individual will belong to one of the two categories given certain other information (Field, 2009).

Treatment vs. No Treatment Logistic Regression

Initially, participants were placed into one of two groups: referred for treatment vs. no treatment. In this logistic regression analysis, both inpatients and outpatients were combined. Results of this analysis suggest that the variables Self-Loathing , Agitated

Depression, and Total HARM score (negative relationship with "no treatment", so more likely to receive treatment if they score higher here) were all predictive of whether or not a patient was referred for treatment.

Table 6: Treatment vs. No Treatment Logistic Regression Results

Scale	Estimate	Std. Err.	Z-Test	DF	P-Value	N
Denial	0.13	0.11	1.19	1	.23	320
Habituation	-0.15	0.10	-1.58	1	.11	330
Hopelessness	-0.12	0.07	-1.85	1	.06	324
Failed Belonging	-0.04	0.06	-0.63	1	.53	324
Self-Loathing	-0.16	0.05	-2.93	1	.00	311
Agitated Depression	-0.07	0.02	-3.05	1	.00	274
Suicidal Intent	-0.12	0.07	-1.68	1	.09	301
Total	-0.04	0.01	-2.64	1	.01	220
Age	0.00	0.01	0.19	1	.85	349

Inpatient vs. Outpatient Logistic Regression

In the second analysis related to treatment disposition, inpatient vs. outpatient groups were examined. For purposes of this analysis those individuals in the "no treatment" category were removed. For those participants who were referred to treatment, all of the scales except Failed Belongingness were predictive of inpatient versus outpatient status. Those who scored higher on the Habituation, Hopelessness, Self-Loathing, Agitated Depression, and Suicidal Intent scales were less likely to be outpatient (more likely to be inpatient). Those who scored higher on the Denial scale were more likely to be seen as an outpatient. Reference Table 7 below for results.

Table 7: Inpatient vs. Outpatient Logistic Regression Results

Scale	Estimate	Std. Err.	Z-Test	DF	P-Value	N
Denial	0.22	0.07	3.39	1	.00	299
Habituation	-0.23	0.05	-4.54	1	.00	308
Hopelessness	-0.15	0.03	-4.37	1	.00	302
Failed Belonging	0.00	0.03	-0.08	1	.94	304
Self-Loathing	-0.11	0.02	-4.44	1	.00	289
Agitated Depression	-0.04	0.01	-4.29	1	.00	256
Suicidal Intent	-0.18	0.04	-4.74	1	.00	281
Total	-0.03	0.01	-4.76	1	.00	205
Age	-0.01	0.01	-1.65	1	.10	325

Treatment Disposition Chi Square Analysis

Chi square analyses were also utilized to explore the predictive relationship between independent and dependent categorical variables. More specifically, this test is used to determine whether two categorical variables are related by comparing the frequencies of cases found throughout the various categories in one variable (i.e. demographic variables) across the categories of another variable (i.e. treatment disposition) (Pallant, 2010). In this case, the chi square disposition analysis indicated that the only demographic variable related to inpatient vs. outpatient classification was the patients' marital status. The largest difference was that of those who were married, only 43.33% became inpatients, as opposed to those who were not married (single/other) where between 61.64% and 63.64% of subjects were psychiatrically hospitalized. Additionally, 51.67% of married individuals became outpatients, while between 28.93% and 31.45% of unmarried individuals became outpatients.

Table 8: Chi Square Results for Relationship Status and Treatment Disposition

Disposition	Single	Married	Other	Total
Inpatient	98 61.64%	26 43.33%	77 63.64%	201
Outpatient	50 31.45%	31 51.67%	35 28.93%	116
No Treatment	11 6.92%	3 5.00%	9 7.44%	23
Total	159	60	121	340

Test	DF	Value	P-Value
Chi-Square	4	10.18	.04
Freeman-Halton			.04

Readmission Status

A Logistic regression analysis was subsequently conducted to examine the effect of each of the HARM scales individually as well as the continuous variable "Age" on whether or not an individual was readmitted to treatment. The purpose of this analysis was to determine which variables best predict the probability of someone being readmitted within 30 days of initial ED discharge. Again, the purpose of conducting a logistic regression analysis in this study was to better assess the impact of several predictor variables on the dependent variable of readmission status. A chi square analysis was also performed to determine if significant relationships existed between any of the categorical independent variables (i.e. marital status, ethnicity) and the dependent readmission status variable.

Readmission Logistic Regression

Therefore, a logistic regression analysis examined the effect of each of the HARM scales individually as well as the continuous variable "Age" on the readmission

variable. Results suggested that Age was the only significant variable predicting whether a patient was readmitted or not. As previously mentioned, there was a positive significant relationship between readmission and age, suggesting that as one's age increases they were more likely to be readmitted.

