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Health Literacy and Psychiatric Hospital Readmissions.

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Dedication

I dedicate this manuscript to my very supportive family, Trents, Pet, and TJ; to an old stalwart, Imogene Picton, my maternal grandmother; and to Daniel and Albertha Anderson, my sainted parents.

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Health Literacy and Psychiatric Hospital Readmissions

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This study examined the health literacy of adult patients diagnosed with bipolar disorder, investigated the relationship between health literacy and psychiatric hospital readmissions, identified differences in readmission rates between health literacy groups, and explored the best predictors of hospital readmission from among selected demographic characteristics (social support, gender, ethnicity, residential status, insurance status, employment status, marital status, education, in-patient length of stay, age, and health literacy). The prospective, exploratory, descriptive research design used a health literacy questionnaire at or near discharge, and tracked 2- and 4-week post discharge readmission rates in 30 adult patients diagnosed with bipolar disorder.

Health literacy was found to correlate strongly with 2-week and total readmissions, and was the only significant predictor of 2-week readmissions. Findings support the feasibility of assessing health literacy further in this patient population, validate the procedure for subsequent studies, and provide preliminary data on the relationship between health literacy and readmissions. Findings may also be useful in patient education, discharge planning, and policy making.

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List of Abbreviations

UTMB	University of Texas Medical Branch
GSBS	Graduate School of Biomedical Science
HL	Health Literacy
ANCOVA	Analysis of Covariance
USDHHS	United States Department of Health and Human Services
US	United States
WHO	World Health Organization
AHRQ	Agency for Health Research and Quality
SAMHSA	Substance Abuse and Mental Health Services Admin.
AHA	American Hospital Association
NIMH	National Institute of Mental Health
CMS	Center for Medicare and Medicaid Services
CLT	Cognitive Load Theory
LTM	Long-Term Memory
WM	Working Memory
TOFHLA or S-TOFHLA	Test of Functional Health Literacy in Adults (Short)
DSM-IV-TR or DSM-5	Diagnostic and Statistical Manual of Mental Disorders
USD	United States Dollar
NCES	National Center for Education Statistics
IPF	Inpatient Psychiatric Facilities
FFS	Fee for Service
GAF	Global Assessment of Functioning
IQ	Intelligence Quotient
COW-AT	Controlled Oral Word Association Test
REALM	Rapid Estimate of Adult Literacy in Medicine
CES-D	Center for Epidemiologic Studies Depression Scale
ECLS-K	Early Childhood Longitudinal Study of Kindergarten
MMSE	Mini Mental Status Examination
EMR	Electronic Medical Record
IRB	Institutional Review Board
UTHealth	University of Texas Health Science Center at Houston
UT-HCPC	UTHealth Harris County Psychiatric Center
MSPSS	Multidimensional Scale of Perceived Social Support
ANOVA	Analysis of Variance
RM-ANCOVA	Repeated Measures Analysis of Covariance
SD	Standard Deviation
IPFQR	Inpatient Psychiatric Facility Quality Reporting

Chapter 1 Introduction

Health literacy (HL) is required for successful navigation of any complex healthcare system. According to the United States Department of Health and Human Services (USDHHS), Office of Disease Prevention and Health Promotion, HL is a public health problem affecting nine of ten English-speaking adults in the United States (US) and has earned a place among the nation's targeted objectives (USDHHS, 2011). Limited HL contributes \$106-236 billion to US annual healthcare expenditures, but the actual present-day cost of limited HL is closer to \$1.6-3.6 trillion (USDHHS, 2011).

Health literacy was initially defined in 1992 as "The ability to perform health related tasks requiring reading and computational skills" (Williams et al., 1995; as cited in Speros, 2005). The definition has grown in complexity, with the World Health Organization further defining it as "The representation of the cognitive and social skills which determine the motivation and ability of individuals to gain access to, and understand and use information in ways which promote and maintain good health" (WHO, 2011, p. 13). According to the WHO, HL implies the achievement of a level of knowledge, personal skills, and confidence to take action to improve personal and community health by changing personal lifestyles and living conditions (WHO, 2011).

The US Department of Human Services defines HL as "The capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions" (USDHHS, 2011, p. 1), and The National Academy of Sciences (2004) adds that HL includes the ability to understand instructions on prescription drug bottles, appointment slips, medical education brochures, doctors' directions, and consent forms,

and the ability to negotiate complex healthcare systems. Health literacy is not simply the ability to read; it requires a complex group of reading, listening, analytical, and decision-making skills, and the ability to apply these skills to health situations (Berkman et al., 2011). Each attribute in the HL definition represents some level of complexity and presents challenges for a certain sector of healthcare consumers, policy makers, and health services providers. One of these challenges is the overuse of emergency departments and inpatient facilities.

A large percentage of the chronically mentally ill (e.g. patients diagnosed with bipolar disorder, schizophrenia, and schizoaffective disorders) have low HL (Krishan, von Esenwein, & Druss, 2012). They are also at increased risk for hospital readmissions and poor self-management skills (Cloonan, Wood, & Riley, 2013; USDHHS, 2011; Krishan et al., 2012); however, very little is known about how poor HL contributes to these risks.

Approximately 9 million adults in the US (4%) have a mental illness that greatly affects their day-to-day living according to a Substance Abuse and Mental Health Services Administration (SAMHSA) report (Behavioral Health, United States, 2012). Individuals with serious mental illness earn an average of \$16,000 less per year, account for an annual loss of 217 million work days, suffer from more comorbidities, and die 25 years earlier than the general population (American Hospital Association [AHA], 2012). The report further states that mental health expenditures have increased from \$75 billion in 1990 to \$155 billion in 2009. A study conducted by the National Institute of Mental Health (NIMH, 2006) reported that 24.9 million adults aged 18 years or older, 11.3% of all adults in the US, had experienced serious psychological distress within the past year.

Montgomery and Kirkpatrick (2002) also report that 30-40% of the mentally ill are rehospitalized within 6 months of discharge and 40-50% within 12 months of discharge. The USDHHS considers mental illness a disability and reports that 25% of all years of life lost to disability and early mortality are due to mental illness (Behavioral Health, United States, 2012).

Hospital readmissions in general have also earned attention due to their high associated cost. This phenomenon absorbs an estimated one-third of total US health expenditure according to Cloonan et al. (2013). Approximately 35 million patients are discharged from US hospitals annually and of this number, 2 million Medicare beneficiaries are readmitted within 30 days of discharge at an annual cost of \$17.5 billion (Cloonan et al., 2013).

The real issue with readmission, mental illness, and HL is the high cost to the US economy resulting from the overuse of services with no improvement in quality of life within the specified populations. Overuse of our healthcare system contributes to increased hospital readmissions and high healthcare expenditure. Readmission occurs when a patient is discharged from one acute care hospital and is admitted to the same or different hospital within a specified time period after the time of discharge from the index hospital. The timeframe of focus for the Center for Medicare and Medicaid Services (CMS) is 30 days (CMS, 2013). Thirty-day readmissions have been identified by the CMS as resulting from inadequate inpatient care and as a driver of high healthcare costs. Individuals with chronic mental illness are among the highest users of inpatient facilities and emergency departments according to the CMS.

POPULATION AT RISK FOR LOW HEALTH LITERACY

The USDHHS identifies those at risk for low HL as adults over age 65 years, racial and ethnic groups other than White, refugees and immigrants, those with less than a high school education, those with incomes at or below the federal poverty level (\$11,770 annually for an individual and \$15,930 for a family of two), and non-native English speakers (USDHHS, 2011, p. 8). The population at greatest risk for readmission—as identified by Cloonan et al. (2013), includes those 75 years and older, ethnic minorities, and individuals with comorbidities and low socioeconomic status. However, Mitchell, Sadikova, Jack, and Paasche-Orlow (2012) found no relationship between comorbidity and HL in their study of 30-day hospital readmissions among general medical patients. In addition, consumers of mental health services die 25 years earlier than the general population (Everett, Mahler, Biblin, Ganguli, & Mauer, 2008) and have comorbid physical health conditions with one illness complicating the treatment of another (AHA, 2012). The variables of comorbidity, low socioeconomic status, low educational attainment, and being a member of an ethnic minority seem to profile the mentally ill as the least likely to benefit from health interventions that are meant for the general population (Everett et al., 2008; Behavioral Health, United States, 2012).

THEORETICAL FRAMEWORK

Cognitive Load Theory

The cognitive load theory (CLT) developed by Sweller (1994) is an instructional design theory based on knowledge of human cognitive architecture and its limitations. The theory addresses the learning of complex tasks in which learners are often overwhelmed by the number of interactive pieces of information that need to be processed simultaneously to initiate meaningful learning. The human cognitive

architecture consists of an unlimited long-term memory (LTM) that interacts with a working memory (WM) that is limited in capacity and duration (Paas, van Gog, & Sweller, 2010). According to the theory, LTM stores previously acquired information, is permanent, and has a large capacity; whereas WM, also known as short-term memory, is equated with consciousness of the information being processed before it is stored in LTM or after it has been retrieved from LTM. The CLT emphasizes that the limitation of WM only applies to novel (previously unknown) information and that WM is unrestricted with respect to processing information retrieved from LTM. Working memory is assumed to have a lifespan of approximately 30 seconds (if not rehearsed) and a capacity of about seven elements. Learning occurs through the formation of schemas in long-term memory.