Table 9: Results of Logistic Regression Analysis for Readmission Status

Scale	Estimate	Std. Err.	Z-Test	DF	P-Value	N
Denial	0.07	0.09	0.71	1	.48	331
Habituation	0.04	0.06	0.57	1	.57	340
Hopelessness	-0.02	0.04	-0.37	1	.71	334
Failed Belonging	-0.02	0.04	-0.52	1	.60	335
Self-Loathing	-0.03	0.04	-0.73	1	.47	319
Agitated Depression	0.02	0.01	1.26	1	.21	282
Suicidal Intent	0.01	0.02	0.32	1	.75	310
Total	0.01	0.01	1.53	1	.13	225
Age	0.04	0.01	2.97	1	.00	363

Readmission Chi Square Analysis

A chi square analysis was also conducted revealing that none of the demographic variables were able to predict readmission status at the .05 level of significance. It should be noted that these results were likely impacted by a small sample size due to the fact that of 185 males, 89.19% were not readmitted (10.81% were readmitted), and of the total of 172 females, 88.95% were not readmitted (11.05% were readmitted).

Final Models and Receiver Operating Characteristics Results

Final models have also been created to help predict treatment outcomes by utilizing logistic regression analyses. These models will help to explain the predictive

nature of the independent variables when determining the specific treatment disposition outcomes examined in this study (i.e. whether one receives treatment vs. no treatment, whether individuals who receive treatment will be seen on an inpatient vs. outpatient basis, and whether individuals were readmitted within 30 days of ED discharge). An explanation of these models will be provided in the following chapter.

ROC curves were also created to further explore the predictive nature of the three disposition models mentioned above. ROC curves are often used to evaluate the efficacy of diagnostic tests and models (Zweig & Campbell, 1993). This type of analysis also allows us to determine the ability of a test to discriminate between two groups of participants (Streiner & Cairney, 2007). For purposes of this study we will first examine the area found under the curve, or the AUC value. This value describes the precision of the model and characterizes the probability that the test will yield a higher value for a randomly chosen individual who receives treatment, is seen on an inpatient basis, or is readmitted within 30 days of ED discharge, in comparison to randomly chosen individuals who do not receive treatment, are seen on an outpatient basis, or not readmitted within 30 days of discharge. AUC's between 0.50 and 0.70 have low accuracy, those between 0.70 and 0.90 have moderate accuracy, and those over 0.90 have high accuracy (Streiner & Cairney, 2007). ROC plots also display the sensitivity and specificity pairs for every possible cutoff value of the final models. These values are somewhat arbitrary, but for purposes of this study the optimal cutoffs will be said to maximize the sum of sensitivity (proportion of true positives correctly identified) and specificity (proportion of true negatives correctly identified). In the following pages both

AUC's and measures of sensitivity and specificity for each of the final disposition models are reported.

Table 10: ROC Final Model For Disposition: Treatment vs. No Treatment

Variable	Estimate	Std. Err.	Z-Test	P-Value
Intercept	0.14	0.03	5.29	.00
Agitated Depression	0.00	0.00	-3.38	.00