Assumptions of Cognitive Load Theory

The CLT assumes three forms of cognitive load: *intrinsic*, *germane*, and *extraneous*. Intrinsic load is caused by the complexity of the material to be learned, and therefore the complexity of the schemas that must be acquired. Intrinsic load is dependent on element interactivity, which is the number of elements that must be processed simultaneously by the learner. If element interactivity is high, learning becomes difficult and WM resource intensive; whereas for low element interactivity, learning is easier and requires fewer WM resources. When intrinsic cognitive load is high, it is necessary to decrease extraneous cognitive load to enhance optimal learning. Germane load refers to the WM resources required to transform intrinsic cognitive load as related to the conscious construction of schema. Extraneous load is the load that interferes with schema acquisition. In a poorly designed or constructed learning

environment, extraneous load is generated because the learner's attention is diverted from schema acquisition. Extraneous load utilizes limited WM resources that could otherwise be used for schema development (Sweller, 1994). Cognitive overload occurs when the volume of information received (number of elements, complexity, and interactivity) exceeds the information processing capacity of the individual's WM.

Cognitive Deficit in Bipolar Disorder

Cognitive impairment is a core feature of bipolar disorder (Sparding et al., 2015). According to Sparding et al. (2015), patients diagnosed with bipolar disorder exhibit typical cognitive development premorbidly, but demonstrate cognitive deficits by their first episode that become increasingly complicated as a result of worsening symptoms and other exacerbating factors. Muralidharan, Torres, Silveira, Kozicky, and Bucker (2014) found that deficits in the cognitive domains of verbal memory, executive function, and sustained attention had been consistently reported in first episodes of patients diagnosed with active bipolar disorder, as well as those in remission. Torrent et al. (2006) also reported that executive dysfunctions are likely to be good predictors of social and occupational difficulties in patients diagnosed with type 2 bipolar disorder, whereas problems in retaining and recovering information may be more relevant in those diagnosed with type 1 bipolar disorder.

Application of Cognitive Load Theory to this Study

Health literacy is a complex construct and not simply the ability to read. It requires a complex group of reading, listening, analytical, and decision-making skills, and the ability to apply these skills to personal health situations (Berkman et al., 2011).

Cognitive overload of the WM may occur at discharge due to the number and complexity of discharge instructions, causing an increase in extraneous cognitive load and leading to difficulty in learning or the formation of schemas. With high extraneous cognitive load, germane cognition is unable to construct schemas for storage in LTM.

Readmission may occur in patients with low HL because they lack the stored schemas in LTM for application of self-care instructions. Patients with documented poor cognition are required to assimilate and utilize complex HL information that they may find overwhelming. Low HL in patients diagnosed with bipolar disorder may result from recurring cognitive overload due to their poor foundational cognition, as well as cognitive overload at discharge or at other significant learning and instructional time points in their lives (e.g., thoughts of reintegration into the community and reunion with a dysfunctional family, new or old medication routine, transportation, finances, jobs, etc.). These patients may be able to overcome cognitive overload if discharge and other instructions are simplified, provided in chunks, provided in a controlled environment, or frequently

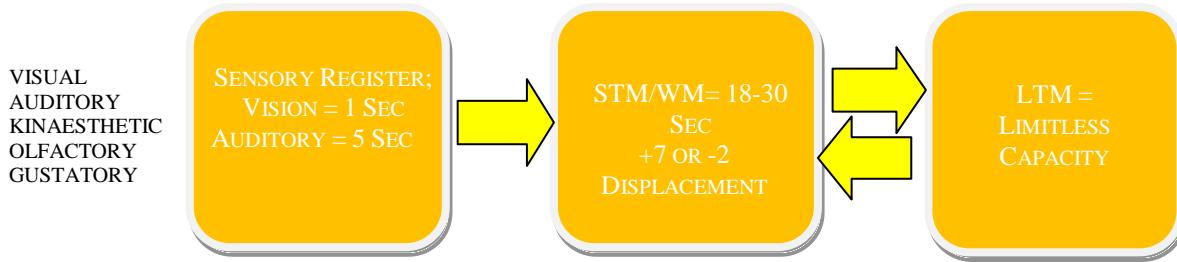


Figure 1: Schematic drawing of the basic memory model as proposed by Atkinson and Shiffrin (1968). Retrieved from www.simplypsychology.org.

SPECIFIC AIMS

The first specific aim explored the functional HL status (total score; levels: inadequate/marginal and adequate) of patients diagnosed with bipolar disorder using the Test of Functional Health Literacy in Adults (TOFHLA). Research questions for this aim

were: (1) What is the functional HL total score in patients diagnosed with bipolar disorder prior to discharge from psychiatric inpatient facility?; and (2) What is the distribution of functional HL levels in patients diagnosed with bipolar disorder?

The second specific aim explored the relationship between HL and psychiatric hospital readmissions at 2- and 4-week intervals post discharge in patients diagnosed with bipolar disorder. The associated research question was: What is the relationship between HL and psychiatric hospital readmissions at 2- and 4-week intervals post discharge in patients diagnosed with bipolar disorder?

Specific aim 3 examined the differences between HL groups (inadequate/marginal and adequate) on total readmissions and readmission across two time intervals, 2 and 4 weeks post discharge, while controlling for age. Two research questions were associated with this aim: (1) What are the differences between HL groups (inadequate/marginal and adequate) in total number of readmissions for patients diagnosed with bipolar disorder, controlling for age?; and (2) What are the differences between HL groups (inadequate/marginal and adequate) in readmissions across two time intervals, 2 and 4 weeks post discharge for patients diagnosed with bipolar disorder, controlling for age?

The final specific aim for the study explored the best predictors of hospital readmission (total and at 2 and 4 weeks) from among demographic variables (social support, age, gender, ethnicity, marital status, education, employment, insurance status, residential status and in-patient length of stay) and HL scores within the sample of post discharge patients diagnosed with bipolar disorder. The research question for this specific aim was: What are the best predictors of readmissions (total and at 2 and 4

weeks) among the identified variables for post discharge patients diagnosed with bipolar disorder?

SIGNIFICANCE

Research on HL as a predictor of psychiatric hospital readmissions in any group of mentally ill patients has been limited during the preceding 10 years. Understanding and applying health information are requirements for adequate HL (WHO, 2011), and successful management of mental illnesses such as bipolar depression requires good HL skills (Galletly, Neaves, Burton, Liu, & Denson, 2012). Numerous studies have indicated that individuals with low HL experience poorer health status (Berkman et al., 2011); higher rates of post discharge hospital utilization (Mitchell et al., 2012); decreased capacity to manage chronic diseases; poor health outcomes; and poor self-care management (AHA, 2012; Everett et al., 2008).

Mental illness is associated with deficits in concentration and memory, poor insight, and impulse control, which would be expected to negatively influence ability to understand and apply health information (Behavioral Health, United States, 2012). There is a stronger correlation between comorbidity and early mortality among the mentally ill than among the general population (Everett et al., 2008). The absence of studies in the current literature measuring associations between mental illness, HL, and readmission could indicate low HL among the mentally ill or correspondence of factors associated with high risk for readmissions with characteristics of mental illness. It can be reasoned that if the co-occurrence of mental illness increases readmission to medical facilities and mortality rates, mental illness makes a significant independent contribution to an

individual's well-being and should be studied in combination with suspected risk factors such as HL and social support.

There are also studies that contradict reports of low HL among patients with major depression (Galletly et al., 2012) and the correlation between low HL and increased health service utilization (Lincoln et al., 2006). These conflicting results may be due to the common problem of operationalizing the three constructs of interest (HL, readmission, and mental illness). Health literacy has multiple operational definitions as noted in the literature and the construct of readmission is operationalized with varying time periods of 30 days (Griffin, Hwu, & Shannon, 2009); 60 days (Kroken, Mellesdal, Wentzel-Larsen, & Jorgensen, 2012; Lin & Lee, 2008); and 90 days (Kottsieper, 2006). According to Holstein (2011), these inconsistent operational definitions have led to poorly developed studies and variations in results.

Bipolar disorder is a mood disorder with presentations of mania, hypomania, and depressive episodes (Sadock & Sadock, 2007). The condition is characterized as severe in 82% of adult patients and has a lifetime prevalence of 4% in the US (Dudas & Semeniken, 2012). An individual diagnosed with bipolar disorder experiences a spectrum of symptoms that are classified into two types: type I and type II. Type I requires the presence of at least one manic or mixed episode lasting for a week and type II is defined by episodes of hypomania lasting for 4 days with features of major depression. In bipolar disorder, episodes of mania and hypomania may alternate with episodes of depression (American Psychological Association [APA], 2000). According to Dudas and Semeniken (2012), bipolar disorder is a progressive illness in which

frequency of episodes increases over time and probability of treatment response decreases.