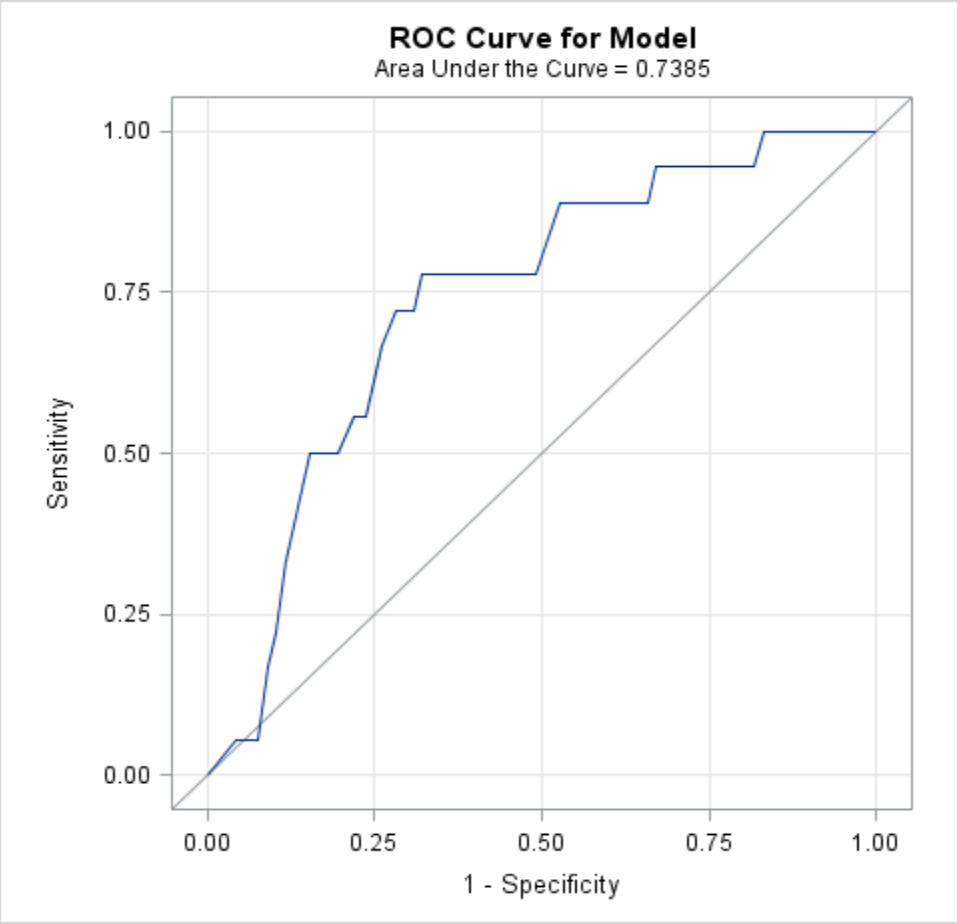

Figure 1: ROC Curve Final Model for Disposition (Treatment vs. No Treatment)

Figure 1 shows the ROC analysis of the treatment vs. no treatment model. The area under the curve is 0.74 (95% CI 0.63-0.85). If the sum of sensitivity (78%) and

specificity (68%) is maximized, a patient will not receive treatment if the model says there is an 8.42% chance or higher that they will not receive treatment.

Table 11: ROC Final Model For Disposition: Inpatient vs. Outpatient

Variable	Estimate	Std. Err.	Z-Test	P-Value
Intercept	0.38	0.35	1.08	.28
White	-0.74	0.36	-2.04	.04
13+ Years Ed	0.64	0.34	1.90	.06
Married	0.98	0.42	2.36	.02
Suicidal Intent	-0.29	0.06	-4.58	.00

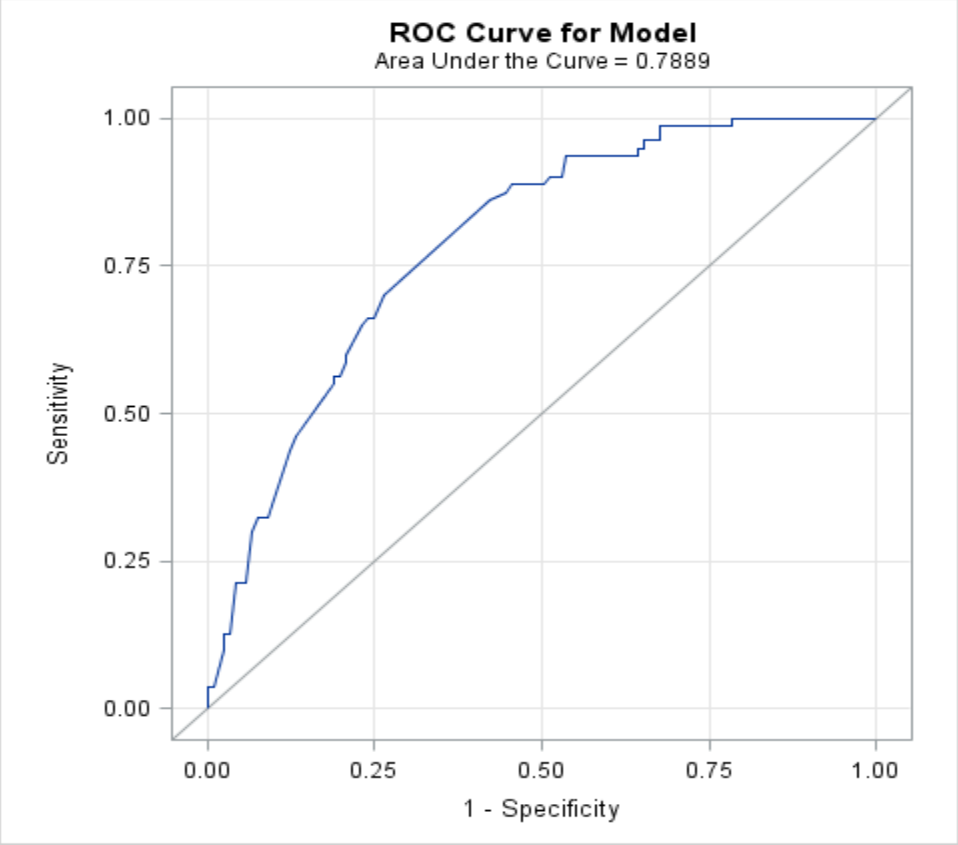

Figure 2: ROC Curve Final Model for Disposition (Inpatient v Outpatient)