This pilot study of HL in a population of patients diagnosed with bipolar disorder investigated whether a relationship exists between levels of HL and readmission rates. Findings suggest that if this method is to be used for subsequent studies, it will require collaboration with similar facilities to capture the full extent of the HL and readmission phenomenon. This could provide another window into the world of patients diagnosed with bipolar disorder and inform the development of more impactful group-specific interventions to reduce readmission rates, utilization of unplanned psychiatric hospitalization, and emergency department overuse. Results of future studies could also contribute to improved quality of psychiatric inpatient care and discharge planning, and provide evidence supporting the development of new policies for post discharge follow-up and coordination of inpatient and outpatient services. The outcome of this pilot study holds promise for subsequent studies and may also improve inpatient staff education and influence psychiatric inpatient length of stay.

VARIABLES AND DEFINITIONS

Mental illness is defined by the National Institute of Mental Health (NIMH, 2014) as occurring in a person 18 years old or older who has had at any time within the past year a diagnosable mental, behavioral, or emotional disorder of sufficient duration to meet diagnostic criteria specified within the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) and has resulted in functional impairment that substantially interferes with or limits one or more major life activities. These disorders have episodic,

recurrent, or persistent features; however, they vary in terms of severity and disability (NIMH, 2014).

Bipolar disorder is a period of abnormal mood or mood disturbance that involves the presence or history of manic episodes, mixed episodes, or hypomania episodes usually accompanied by the presence or history of major depressive episodes.

Manic episode is defined by a distinct period of at least one week during which there is an abnormally and persistently elevated, expansive, or irritable mood.

Mixed Episodes is a period lasting for at least one week during which the individual experiences rapidly alternating mood (sadness, irritability, and euphoria) accompanied by symptoms of a manic episode and a major depressive episode.

Hypomanic episode is a distinct period during which there is an abnormally and persistently elevated, expansive, or irritable mood that lasts at least 4 days.

Major depressive episode is characterized by a period of at least 2 weeks during which there is either depressed mood or loss of interest or pleasure in nearly all activities.

Readmission occurs when a patient is discharged from one acute care (index) hospital and is admitted to the same or different hospital within a specified period from the time of discharge from the index hospital. The timeframe of focus for the CMS is 30 days (CMS, 2013). Thirty-day readmissions have been identified by the CMS as resulting from inadequate inpatient care and are a driver of high healthcare cost. Individuals with mental illness are among the highest users of inpatient facilities and emergency departments according to the CMS.

Health literacy is defined by the USDHHS as, “The capacity to obtain, process and understand basic health information and services needed to make appropriate health

decisions” (USDHHS, 2002, p. 11-20). The National Academy of Sciences states that HL includes the ability to understand instructions on prescription drug bottles, appointment slips, medical education brochures, doctors’ directions and consent forms, and the ability to negotiate complex healthcare systems. Health literacy is not simply the ability to read, it requires a complex group of reading, listening, analytical, and decision-making skills, and the ability to apply these skills to health situations (National Academy of Sciences, 2004). Each attribute in the HL definition represents some level of complexity and presents challenges for a certain sector of healthcare consumers, policy makers and health services providers. One of these challenges is the overuse of emergency departments and inpatient facilities.

Demographic factors include characteristics such as social support, age, gender, ethnicity, residential status, employment, insurance, co-morbidity, and education.

The remaining chapters will be arranged in the following order: Chapter 2 will present a review of the relevant literature dealing with current and evolving issues having the potential to affect mental health practice in some significant manner; Chapter 3 delineates the research design and methodology of the study. This chapter will also highlight the instruments used for data gathering, the procedure followed, and the sample selected. Chapters 4 and 5 will address the data analysis and discussion of the findings.

SUMMARY

Health literacy is a global issue according to the WHO (2013) and the USDHHS (2011) considers HL a national priority. It is also deemed an important component of health communication, medical product safety, and oral health (National Academy of Sciences, 2004). The chronically mentally ill, especially patients diagnosed with bipolar disorder,

are at greater risk for low HL, comorbidities, and hospital readmissions. However, no study has examined the combined effects of mental illness, HL, and psychiatric hospital readmissions. Research to study the effects of and the interactions among these three variables will provide insight toward targeted interventions and improvement of mental health services for this population.

Chapter 2 Review of the Literature

NATIONAL FOCUS ON HOSPITAL READMISSIONS AND HEALTH LITERACY

The issues of psychiatric hospital readmissions and HL have become national priorities in recent years. According to the United States Department of Health and Human Services (USDHHS, 2011, p. 10), the annual costs of limited HL are between 1.6 and 3.6 trillion US dollars (USD) and annual hospital readmissions contribute another \$17.5 billion annually to the national healthcare budget (Cloonan, Wood, & Riley, 2013). In addition, the health outcomes of frequent hospitalizations and associated chronic illnesses, disability, lost wages and poor quality of life are not commensurate with the high readmission cost causing the CMS to implement the Hospital Readmission Reduction Program to address these issues.

Early initiatives to address the readmission issue grew from a June 2007 Medicare Payment Advisory Commission (MedPac) report in which the commission recommended comparison of clinical effectiveness with its alternatives. The intent was to promote greater efficiency in the delivery of healthcare and to improve outcomes for Medicare recipients, the new baby boomers population (Medicare Payment and Advisory Report; News Release, 2007). Efficiency, as defined by the commission, encompasses quality, quantity, and cost. According to the report, it was evident that hospitals were negligent in implementing measures that could avert avoidable hospital readmissions. They recommended public reporting of hospital-specific readmission rates for a set of conditions and an adjustment to the underlying payment method to create incentive for lower readmission rates. In 2009, the CMS began public reporting of the hospital readmission rates on the Hospital Compare website (Health Policy Briefs, November

2013). In October 2012, CMS began reducing Medicare payments to hospitals with higher than expected readmissions rates for three targeted conditions: congestive heart failure, acute myocardial infarction, and pneumonia (Cloonan et al., 2013).

Psychiatric in-patient readmissions came under scrutiny in 2008 when MedPac analyzed the cost reporting of psychiatric inpatient facilities and reported their findings to the US Congress in 2010 (The Moran Company, 2013). In the 2010 report, the commission stated that users of inpatient psychiatric facilities (IPF) as a group consume more healthcare services and result in higher costs than other beneficiaries. The report also stated that 2007 Medicare spending for all hospital in-patient services was more than five times higher for IPF users than for all fee for service (FFS) beneficiaries, and that skilled nursing facilities' costs were also five times higher for IPF users than for all FFS beneficiaries. Further, Medicare spending for hospital outpatients, physicians and suppliers, and part D-covered drugs was more than twice as high for Medicare beneficiaries who had IPF stays than for all FFS beneficiaries (MedPac, 2010). In the Commission's comparison of 2007 annual prescription costs, IPF users filled an average of 64 prescriptions at a cost of \$6,100 per year compared with 44 prescriptions at \$2,400 for all part D enrollees, and 51 prescriptions at \$3,300 for part D enrollees who receive low income subsidies. Average spending per prescription for IPF enrollees was \$92, for part D enrollees \$54, and \$65 for part D low-income subsidy enrollees (MedPac, 2010).

This was a clarion call for the development of quality measures for IPFs and establishment of Inpatient Psychiatric Facility Quality Reporting (IPFQR). In July 2013, IPFs were required to submit data on quality measures for a reporting period beginning October 1, 2012 under the Patient Protection and Affordable Care Act (2010), Sections

3401f and 10322a. A 2013 report prepared by the Moran Company for the National Association of Psychiatric Health Systems described the characteristics of psychiatric patients associated with high risks for readmission as: male, poverty level, either uninsured or Medicaid insured, individuals with unstable living conditions, non-speakers of English language and those with low HL. The authors also identified recent admissions, frequent emergency department visits and disease burden (takes six or more medications; has congestive heart failure, diabetes, chronic obstructive pulmonary disease (COPD), depression, mood disorder, psychosis, alcohol or drug dependency) as having high risks for psychiatric readmissions. The study also reported that Medicare beneficiaries with psychiatric inpatient stays were admitted with high frequency.

HISTORY OF HEALTH LITERACY

Although HL is not synonymous with literacy, the focus on HL emerged from a seminal study of adult literacy requested by The US Congress in the Adult Education Amendment of 1988. The Department of Education's National Center for Education Statistics (NCES) and the Division of Adult Education and Literacy planned the national household survey of adult literacy in 1989-1990. The aim of the survey was to profile the English literacy of adults in the United States based on the demand and the type of material they encountered in their daily lives (Kirsch, Jungeblut, Jenkins and Andrews (NCES), 2002). Two previous efforts included a 1985 household survey of the literacy skills of 21- to 25-year-olds funded by the US Department of Education, and a 1989-1990 survey of the literacy proficiencies of job seekers funded by the U.S. Department of Labor (NCES, 2002).

The definition of literacy that resulted from these studies and guided the National Adult Literacy Survey was, “Using written and printed information to function in society to achieve one’s goals and to develop one’s knowledge and potential” (NCES, 2002, p. 27). The study measured literacy on a scale of 1-5 with level one being the lowest and level 5 the highest. The survey identified 21-23% of adults in the US (40-44 million) as operating at the lowest level of literacy, 25-28% (50 million) functioning at level two, 33% (61 million) demonstrating literacy performance at level 3, and 18-21% (34-40 million) performing at the two highest levels. Another 1992 study was conducted by physicians from Emory University and the University of California at Los Angeles (funded by the Robert Wood Johnson Foundation) to evaluate participants’ ability to successfully complete basic reading and numeracy activities that would indicate their ability to function in a healthcare environment. The term HL was reintroduced then, after its 1974 appearance in a paper calling for minimum education standards for all grade school levels in the US (Speros, 2005).