Figure 2 shows the ROC analysis of the model for inpatient vs. outpatient status. The area under the curve is 0.80 (95% CI 0.73-0.85). If the sum of sensitivity (86%) and specificity (58%) is maximized, a patient will be outpatient if the outpatient/inpatient model says there is a 41.05% chance or higher that they will be outpatient.

Table 12: ROC Final Model for Readmission

Variable	Estimate	Std. Err.	Z-Test	P-Value
Intercept	-3.56	0.55	-6.45	.00
Age	0.04	0.01	2.97	.00

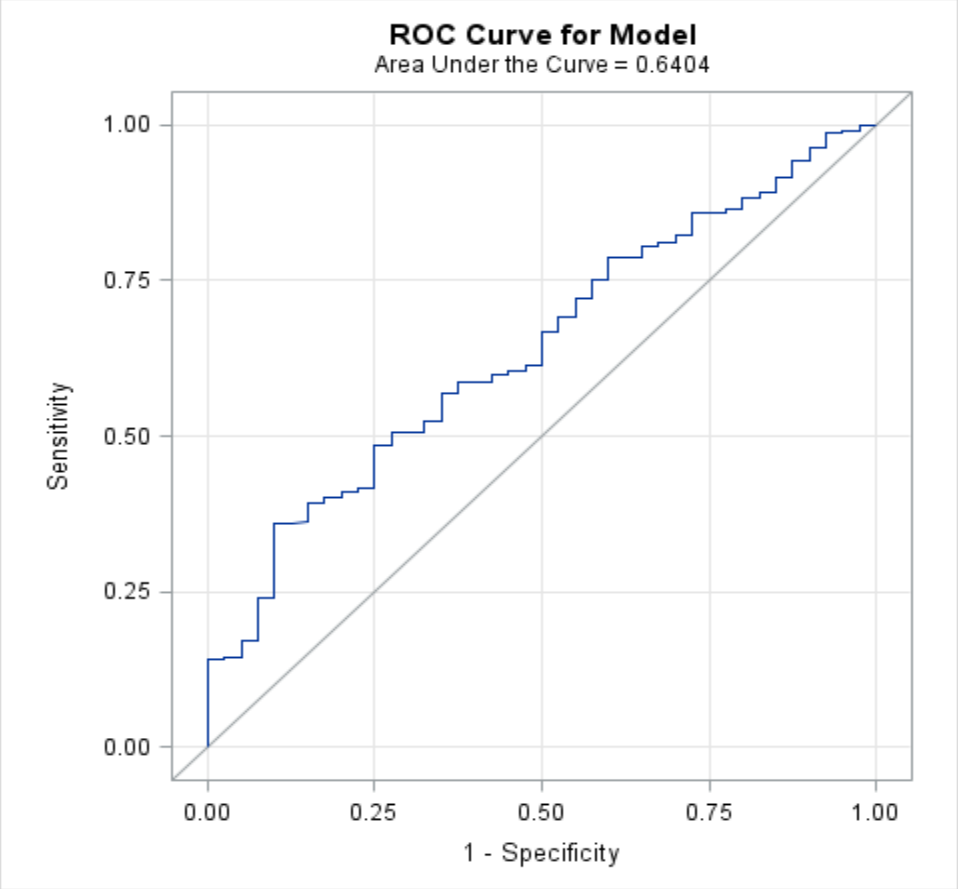

Figure 3: ROC Curve Final Model for Readmission

Figure 3 shows the ROC analysis of the model for readmission status. The area under the curve is 0.64 (95% CI 0.56-0.72). If the sum of sensitivity (36%) and specificity (90%) is maximized, a patient will be readmitted if the readmission model says there is a 92.42% chance or higher that they will be readmitted.

CHAPTER 5

Discussion

The primary goal of suicide risk assessment is to identify individuals a priori who are at an increased risk of ending their lives, so that preventative measures (e.g. medication, psychotherapy) can be enacted with the highest degree of promptness and efficiency (Range & Knott, 1997). This study explores whether and to what extent a specific measure of suicide risk, the HARM, predicts treatment decision-making and readmission status for a population that is innately at high risk for suicide. In addition, this study indirectly contributes to the literature on suicide risk assessment regarding the added benefits of utilizing both a clinical interview and a quantitative tool.

As can be seen from reviewing current literature in the area of suicide risk assessment, clinicians and researchers alike have attempted to identify and implement techniques aimed at the early detection of individuals at increased risk of suicide (Granello, 2010). The purpose of this study was to further validate the HARM, a multi-factor self-report risk assessment tool, designed to prevent suicide through the early detection of known risk factors. Specifically, the primary study aim was to explore the predictive validity of the HARM in determining treatment disposition outcomes (e.g. treatment vs. no treatment and inpatient vs. outpatient) and readmission status in a hospital Emergency Department (ED) population.

This study is based on archival data collected as part of a system wide quality improvement initiative within a large multi-hospital healthcare system. Over a 120-day period, from January 1, 2011 through April 21, 2011, the HARM was administered to 494 ED patients. In an attempt to assess for suicide risk, patients initially entering through one of the EDs were screened for necessity of a Mental Health Evaluation (MHE). If a formal evaluation was deemed necessary by the attending physician on duty, an MHE was ordered and the patient was asked to independently complete the HARM as part of a comprehensive mental health assessment. Again clinicians were not trained on how to score or interpret the HARM, they were simply instructed to administer the tool as one part of the comprehensive mental health assessment. After carefully weighing all relevant information, including potential qualitative data gathered from the HARM, a determination was made by the assessor and other healthcare providers to admit or to discharge the patient.

Initially, descriptive statistics were found for all variables. Correlational relationships between various HARM subscales were also explored. Between-group comparisons were then conducted via independent t-test and analysis of variance methods. Logistic regression analyses were used to determine which continuous demographic variables and HARM subscales were most predictive of treatment disposition and readmission status. Chi square analyses were also conducted to determine whether significant relationships existed between categorical independent variables and treatment outcomes. Logistic regression analyses were then performed to create final models utilizing the variables found to be most predictive of treatment and readmission status outcomes (e.g. treatment vs. no treatment, inpatient vs. outpatient, and

readmission status within 30 days of ED discharge). Finally, ROC curves along with measures of sensitivity and specificity were utilized to ascertain the predictive properties of these models.

Overview of Results

Correlational Analysis

Correlational analyses revealed that several of the scales were interrelated (a few of them were very highly correlated with one another). This is likely due to the fact that some of the constructs within individual subscales are highly related to constructs measured by other subscales. The overall significance of this finding suggests that relationships between some scales are so strong that the inclusion of one or more scales into a final version of the HARM should be carefully considered. For example the correlational coefficient for Agitated Depression and Self-Loathing is r=.83. This indicates a strong positive relationship between both variables and suggests that as an individual's score for Agitated Depression increases, their score on the Self-Loathing scale will increase as well. One reason for this may be that if individuals are endorsing several depressive symptoms represented by the Agitated Depression scale, they may also be reporting feelings of guilt or worthlessness (i.e. personal ineffectiveness) better captured by the Self-Loathing scale. While these two scales correlate highly with one another, they appear to measure two distinct constructs and the value of including each into a final iteration of the HARM is clear.

ANOVA and t-test Analyses

ANOVA and t-test analyses were conducted to determine whether significant differences existed between any of the demographic variables in relation to various

HARM subscales. Significant differences were not found across a majority of demographic variables. Despite this finding, at the .05 level of significance, differences were seen to exist between the participant's reported marital status and various HARM subscales including: Hopelessness (those who were in the "Divorced" category scored significantly higher than singles or married individuals) and Agitated Depression (those who were in the "Divorced" category scored significantly higher than those who were married). This finding is notable given that clinicians often perceive the patient's marital status as an important determining factor regarding the appropriate disposition of cases (Umberson, 1992). Research has shown that suicide risk may increase as one's sense of integration with family members is perceived to decrease (Stack, 2000). Similarly, higher rates of suicide have also been found amongst divorced and widowed persons in comparison to married individuals.

Additionally, a linear regression analysis revealed that there were borderline significant results between participants' age and several of the HARM scales. Overall, however, significant (a = .05) differences were found between participants' age and scores on the Hopelessness scale. More specifically, for each year one grows older, on average the Hopelessness score will increase by 0.02 points. As previously stated, suicide risk begins to rise above the national average between the ages of 25-34 (12.4 per 100,000) and remains elevated until individuals reach the 50-54 range (16.4 per 100,000) (WHO, 2011). After reaching the 55-64 age range, one's risk falls steadily until arriving at the 75+ range. In fact, the most up to date statistics published by the World Health Organization identify individuals in the 75+ age group as having the highest suicide rates of 16.8%. One of the likely reasons for this finding is that as individuals age they will be

faced with an increasing number of life events likely to foster a sense of hopelessness (i.e. death of loved ones, loss of independence, illness). As the literature on suicidology has repeatedly confirmed, feelings of hopelessness are a significant risk factor for suicide (Beck et al., 1985; Beck et al., 1990). Therefore, as hopelessness increases with age, general suicide risk may increase as well.