The term has since gained national and international renown and has acquired prominence among the national objectives for the improvement of health outcomes in the years 2010-2020. In the 2003 national assessment of American adults HL, the US Dept. of Education, (NCES, 2002) adopted the definition of HL offered by the USDHHS as, “The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (USDHHS, 2002). Results of this assessment were reported using four literacy levels: below basic, basic, intermediate, and proficient. Fifty-three percent of the adults studied had intermediate HL, with 22% basic, 14% below basic, and 12% proficient. Women

scored higher in the below basic and intermediate levels than men, but there was no significant difference between the genders in the basic and proficient HL groups (NCES, 2006).

HEALTH LITERACY, COGNITION, AND BIPOLAR DISORDER

Sadock and Sadock (2007) define cognition as a process of obtaining, organizing, and using intellectual knowledge. Cognition implies understanding the connection between cause and effect, between action and the consequences of action; cognitive strategies are mental plans that people use to understand themselves and the environment. Sadock and Sadock's (2007) definition of cognition is similar to the definition of HL provided by the USDHHS for good reason, as functional cognition is a requisite condition for functional HL. In addition, the American Psychological Association expands cognition to incorporate domains of *complex attention* which involves sustained attention, divided attention, selective attention and processing speed. *Executive function* is a domain of cognition that includes planning, decision making, working memory, responding to feedback, error correction, overriding habits, inhibition, and mental flexibility. *Learning and memory* include immediate, recent (including free recall, cued recall, and recognition memory), and long-term memory (semantic, autobiographical and implicit learning). *Perceptual-motor* includes abilities subsumed under the terms visual perception, visuo-constructional, perceptual-motor, praxis, and gnosis. *Social cognition* involves the recognition of emotions, theory of mind {ability to consider another person's mental state [thoughts, desires, intentions] or experience} (APA, 2013).

Cognition in Patients with Bipolar Disorder

Sparding et al. (2015) conducted a battery of 21 neuropsychological tests on a group of patients diagnosed with both bipolar disorder types I (N=64) and II (N=44) who were euthymic at the time of testing. Patients were compared with normal controls (n=86) randomly selected from the same population in a Stockholm catchment area. Purposes of the study included: (1) elucidation of dissimilarity in cognition between bipolar disorder types I and II; and (2) clarification of the extent to which cognitive impairment was clinically significant neurologically, as opposed to statistically different from healthy controls. The investigators reported that patients with bipolar disorder type-I were indistinguishable from bipolar disorder type -II in 16 of 18 cognitive measures, (89%) with discriminant loadings of ≥ 0.15 . This study is in agreement with the DSM-5 statement concerning the new perspective on bipolar disorder type II, “Bipolar II disorder requiring the lifetime experience of at least one episode of major depression and at least one hypomanic episode, is no longer thought to be a ‘milder’ condition than bipolar I disorder, largely because of the amount of time individuals with this condition spend in depression and because the instability of mood experienced by individuals with bipolar I disorder is typically accompanied by serious impairment in work and social functioning” (APA, 2000, p. 123). The DSM-V reports that individuals with bipolar disorder types I and II may return to full functional levels; however, approximately 30% of patients with bipolar disorder type I remain impaired in work role function and functional recovery is slower than symptom recovery, especially occupational recovery. Approximately 15% of people with bipolar disorder type II continue to experience dysfunction between episodes and 20% transition directly into another episode without recovering from the previous episode. As with bipolar disorder type I, functional recovery is also slower than

symptom recovery in bipolar disorder type II, especially in occupational recovery (APA, 2000, p.131; Lima, Czepielewski, Gama, Kapczinski, & Rosa, 2014). This lag in functional recovery leads to lower socioeconomic status in patients with both bipolar disorder types I and II when compared with the general population. Euthymic patients with bipolar disorder type II exhibit, although to a lesser degree, the persistent cognitive deficit seen in patients with bipolar disorder type I (Torrent et al., 2006). With the exceptions of memory and semantic fluency, patients with bipolar disorder type II have similar cognitive impairment to those with bipolar disorder type I (APA, 2000, p. 138; Torrent et al., 2006). Cognitive impairment may contribute to vocational and interpersonal difficulties (APA, 2000, p. 131) and diminished psychosocial functioning (Lima et al., 2014) that persist throughout the lifespan, even during euthymic periods (APA, 2000, pp. 131, 138).

Cognition in Bipolar Subtypes

Torrent et al. (2006) compared cognitive performance in patients with bipolar disorder types I and II, and healthy controls. They concluded that the bipolar disorder type II group exhibited greater verbal memory deficits compared with healthy controls, but the bipolar disorder type I group demonstrated quantitatively greater dysfunction than the bipolar disorder type II group. Bipolar type II patients in this study made more perseverative errors (pathological repetition of the same response to different stimuli), which may be related to greater impulsivity and higher comorbidity. Healthy controls performed better than patients with bipolar disorder types I and II on working memory and attention, with patients in the bipolar disorder type II group performing at an intermediate level between bipolar disorder type I and controls in areas of verbal memory

and executive function. They suggest that working memory may be correlated with illness severity and that bipolar disorder type II is not merely a milder form of the disorder (APA, 2000, p. 123) but a malignant subtype with respect to frequency of episodes. The study reports that patients with bipolar disorder type II had an average of three more episodes than participants with bipolar disorder type I, although this was not statistically significant (Torrent et al., 2006).

These authors also suggested that executive functions specifically related to impaired working memory may result in diminished psychosocial functioning in patients with bipolar disorder type II, as was reported in euthymic patients. In addition, dysfunctions in executive memory are likely to be good predictors of social and occupational difficulties in bipolar disorder type II, whereas problems in retaining and recovering new information may be relevant to bipolar disorder type I.

In a study of patients with bipolar mania, Vrabie et al. (2015) stated that cognitive impairment must be considered a core feature of bipolar disorder and that this feature influences remission and overall functioning of these patients. Higher numbers of past manic episodes exacerbate cognitive impairment more than a higher number of past depressive episodes. In this study, investigators conducted a battery of eight cognitive tests on four subgroups of bipolar patients (manic, n= 54; depressed, n=32; mixed, n=21; and euthymic, n=30) and compared them with a group of 62 healthy controls. The lowest scores on the verbal memory test were recorded by manic patients (37 on the List Learning test). Patients with manic and mixed episodes scored lower in working memory for executive function/reasoning (a score of 14 for each group on the Digit Sequencing Task) and problem solving tests (11.5 and 11, respectively, on the Tower of London

Test). Patients experiencing a depressive episode scored lower in psychomotor speed (48 on the Token Motor Task) and verbal fluency tests (34 on the Category Instances-Semantic Fluency test and Controlled Oral Word Association Test-Letter Fluency); whereas patients with mixed episodes scored lower in terms of attention and speed of information processing tests (40 on the Symbol Coding Test). Overall, bipolar patients performed worse than healthy controls in all cognitive domains tested (Vrabie et al., 2015).

The literature indicates that bipolar patients experience poor cognitive outcomes and persistent symptomatology across the spectrum of the disorder. The goal of treatment in the disease process is to improve one's functional state and overall wellbeing, which ultimately prolongs useful life. Applying Sadock and Sadock's (2007) definition of cognition—a process of obtaining, organizing, and using intellectual knowledge; understanding the connection between cause and effect; and using cognitive strategies, which are mental plans that people use to understand themselves and the environment—a large percentage of patients with bipolar disorder who experience poor cognition lack the capability to formulate mental plans necessary to understand themselves and their environment, and therefore experience poor health outcomes.

According to Zarate, Tohen, Land, and Cavanagh (2000), poor outcomes are measured as: (a) the proportion of patients who achieve symptomatic/syndromal recovery after an index episode or the time it takes to reach symptomatic or syndromal recovery; (b) the rate of relapse or recurrence after an index episode; (c) counting the number of affective episodes; (d) estimating the duration of each episode; (e) the number of hospitalization at follow-up; and (f) cumulative morbidity (i.e., combining both the

counts of affective episodes and subtle affective symptoms). Poor outcomes involve one's level of functioning, which is delayed or absent in bipolar patients who are in recovery compared with those who have recovered symptomatically.

Cohen, Gottlieb, and Underwood (2000) describe functional recovery as the ability to achieve a level of functioning that existed prior to the most recent episode of bipolar illness. Functioning is complex (Zarate et al., 2000) and involves multiple domains including the capacity to work, and live independently, and capacity for recreation, for romantic life, and capacity to study. Outcomes have also been measured in terms of psychosocial capacity and, more specifically, as psychosocial functioning relates to interpersonal, occupational, and self-care abilities using the Global Assessment of Functioning (GAF).

Bello (2009) performed a battery of neuropsychological tests (including Lateral Dominance Examination, California Verbal Learning Test, Wisconsin Card Sorting Test, Judgment of Line Orientation, and Controlled Oral Word Association Tests) on 47 individuals with bipolar disorder types I and II (17 males, 30 females) ranging in age from 18 to 59 years. The purpose of the study was to explore whether neurocognitive deficits would predict social and occupational functioning in patients with bipolar disorder types I and II if greater cognitive impairment is associated with poorer functioning; and whether specific neurocognitive domains were associated with specific functional outcomes such as verbal learning memory, executive functioning, and recreational planning. Based on regression analysis, the author found that functional outcomes measured by the total score on the performance-based skills assessment (UPSA) were significantly predicted by the Global Neurocognitive Impairment score,

and that lower Global Neurocognitive Scores were associated with greater impaired functional performance.

In the Bello (2009) study, the author reported greater neurocognitive impairment in patients who have a more severe course of illness. In addition, patients who had higher hospital readmissions rates, a greater number of mood episodes, and psychotic features exhibited greater impairment in executive functioning, verbal memory, and attention and concentration than patients without these severe clinical characteristics. Chowdhury, Ferrier, and Thompson (2003) suggest that disease progression is accompanied by increasing neurocognitive deficits, which implies that repeated episodes of illness cause more damage to brain tissue with resultant effect on neurocognitive processes. In an examination of groups with higher genetic risk for bipolar disorder, investigators report poorer performance intelligence quotient (IQ) than verbal IQ and deficits in verbal recall in bipolar patients (Franton, Allen, & Knatz, 2005; Bello, 2009). These studies support the hypothesis that neurocognitive deficits are present early in the course of bipolar illness and may represent phenotypes of the disorder arising from neurodevelopmental or genetic processes (Savitz, Solms & Ramesar, 2005).

NEUROCOGNITIVE DEFICITS IN MANIA

Murphy and Sahakian (2001) and Sweeney, Kmiec, and Kupfer (2000) reported deficits in executive functioning in bipolar patients who were in the manic phase of the illness. These deficits in executive function were found specifically in planning, problem solving, concept formation, and set-shifting. Deficits in vigilance or sustained attention were also identified by Clark, Inverson, and Gordon (2002). Murphy and Sahakian (2001) also reported deficits in pattern and spatial recognition in memory among patients

in the manic phase. Sweeney, Kmiec, and Kupfer (2000) found deficits in spatial, working, and short-term memory, and delayed visual design recognition in a group of mixed- and manic-state patients compared to healthy controls.

NEUROCOGNITIVE DEFICITS IN DEPRESSED STATES

The Diagnostic and Statistical Manual of Mental Disorders; Edition V (APA, 2013) criteria for the diagnosis of a depressive episode of bipolar disorder include subjective or observational information of depressive moods occurring most of the day or nearly every day. The diagnostic criteria also elicit responses for psychomotor agitation or retardation, diminished ability to think or concentrate, and indecisiveness (APA, 2013). The presence of five or more of nine symptoms causing clinically significant impairment or distress in social, occupational, or other important areas of functioning confirms a major depressive episode.

Borkowska and Rybakowski (2001) report poorer performance in bipolar group executive functioning and verbal fluency than in patients with major depression. They also report that patients with bipolar disorder who were experiencing a depressed episode had poorer performance on the Stroop-color-word Test (for attentional difficulties: patients are presented with the names of colors written in different color ink; green might be written in red); Trails-B (measures neuropsychological impairment: patients draw lines connecting consecutively numbered circles); the Controlled Oral Word Association Test (COW AT/FAS; measures aphasia and mental decline); and WAIS-R Performance IQ Scores (used to measure memory function and attention). Some studies (Oley et al., 2005; Mitchell & Malhi, 2004; Murphy & Sahakian, 2001) have suggested that the neuropsychological deficits between unipolar and bipolar depressed groups are similar

but more severe in patients with bipolar depression. Tests of executive functioning—specifically in the areas of problem-solving, concept formation, and decision making—are impaired in the depressive phase of bipolar disorder when compared to control groups.

NEUROCOGNITIVE DEFICITS IN EUTHYMIC STATE

Zubieta et al. (2001) observed cognitive deficits in patients experiencing the euthymic state of bipolar disorder, including impairment in the domains of verbal learning, executive functioning, motor speed, coordination, and sequential memory when compared with controls. Frangou et al. (2005) found executive dysfunction in patients in the euthymic state using the Wisconsin Card Scoring Test, the Controlled Oral Word Association Test, and the Stroop Color Word Test. Patients with bipolar disorder in clinical remission were found to have impairment on a test of visiospatial recognition memory compared to controls, even though they had good social adaptation (Rubinsztein, Michael, Paykel, & Sahakian, 2000). Deckersbach et al. (2004) also found impairment in visual memory, specifically immediate memory recall, on the Rey-Osterrieth Complex Figure Test. The results indicated impairment due to poor use of organizational strategies during encoding. Clark, Iversen, and Goodwin (2002) reported impairment in sustained attention during the euthymic bipolar state than in controls. In a comparison of patients in the manic and euthymic states, Fleck, Shear, and Strakowski (2005) found that patients in the manic state performed poorly on measures of sustained attention, while patients in the euthymic state had slower reaction times but performed similarly to controls when the investigators controlled for reaction time. The investigators suggested that sustained attention deficits in the euthymic state of bipolar disorder differ from deficits in the manic

phase and may reflect more complex cognitive processes that are difficult to capture using error measurements (Fleck et al., 2005).

Martinez-Aran et al. (2004) compared depressed, manic or hypomanic, and euthymic bipolar patients with normal controls on a set of neuropsychological measures. These authors reported that performance was not significantly different between the groups. Overall, the bipolar groups performed more poorly than the control groups on measures of verbal memory (measured of the California Verbal Learning Test and the Wechsler Memory Scale - Revised Logical Memory Subset). Patients who were acutely ill (depressed or manic) performed significantly worse than controls on verbal recognition tasks. Executive function was also affected when measured by the Wisconsin Card Sorting Test, Wechsler Adult Intelligence Scale Digit Span Backward Subset, and the Stroop Test. All groups performed worse than controls in the domain of executive functioning, with deficits in verbal memory and executive functioning evident in manic and depressive phases and persisting through euthymic periods. Dixon, Kravaniti, Frith, Murray, and McGuire (2004) also compared patients in the manic, depressive, and euthymic phases. They reported impairment of all groups when compared with controls in the executive functioning components of strategic thinking, inhibitory control, and response initiation, with the manic group having the greatest impairment in executive functioning. Larson, Shear, Krikorian, Welge, and Strakowski (2005) compared manic and euthymic bipolar patients and found that patients in both states had deficits in inhibitory control or self-regulation when compared with controls.

Recent literature reports the presence of neurocognitive deficits across all mood states of bipolar disorder, including periods of euthymia. Deficits were reported in only

10% of bipolar patients in the years prior to the use of psychopharmacology, and poor outcomes of mania were considered a rare occurrence (Zarate et al., 2000). Early studies conducted by Kraepelin (1921; Zarate et al., 2000) reported that manic and depressive episodes were periodic in nature and were followed by a return to normal function. More than 90% of patients were reported to have recovered from an initial episode and experienced remissions lasting for many years. In contrast, more recent studies beginning in the 1960s do not report such favorable outcomes in patients with bipolar disorder (Zarate et al., 2000). Bello (2009) reported cognitive deficits in as many as 32% of patients and Zarate et al. (2000) suggested that discrepancies between earlier outcomes and more recent studies may be due to factors such as research methodology (design, group comparison and control), diagnostic criteria, medication induced changes, psychiatric and medical comorbidities, alcohol and drugs, as well as other unidentified factors. Angst (1985, in Zarate et al., 2000) reported that switch rate (the phenomena of patients moving from depression to mania or hypomania and vice versa) into mania has increased each decade with the introduction of new pharmaceutical treatments. In studies from the pre-pharmacotherapy era, the switch rate ranged between 3% and 4%; however, the switch rate increased to approximately 8% with the introduction of tricyclic antidepressants. Patients exposed to long-term use of antidepressants may also be at higher risk for rapid cycling, in which they experience swings from the highs of mania to the depths of depression within days or even hours (Zarate et al., 2000).

HEALTH LITERACY AS A PREDICTOR OF PSYCHIATRIC HOSPITAL READMISSION

Health literacy is a complex phenomenon representing a constellation of skills including the ability to read and write prose, use quantitative information, speak, and

listen effectively (Behavioral Health, United States, 2012). The demand and burden of accessing a complex healthcare system can be overwhelming for normally functioning individuals. Health literacy could thus represent a herculean task for those with persistent mental illnesses such as chronic schizophrenia or bipolar disorder. Krishan et al. (2012) measured the HL of 256 adults with severe mental illness using the Rapid Estimate of Adult Literacy in Medicine (REALM). The REALM is a validated instrument considered suitable for psychiatric populations and measures a patient's ability to pronounce 66 medical words in an ascending order of difficulty. A score of 0-18 indicates a reading level of up to third grade, 19-44 corresponds to a 4th- 6th grade reading level, 45-60 corresponds to a 7th-8th grade reading level, and a score of 61-66 indicates a reading level of 9th grade or above. The authors reported that 4% of the participants had low HL that was associated with increased odds of inpatient medical hospitalization. The authors concluded that low HL may affect the ability of this population to effectively interpret health information or meaningfully engage in psychiatric interventions, which could result in poor self-management. The study addressed psychiatric patients prone to readmission for medical reasons due to low HL, not readmissions to psychiatric hospitals.