Disposition Analysis

As previously mentioned, there were three possible treatment disposition outcomes (e.g. inpatient, outpatient, and no treatment). Therefore, the data were examined in two different ways to better explain treatment disposition outcomes.

First, participants were placed into one of two groups: treatment versus no treatment. In this analysis both inpatients and outpatients were combined. The no treatment group was comprised of individuals not referred to treatment or those who left against medical advice. Results suggest that the variables Self-Loathing (negative relationship with "no treatment", so more likely to receive treatment if they score higher here), Agitated Depression (negative relationship with "no treatment", so more likely to receive treatment if they score higher here), and total HARM score (negative relationship with "no treatment", so more likely to receive treatment if they score higher here) were all significantly related to whether or not the individual received treatment. With this being said, the only variable found to contribute significantly to the predictive ability of the model after utilizing a backwards selection method was Agitated Depression. The final model of treatment vs. no treatment can be found below.

Table 13: Final Model Treatment vs. No Treatment

Variable	Estimate	SE	Z-test	P-value
Intercept	0.1397	0.03	5.29	.00
Agitated Depression	-0.0035	0.00	-3.38	.00

When interpreting this model, the odds of a patient not receiving treatment versus receiving treatment decreases by a factor of exp (0.0035) = 1.00 for every extra point scored on the Agitated Depression scale. For this model -0.0035 is the natural log of the odds ratio. Due to the fact that several of the predictor variables within this study are continuous, the variables must be converted utilizing the natural log calculation to better capture the probability of a specific event occurring within the 0 to 1 range (Pallant, 2010). If this calculation was not performed, the probability of a specific event occurring could theoretically range from – to + infinity. Therefore in order to convert the natural log back to an odds ratio format, the estimate must be multiplied by "exp." For purposes of explaining all the final models, "exp (estimate)" is the equivalent of an odds ratio, or the odds of being in one of the outcome categories when the value of the predictor variable increases by one unit. The following equation represents the probability of a patient not receiving treatment given their Agitated Depression score.

$$P = (\exp [0.1397 – 0.0035*AD])/(1 + \exp [0.1397 – 0.0035*AD])$$

According to this model, an individual who scores higher on the Agitated Depression scale has less of a chance of not receiving treatment. For example, a patient who scored

0 on the Agitated Depression scale is predicted to have a 53.49% chance of not receiving treatment.

$$P = (\exp [0.1397 – 0.0035*0])/(1 + \exp [0.1397 – 0.0035*0]) = 53.49\%$$

An individual who scored 40 for Agitated Depression would be predicted to have a 49.99% chance of not receiving treatment.

$$P = (\exp [0.1397 – 0.0035*40])/(1 + \exp [0.1397 – 0.0035*40]) = 49.99\%$$

In the second disposition analysis, participants were placed in either the inpatient or outpatient group. In this particular analysis those individuals in the "no treatment" category were removed. For those participants who did receive treatment, all of the scales except for Failed Belongingness were individually related to inpatient versus outpatient status. After utilizing a backwards method, four explanatory variables were found to be significant at the .10 level; race (White versus not), years of education (at least 13 versus not), relationship status (married versus not), and score on the Suicidal Intent scale. The final model of being seen as an inpatient vs. outpatient can be seen below.

Table 14: Final Model Inpatient vs. Outpatient

Variable	Estimate	SE	Z-test	P-value
Intercept	0.38	0.35	1.08	.28
Race	-0.74	0.36	-2.04	.04
Education	0.64	0.34	1.90	.06
Relationship	0.98	0.42	2.36	.02
Suicidal Intent	-0.29	0.06	-4.58	.00

Holding years of education, relationship status, and Suicidal Intent score constant, the odds of someone being an inpatient instead of an outpatient increases by a factor of exp (0.74) = 2.10 if the individual is Caucasian. Holding race, relationship status, and Suicidal Intent score constant, the odds of someone being an outpatient instead of an inpatient increases by a factor of exp (0.64) = 1.90 if that individual has had at least 13 years of education. Holding race, years of education, and Suicidal Intent score constant, the odds of someone being an outpatient instead of an inpatient increases by a factor of exp (0.98) = 2.68 if the individual is married. Finally, holding race, years of education, and relationship status constant, the odds of someone being an inpatient instead of an outpatient increases by a factor of exp (0.29) = 1.33 for every extra point scored on the Suicidal Intent scale. The estimated probability of someone being outpatient instead of inpatient is highlighted by the following equation.

$$P = (\exp [0.38 - 0.74*W + 0.64*Y + 0.98*M - 0.29*SI]) / (1+ \exp [0.38 - 0.74*W + 0.64*Y + 0.98*M - 0.29*SI])$$

Based upon this model, individuals who report as being Caucasian, have 12 or fewer years of education, are unmarried, and achieve a maximum score of 30 on Suicidal Intent are least likely to be seen on an outpatient basis, at 0.01% chance. On the other hand, those who identify as non-Caucasian, have 13 or more years of education, are married, and who score a 0 on Suicidal Intent are most likely to be outpatients, at an 88.16% chance.

The results of this disposition analysis are not surprising given the current research concerning suicide risk. For example, those participants reporting higher levels of Agitated Depression were more likely to receive treatment. Additionally, non-

Caucasian, more educated, married participants, who scored lower on the Suicidal Intent scale, were more likely to be seen on an outpatient basis. This finding suggests that if treatment was warranted, their symptoms were not severe enough to require they be hospitalized and treated on an inpatient basis. This is consistent with current literature identifying the demographic variables of race/ethnicity, education, and relationship status as significant factors in the determination of suicide risk (CDC, 2009; Waite, 2006; Stack, 2000). For example, non-Caucasian, married, more educated individuals are believed to be at lower levels of general risk when compared to other demographic groups. Additionally, the finding that increased scores on both the Agitated Depression and Suicidal Intent scales suggested more substantial treatment interventions were warranted (i.e. receiving treatment and inpatient status), is consistent with the fact that clinicians likely based treatment decisions upon more readily observable signs of distress.

Despite these assertions, the results from this analysis are notable given that the variables of Habituation, Hopelessness, Suicidal Intent, and Failed Belongingness would have been expected to play a greater role in the determination of the treatment vs. no treatment distinction. Given the literature on suicide risk assessment highlighting the importance of these factors in the appraisal of overall risk, it is interesting that Agitated Depression emerged as the predictive variable of most significance regarding the distinction of treatment vs. no treatment (Beck et al., 1979; Beck et al., 1990; Joiner, 2005). One reason for this may be that clinicians based treatment decisions upon more directly observable symptoms. Higher levels of depression may be more readily observed within this context as opposed to subjective symptoms such as those captured by the Hopelessness and Failed Belongingness scales. In addition, at risk individuals

may have denied or minimized overall levels of suicidal intent in order to avoid hospitalization or in an attempt to respond to items in a more "socially desirable" manner.

Readmission Analysis

Finally, a logistic regression analysis was conducted to examine the predictive significance of each of the HARM scales individually as well as the continuous variable "Age" on whether or not an individual was readmitted within 30 days of discharge. Results suggested that at the .10 level, Age was the only significant variable predicting whether a patient was readmitted or not. The model below explains the likelihood of a patient being readmitted versus not being readmitted. Recall that "exp (Age)" is the equivalent of an odds ratio or the likelihood of being in one of the outcome categories when the value of the predictor variable increases by one unit (Pallant, 2010).

Table 15: Final Model Readmission Status

Variable	Estimate	SE	Z-test	P-value
Intercept	-3.56	0.55	-6.45	.00
Age	0.04	0.01	2.97	.00

The odds of a patient being readmitted compared to not readmitted increases by a factor of exp (0.04) = 1.04 for every extra year of age. The estimated probability of someone being readmitted or not is explained by the following equation:

$$P = (\exp [-3.56 + 0.04*AGE]) / (1 + \exp [-3.56 + 0.04*AGE])$$

This model is somewhat consistent with the literature on suicide risk claiming that individuals age 75 and above have the highest rates of suicide among any other group (WHO, 2011). One important distinction to make, however, is that this model predicts readmission status and not overall suicide risk. If one considers other factors contributing to readmission not captured by this study (e.g. chronic illness), it makes more sense intuitively that as one ages they are more likely to be readmitted to the ED over time. Based upon this assertion, the relationship between Age and readmission status for suicide risk is not that clear cut. Nevertheless, with regard to readmission, only the Age variable was found to be significant.