Lincoln et al. (2006) also used the REALM and the Center for Epidemiologic Studies Depression Scale (CES-D) in a randomized controlled trial designed to link substance abusers to primary medical care. The study was conducted in a short-term detoxification unit with 380 adult participants recruited during detoxification and followed up every 6 months for 2 years. The study reported that 174 subjects had low literacy and 30% (n=52) of this group had REALM scores indicating less than 6th grade education and low HL, while 70% had 7th-8th grade scores. Baseline HL was not

significantly associated with alcohol or drug addiction severity; however, low HL was associated with high levels of depressive symptoms. Health service utilization was examined for both high and low HL groups at each time point and there were no significant differences between groups in health service utilization. This study indicates that low HL in depressive patients does not explain service utilization in the study sample, while a study conducted by The Moran Company (2013) reported that depressive patients were at high risk for psychiatric readmissions. Although other studies (Hernandez-Rapporteur, 2009; Mitchell et al., 2012) have associated low HL with readmissions, this study suggested that low HL in this group of depressive patients was not associated with psychiatric hospital readmissions.

OTHER COMMON PREDICTORS OF PSYCHIATRIC READMISSIONS

Mental health services are usually provided separately from other health services and are often fragmented. Schmutte, Dunn, and Sledge (2010) conducted a matched control study of 150 adults (75 in each group), ages 19-82 years, with three or more psychiatric readmissions within 18 months of discharge. The study was conducted in a public mental health hospital. Health records were reviewed and data were analyzed using univariate and multivariate statistics. Kaplan Meier Life tables identified time to readmission (the outcome variable). The authors reported that 59% of the sample that were frequently admitted had a psychotic disorder. Thirty percent were readmitted within a 12-month period and 90 days was the median length of time to readmission. Multivariate regression identified two variables that predicted time to readmissions—unemployment and living in a supervised residential facility. The relatively small sample size and broad age range between subjects may have affected the validity of the study. It

would also be of interest to know the percentage of participants older than retirement age, as the study would be biased toward unemployment if a large percentage of the sample were 65 years and older. However, the study is relevant because readmission is a complex issue and may require variety in study samples and methods to fully comprehend its depth.

Prior Hospitalization as a Readmission Factor

An odd but consistently reported feature of the studies reviewed was the effect of prior hospitalization on the need for future hospitalizations. In their study of 277 schizophrenic patients, Kroken et al. (2012) found a readmission rate of 55.6% over a 3-year period. They reported that involuntary treatment more than doubled the risk of rehospitalization. Moreover, involuntary admissions with forced psychiatric medication administration tripled the risk of readmission during the 3-year study period. In a retrospective study using the medical records of 9,367 seriously mentally ill patients, Song, Son, and Lin (2011) reported current hospitalization as the most significant predictor of future hospitalization. They found that patients who used larger increments of mental health services during a given year were most likely to be hospitalized in that year. The study sample consisted of patients with schizophrenia; however, the phenomenon of prior hospitalization influencing the number of future hospitalizations may be applied to any group of patients with serious mental illness.

In a purposive sample of 81 mentally ill individuals, Holsten (2011) found that patients who had longer inpatient stays (38.3%) were more likely to have rapid readmissions (rehospitalization within 30 days or 2 admissions within 3 months). Montgomery and Kirkpatrick (2002) suggest that there are several environmental and

social variables that predict readmissions such as patient demographics, attraction toward hospitalization, quality of life, family characteristics, residence in an urban versus a rural area, and accessibility and type of community aftercare.

Role of Social Support

Social support is the provision of both psychological and material resources with the intention of helping the recipients cope with stress (Cohen, 2004). Cohen also proposed that social support is related to well-being because it fosters positive emotions, a sense of self-worth, and predictability; it also functions as a stress buffer by reinforcing self-esteem, self-efficacy, and problem-solving behaviors. Overall, social support has a positive effect on well-being (Cohen, 2004). Lopez and Cooper (2011) identified three broad categories of social support: (a) social connectedness or social embeddedness; (b) perceived social support; and (c) actual or enacted social support.

Social connectedness is the quantity and quality of social ties or interpersonal connections between individuals and includes formal and informal relationships (Lopez & Cooper, 2011). Informal relationships include family members, relatives, friends, neighbors and others; whereas formal relationships include interactions with mental health professionals, physicians, counselors, teachers, and clergy, among others (Lopez & Cooper, 2011).

Perceived social support refers to an individual's cognitive appraisal of support that promotes coping and thereby reduces negative effects on outcomes. Measures of this concept have the strongest relationship with measures of reduced stress and

psychological distress, as well as measures of improved well-being (Lopez & Cooper, 2011).

Actual or enacted social support focuses on an individual's report of support they actually received. In describing the role of social support in individual well-being, Cohen et al. (2000) stated that there is an association between measures of interpersonal relationships and mortality, psychiatric and physical morbidity, and adjustment to and recovery from chronic disease. The literature indicates that social support improves physical health (Cohen, 2004); quality and quantity of interaction (Kiecolt-Glaser, & Newton, 2001); and feelings of isolation and loneliness (Cacioppo et al., 2002). It also buffers the effects of stress on psychological distress, depression, and anxiety (Kawachi & Berkman, 2001). Social support is an essential component in health/illness outcomes and treatment modalities or interventions can therefore be improved or modified with knowledge of the social needs of healthcare recipients. With an understanding of the role of social support on physical and emotional health, professionals in healthcare can successfully apply this knowledge to health promotions and interventions (Cohen, 2004).

Turney and Kao (2009) suggested that social support may also be predicted by ethnicity, immigrant status, language, and race, which seems to parallel variables cited as predictors of inadequate HL. Using data from the Early Childhood Longitudinal Study of Kindergarten cohorts (ECLS-K), a 1998 to 1999 national representative sample of parents with children in kindergarten, Turney and Kao (2009) examined the extent to which minorities and immigrant parents in the United States believe they have social support from friends and family and the differences in their perceived support compared with native-born Whites. The investigators also examined how language ability and time

spent in the US mediated minority perception of social support and ethnic origin as predictors of perceived social support. The original sample included 17,490 students in approximately 3,500 classrooms in 1,280 schools.

The authors reported substantial differences in perceived social support between native-born Whites and minority and immigrant parents based on race and immigration status. Immigrant parents felt disadvantaged in perceived social support; Hispanic and Asian immigrant parents reported less perceived social support compared to White immigrant parents. Immigrant parents who did not speak English reported significantly less perceived support than their counterparts who spoke English. There was no statistically significant correlation between time spent in the US and perceived social support. When perceived social support of Hispanics, Asians, and Whites were compared using Whites as a reference group, Hispanic parents reported less perceived social support compared to Whites ($M = -.493$, $p < .01$), although Cuban parents reported more social support than their White counterparts ($M = .842$, $p < .001$). Both native- and foreign-born Asians generally reported less available support than native-born Whites.

Cohen et al. (2000) reported that social support affects mental and physical health through its influence on emotions, cognition, and behaviors. In the case of mental health, social support is thought to regulate these response systems and prevent extreme responses associated with dysfunction. This regulatory maintenance occurs through communication of what is expected, of appropriate norms, of rewards and punishment, and through the provision of coping assistance. Social support is also thought to play a role in the risk for progression of and recovery from physical illness (Cohen et al., 2000).

Demographic and Environmental Factors

A large body of literature supports the contribution of effective social and environmental measures to decreased readmission rates. Age is a significant predictor of readmission, with increased probability when patients are males or have an early onset of mental illness (Hodayah et al., 2011; Kottsieper 2006; Lay, Lauber, & Rossler, 2006; Song, Biegel, & Johnsen, 1999). Patients discharged with low functional scores on the Comprehensive Functional Assessment Scale were more likely to be readmitted (Coughnard et al., 2006; Hodayah et al., 2011; Lay, Lauber, & Rossler, 2006). In their study of 424 first admissions with mental illness, Lay, Lauber, and Rossler (2006) found age at admission, psychiatric diagnosis, irregular discharge (against medical advice), living alone, and low level of education to be predictors for increased inpatient use. Being unemployed is also associated with other socially determined factors such as low educational achievement, strained relationship, poor social support, distress based on lack of coping skills, low socioeconomic status, and homelessness (Falconnier & Elkin, 2008), as well as hospital readmissions (Coughnard et al., 2006; Lay, Lauber, & Rossler, 2006). Several authors have suggested that a well-organized, coordinated, and monitored service delivery system that includes case management (Kottsieper, 2006; Lin & Lee, 2008; Price, 2007), early post discharge follow-up appointments (Price, 2007), and weekly contact with nursing staff and community providers, can decrease readmission rates (Kottsieper, 2006; Price, 2007; Song, 1999; Thambyrajah et al., 2007) and smooth transition to community life. The research shows that individuals who frequently seek hospitalization are affected by multiple factors that require multimodal interventions.

Many of these services are available from community service providers, but are not sufficiently structured, lack the necessary financial and human resources, are not well understood, or are operating through the conduits of old, unreliable, or broken systems (Holsten, 2011).

CONCLUSION

Current and historic literature is fraught with negative connotations regarding the existence or mere survival of the patient with bipolar disorder. Neurocognitive deficit persists in every phase of the illness and has been identified to be an impediment in numerous psychosocial domains (self-care, relationships, executive function) and HL. With existing mandates on psychiatric hospital readmissions, attempts to provide optimum time for inpatient stabilization may be difficult for clinicians and other healthcare providers. Knowing that each admission and other factors influence future readmissions and overall well-being, care providers may struggle to find alternatives to rehospitalization. One valid option could be to invest in HL promotion and implementation that may eventually curb readmissions.

Chapter 3 Methodology

In this chapter, the research design and methodology, sample, sampling procedures, instrumentation, data collection procedure, and data analysis will be described. This pilot study of HL in a sample of patients diagnosed with bipolar disorder examined whether a relationship exists between levels of HL and readmission rates. Findings validate the methods for use in subsequent studies which could inform the development of group specific interventions to reduce readmission rates, utilization of unplanned psychiatric hospitalization, and emergency department overuse. These results could also guide future studies and contribute to improved quality of psychiatric inpatient care and discharge planning. The study provides preliminary evidence supporting development of new policies for post discharge follow-up and coordination of inpatient and outpatient services.

RESEARCH DESIGN

This study employed a prospective, exploratory, descriptive research design utilizing a questionnaire to assess HL at discharge and tracking readmission rates at 2- and 4-week intervals post discharge. Due to the lack of prior research across the variables of interest, a pilot study that examined the phenomenon of interest and explored its dimensions, including how it related to other factors, was deemed most appropriate (Portney & Watkins, 2009). The need to capture HL competencies that have, heretofore, not been assessed dictated the need to prospectively follow patients as they progressed through evaluation or treatment to identify factors that precede given outcomes.

POPULATION AND SAMPLE

Patients were recruited from the inpatient population of a major metropolitan mental health facility in the southwestern US. Inclusion criteria were: (a) patients diagnosed with bipolar disorder, (b) who spoke and comprehended English, (c) were pending discharge, (d) reported a stable address, and (e) scored 19 or higher upon screening using the mini mental status examination (MMSE). Both genders and all ethnic and racial groups were eligible for participation. Patients were excluded if: (a) they were under 19 years of age or older than 69 years, (b) unable to read and understand English, (c) currently under supervision by the correctional system, (d) could not report a stable address (living in a transient group home or other temporary facilities); (e) had a diagnosis of dementia or mental retardation, (f) were admitted with substance abuse as the primary diagnosis even if also diagnosed with bipolar (dual diagnosis), or (g) obtained a score of less than 19 on the MMSE. A minimum sample size of 30 participants was determined by power analysis as sufficient to reach significance at effect sizes of $r \geq .49$, $p = 0.05$ (two-tailed), power = 0.80 (<http://biomath.info/power/corr.htm>).

The sample consisted of 30 patients, 16 males and 14 females, aged 23-69 years who were admitted with a diagnosis of bipolar disorder and were not currently exhibiting symptoms at the time of assessment. The study began in late November 2016 and was completed in early March 2017. Sixty volunteers were recruited and 37 consented to participate. Two of those enrolled did not complete all items on the Test of Functional Health Literacy (S-TOFHLA), but successfully completed all other study materials. All other contacts either refused upfront or were discharged before consenting and testing

could occur. Several recruits verbally agreed to participate, but did not meet the language or residency criteria. During post discharge electronic medical record (EMR) chart review data verification, seven of the patients who had asserted stable addresses at enrollment were found to be homeless and were withdrawn from the study and all data collected was destroyed. Appropriate notifications were made to The University of Texas Medical Branch at Galveston (UTMB) Institutional Review Board (IRB) and University of Texas Health Science Center at Houston (UTHealth) Committee for the Protection of Human Subjects. The sample size was therefore reduced to 30 participants that met the inclusion criteria for this study.

SAMPLING PROCEDURE

The study entailed a non-probability, purposive sampling procedure in which the researcher selected the subjects based on specific criteria that represented the spectrum of the population characteristics (Portney & Watkins, 2009). Approvals were obtained from the UTHealth Harris County Psychiatric Center (UT-HCPC) and UTMB IRBs. A meeting was held with the hospital research coordinator at which time unit directors, physicians and managers were notified via e-mail for collaborations and the expression of concerns. Attending physicians and charge nurses were requested to assist in the recruitment effort with input and direction from the research coordinator as needed. Patients who met the age, clinical, and residency criteria for inclusion, as ascertained from the EMR and nurses' printed daily roster, were identified for recruitment. The investigator also directly approached eligible individuals identified from the daily admissions roster and referrals from other patients.

Patients who were contacted also referred friends who sometimes met inclusion criteria. Patients who agreed to participate were informed individually or in groups about the study and assured that their personal identities would be kept confidential. Patients who participated were issued a gift card of \$20.00 at the end of the study, including responding to the 2- and 4-week follow-up calls. Those who agreed to continue were taken to a quiet place within the unit, the consent form (Appendix A) was read aloud to ensure comprehension, further questions were answered, and patients were asked to sign the form prior to completion of the screening assessment. Those who consented completed a coded MMSE (Appendix B) that was administered and scored by the PI. Those scoring 19 or higher on the MMSE were asked to complete an individual demographic data sheet, the TOFHLA, and the MSPSS. Those scoring lower than 19 on the MMSE were thanked for their time and informed that they did not qualify for the study at this time.

INSTRUMENTS

The instruments used in the current study assessed overall cognition, HL, and perceived social support. Demographic information was obtained using a data sheet compiled by the investigator and was complemented with additional information from participant EMRs.

The Mini Mental Status Examination (MMSE)

The MMSE (Appendix B) was developed by Folstein, Folstein, and McHugh (1975) and is one of the most widely used brief tests of cognition in clinical and research settings. The test is divided into two sections, with one point awarded for each correct

response. The first part requires verbal responses only and covers orientation, memory, and attention for a maximum score of 21. The second part tests ability to name, follow verbal and written commands, write a sentence spontaneously, and copy a complex polygon with a maximum score of nine. The maximum total combined score for both parts is 30, and a score greater than 23 is considered normal. The test is not timed, but is estimated at 5-10 minutes by the authors—although it may take up to 30 minutes in the specified population. It was validated by test-retest reliability at an interval of 2 months or less and had a correlation coefficient of .90 between subjects' baseline and repeat MMSE scores according to Folstein et al. (1975). With test-retest intervals of 2 years, a correlation coefficient of .80 was reported in non-demented patients. Folstein et al. (1975) also reported inter-rater reliability of .80, and Ridha and Rossor (2005) reported that at a cut-off score of 24, the MMSE is 87% sensitive and 82% specific in detecting dementia and delirium in patients on a general medical unit.

Demographic Data Sheet

Demographic data was obtained from participants and verified based on medical record historic information. The demographic data sheet was created specifically for this study and was used to document each subject's age, ethnicity, marital status, gender, education, diagnosis, years since diagnosis, residential status, employment status, insurance status, social support, and comorbidities. A follow-up information sheet (Appendix D) was also used to capture self-reported post discharge information by telephone at each time interval because patients may have sought care or been admitted at another psychiatric facility during the follow-up period.

The Short Test of Functional Health Literacy in Adults (S-TOFHLA)

The S-TOFHLA (Parker, Baker, Williams, & Nurss, 1995) is used extensively in the assessment of HL and assesses a patient's comprehension of health-related material. The test is available in a full-format (a 22-minute test with 50 reading comprehension items in three passages and 17 numeracy items); an abbreviated format (a 12-minute test with 36 reading comprehension items in two passages and four numeracy items); and a shortened version (a 7-minute test with 36 reading comprehension items in 2 passages). The shortened version was used in this study.

A search of the literature did not produce a reliability coefficient for the S-TOFHLA specific to the mentally ill; however, Connor, Mantwill, and Schultz (2013) reported a Cronbach's alpha value of .73 for a German version of the S-TOFHLA, .88 for an Italian version, and .61 for a French version in a study sample of 651 Swiss residents aged 18-65 years. For this study, a reliability coefficient of .89 was obtained with a sample of 35 on the 36-item short test.

The passages on the S-TOFHLA use a modified cloze procedure, a reading comprehension activity in which words are omitted from a passage and patients are required to fill in the blanks. This procedure is very useful in reading instruction because it can be easily administered and provides valuable reading comprehension information. In the S-TOFHLA, every fifth to seventh word is omitted and subjects are asked to select the correct word from among four options. The passages contain information about an upper gastrointestinal tract x-ray procedure and the "Rights and Responsibilities" section from a Medicaid application. The passages have Gunning-Fog readability indices of fourth and tenth grade, respectively. In early developmental studies, the reading

comprehension passages in the S-TOFHLA had a reliability coefficient (Cronbach's alpha) of 0.97 and a correlation coefficient of 0.81 with the REALM, another widely used HL measure. Each selection is scored *1* for correct or *0* for incorrect and scores are summed over items to generate a total score. The 36-point scale of the S-TOFHLA is divided into three categories of functional literacy based on total score: inadequate (0-16), marginal (17-22), and adequate (23-36). However, given the small sample size, these categories were combined into two groups—inadequate/marginal(0-22) and adequate (23-36).