For the treatment versus no treatment condition, the only predictive variable of significance was Agitated Depression. While earlier analyses indicated that there were other subscales associated with receiving or not receiving treatment, due to the high number of correlational relationships between the subscales, only one is necessary to make a prediction regarding disposition. In other words, once Agitated Depression is accounted for other subscales do not provide significant further information (nor do the demographic factors) regarding treatment disposition. Therefore, those who score higher on the Agitated Depression scale are more likely to receive treatment of some type. This finding implies that without quantitatively utilizing the HARM, clinicians seemed to be most influenced by the acute distress of patients when referring to treatment. In this case, less emphasis was placed on other factors typically associated with increased suicide risk (i.e. Failed Belongingness, Hopelessness).

The final model for inpatient versus outpatient status contains multiple factors likely to help predict disposition. Initially, almost every HARM scale was found to

significantly distinguish between inpatient vs. outpatient status. Nevertheless, the only HARM subscale that is significant in this model is Suicidal Intent; its inclusion indicates that it is the most useful subscale in predicting inpatient/outpatient status. Once Suicidal Intent is accounted for, other scales do not contribute significant further information. Again, as with Agitated Depression, Suicidal Intent is one of the more readily ascertained suicide risk factors. Those who score higher on this scale are less likely to be outpatient and therefore more likely to be inpatient. Other factors that influence disposition in the presence of the Suicidal Intent score are race (white individuals are less likely to be outpatient than black individuals or those of other races), years of education (those with 13 or more years of education are more likely to be outpatient), and relationship status (those who are married are more likely to be outpatient). While some of these variables were not seen to influence the disposition at highly significant levels, their inclusion in the final model indicates that once we control for other factors, these factors may continue to influence outcome (for example, after controlling for relationship status, education does further influence the results).

Based upon the results of this study, several variables within the HARM appear to adequately predict treatment disposition and readmission status within the current population. Additionally, the measure does facilitate a more comprehensive understanding of theoretically-derived factors associated with increased suicide risk, thereby informing treatment decision making procedures. With this being said, commonly known risk factors can be utilized to more readily identify and treat individuals in distress. While the factors shown to be most predictive of treatment

decision making and readmission status are not central to Joiner's theory of suicide risk, further research is warranted to determine whether this finding holds up over time.

Limitations

One of the limitations of this study stems from the fact that clinicians maintained a degree of autonomy when determining which patients would be administered the HARM. As such, when patients first presented to the ED, potentially suicidal individuals may have been excluded from participating in the study based solely upon clinical judgment regarding perceived capabilities and/or level of impairment. This phenomenon, commonly referred to as selection bias, might have impacted findings from this study. For example, a patient may have presented to the ED voicing significant suicidal thoughts, however the Mental Health evaluator may have deemed them unable to complete the HARM for a variety of reasons including: substance intoxication, level of educational attainment, or psychosis. Additionally, a substantial number of patients may have refused to complete the measure despite reporting significant suicidal ideation.

Another limitation of the study is that individuals from specific demographic groups were clearly underrepresented in the population. For example, the percentage of individuals in this study who self-identified as Hispanic was significantly less in comparison to the amount normally found in both southeastern and U.S. populations as a whole. The problem with different groups being underrepresented is that there are greater concerns generalizing findings from this study to the larger population.

Additionally, a third limitation of this study stems from the fact that data was unavailable for a notable percentage of patients concerning both treatment disposition and readmission status. More specifically, treatment disposition data was available for

343 out of 494 patients, and readmission data was available for 363 out of 494 patients. If outcome data was readily available for all participants, the findings from this study could potentially change.

In this particular study, the HARM was administered to participants as part of a comprehensive suicide risk assessment. Through the course of this process Mental Health evaluators relied upon multi-source data outside of HARM scores to make their determinations regarding treatment disposition outcomes. For example, evaluators may have utilized a combination of qualitative and quantitative approaches when assessing suicide risk. In addition, clinicians did not use the HARM quantitatively. They were asked to simply administer the measure without prior knowledge of how to properly score or interpret it. With regard to this particular study, Mental Health evaluators could have only used the measure qualitatively. The fact that providers likely used other variables to make their treatment decisions (e.g. clinical interview), suggests it will be difficult to determine to what extent the HARM was utilized in predicting case disposition.

Future Research

Due to the fact that data for this study were collected from an ED sample, it will be helpful for future research to determine if similar results can be found across other populations and settings. As previously mentioned, various demographic groups were not represented fully in the current study and this will likely impact the generalizability of findings to other populations. Future research should also be conducted to determine whether results will change after clinicians have been instructed on how to correctly score and interpret the HARM. Additionally, the HARM is a fairly new measure and

continued analyses should be conducted to further establish its psychometric properties and utility for clinical decision-making purposes. Of primary importance is determining the extent to which HARM scales prospectively predict suicide and suicidal behavior.

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