Baker, Parker, Williams, and Clark (1998) reported cut-off scores for the S-TOFHLA as determined by linear regression using numeracy items and total reading comprehension scores from the long version of the TOFHLA as independent variables and total TOFHLA score as the dependent variable. Coefficients from the linear regression equation were used to develop scores for each item and an overall scoring system for the S-TOFHLA. This test has been criticized for lack of validity in that it does not measure all attributes within the construct of HL; the S-TOFHLA was employed in this study because it is promoted as one of the best available instruments for measurement of HL.

The Multidimensional Scale of Perceived Social Support (MSPSS)

The Multidimensional Scale of Perceived Social Support (MSPSS) instrument was developed to assess three sources of perceived social support: family, friends, and significant others (Zimet, Dahlem, Zimet, & Farley, 1988, 1990). The scale consists of 12 items on a 7-point Likert-type scale with options ranging from *very strongly disagree* to *very strongly agree*. Each of the three subscales (family, friend, and significant other)

consists of four items. Responses to items within each subscale are summed to obtain a total subscale score, and scores on all 12 items are summed to produce a composite MSPSS scale score (i.e., global perceived social support). A high total mean score on any specific subscale indicates a high level of perceived social support from that source. Park et al. (2015) reported a Cronbach's alpha of .92 and factor loadings of .74-.85 for the family subscale, .87-.89 for the friend subscale, and .72-.88 for the significant other subscale. For this study, the overall reliability was .96, reliability for the friend subscale was .97, for the family subscale was .95, and for the significant other subscale was .90.

DATA COLLECTION PROCEDURE

Approval for this study was obtained from the IRBs for UTMB and UTHealth, which serves as the research oversight entity for the clinical site. The facility research coordinator was consulted and provided physicians, unit directors, and managers with information about the study and requested they provide input and express any concerns.

The consent form, individual demographic data sheet, and study instruments were numerically coded (01- 30) and documented on a master list of identification codes that was maintained until all data had been collected and subsequently destroyed at the end of data collection, effectively de-identifying the data. All scored tests were stored in a secure file cabinet at the study location and transferred to a secure cabinet in the investigator's home office at a later date. The data was then loaded onto a password-protected computer for data analysis. Data cleaning and entry began immediately after the first set of data was collected, although the recruitment process continued until the target sample size was reached. This phase of the study ended on December 22, 2016.

The second phase of data collection included a baseline review of participant medical records for dates of discharge and again at 2 and 4 weeks post discharge to identify patients who had been readmitted. Two-week review and call-back began on December 13, 2016. At each time point, the patients were contacted by telephone and asked to self-report admissions to other hospitals. The information obtained during the follow-up was recorded using a follow-up information sheet (Appendix D). Five participants responded at both 2- and 4-week follow-ups, and three responded only at the 2-week follow-up. Eight participants never responded, and 14 responses were obtained from a family member or significant other who reported that the whereabouts of the participant were unknown. Three family members reported that participants had enrolled in rehabilitation or a transitional programs.

DATA ANALYSIS

Data were analyzed using SPSS version 24 for Windows. Significance was calculated at $\alpha \leq .05$, and power analysis was completed a priori. Continuous variables were analyzed using mean, standard deviation, t-test for independent samples, analysis of variance (ANOVA), analysis of covariance (ANCOVA), and multiple regression. Categorical variables were analyzed using descriptive statistics (frequency distribution and percentages). Preliminary analyses examined all data for appropriate analytic assumptions (i.e., normality, linearity, homogeneity, collinearity and homoscedasticity). There were no issues of heterogeneity or other violations of analytic assumptions. Complete case analysis was performed only on those subjects with data sets having less than 10% missing information. Patients having greater than 10% missing information

were excluded and counted as dropouts or analyzed pairwise (excluding the cases only if they were missing the data required for the specific analysis).

Research question 1 focused on the descriptive aspects of the sample examining HL scores and how they were distributed. Frequencies, means, standard deviations, and chi-square analysis were computed for each HL category, total, inadequate, marginal, adequate, and combined inadequate/marginal. Research questions 2 and 4 focused on the relationship between HL scores and total readmissions at 2- and 4-week intervals using the Pearson Product Moment Correlation and forward and backward multiple regression analyses to determine whether there were significant predictive relationships between subsets of three and four dichotomous predictors (i.e., marital status, education, gender, ethnicity, employment, insurance status, living arrangement) and age, perceived social support, functional HL, and hospital length of stay. Criterion variables were total readmissions and 2-week readmissions.

Research question 3 (part one) employed a one-way ANCOVA to test differences between the two HL categories (low and adequate) on total readmissions while controlling for age. A one-way repeated measures analysis of covariance (RM-ANCOVA) was also used to assess HL group differences across the two time intervals (2 and 4 weeks) post discharge, controlling for age.

Chapter 4 Results

This chapter presents the results of analyses examining HL levels, readmission rates at 2- and 4-week intervals, and variables that are predictors of readmission for individuals diagnosed with bipolar disorder on a psychiatric inpatient unit. The chapter is organized as follows: psychometric analyses, description of the study sample and preliminary analyses describing the relationship among categorical variables, and group differences on interval variables and the distribution of demographic variables across other categories. Finally, the results of each research question are presented within each specific aim.

PSYCHOMETRIC ANALYSES

Cronbach's alpha was calculated to assess the reliability of the two instruments used in the study, the MSPSS and the S-TOFHLA. The three subscales of the MSPSS (family, friend, and significant other) had Cronbach's alphas of .95, .97, and .90, respectively, with the overall 12-item scale having a reliability coefficient of .96. The extremely high reliability strongly suggests a considerable degree of redundancy. The 36-item S-TOFHLA had a robust reliability coefficient of .90. Both instruments meet the criteria for acceptable reliability for this study.

Sample Characteristics

Descriptive statistics for the total sample are presented in Table 4-1. Thirty individuals participated (16 males and 14 females) with an overall average age of 39 years ($SD = 12.3$). The data indicate that a majority of participants were single (70%),

non-white, had less than a high school education, were unemployed, and lived with others.

Table 4.1. Total Sample Characteristics

Characteristics	<i>n</i>	Mean (SD) or %	Skewness
Age ± SD	30	39 (12.3)	.93*
Gender			
Male	16	53.35%	-
Female	14	46.7%	-
Ethnicity			
White	13	43.3%	-
All Other Races	17	56.7%	-
African American	10	33.3%	-
Asian	1	3.3%	-
Hispanic	6	20.0%	-
Marital Status			
Single	21	70%	-
All Other Arrangements	9	30%	-
Education			
≤ High School	16	53.3%	-
> High School	13	43.3%	-
Employment			
Employed	3	10%	-
Unemployed	27	90%	-
Residence Status			
Lives Alone	6	20%	-
Lives with Others	23	76.7%*	-
Insurance Status			
Insured	8	26.7%	-
Uninsured	22	73.3%	-
2-Week Readmission			
Yes	4**	10%	-
No	27	90%	-
4-Week Readmission			
Yes	1	3.3%	-
No	29	96.7%	-
TOFHLA	28	28.74 (8.0)	-1.67
MSPSS (Mean Scores)	28	55.57 (23.6)	-0.26
Family (4 Items)	28	19.07 (8.65)	-
Friend (4 Items)	28	16.43 (9.67)	-
Significant Other (4 Items)	28	20.07 (8.03)	-
LOS	30	9.90 (4.82)	1.19
Total Readmission	30	.167 (.46)	2.93

DISTRIBUTION OF DEMOGRAPHIC VARIABLES

Chi-square analyses were calculated to investigate the association between nominal level demographic variables (Appendix G). Because of the small sample size and low frequencies in some variables, all categories were collapsed into dichotomous groups enabling the use of Fisher's exact test in all cases except for analyses between HL and marital status, HL and ethnicity, education and ethnicity, and education and gender. There were no significant associations among the variables, indicating a statistically even distribution of these characteristics across the demographic groups (Table 4-2).

Table 4.2. Distribution of Demographic Variables (% , n)

	EDUCATION		ETHNICITY		GENDER		EMPLOYMENT	
	≤HS % (n)	>HS % (n)	White % (n)	All Others % (n)	Male % (n)	Female % (n)	Employed % (n)	Unemployed % (n)
Living Arrangement								
Alone	66.7% (4)	33.3% (2)	33.2% (2)	66.7% (4)	33.3% (2)	66.7% (4)	16.7% (1)	83.3% (5)
With Others	52.2% (12)	47.8% (11)	43.5% (10)	56.5% (13)	56.5% (13)	43.5% (10)	8.7% (2)	91.3% (21)
Education								
≤HS			37.5% (6)	62.5% (10)	62.5% (1)	37.5% (6)	12.5% (2)	87.5% (14)
>HS			42.2% (6)	53.8% (7)	38.5% (5)	61.5% (8)	7.7% (1)	92.3% (12)
Ethnicity								
White					61.5% (8)	38.5 % (5)	15.4% (2)	84.6 % (11)
All Others					47.1% (8)	52.9 % (9)	5.9% (1)	94.1% (16)
Gender								
Male							66.7% (2)	51.9% (14)
Female							33.3% (1)	48.1% (13)

Table 4-2 indicates that 83% of those who lived alone were unemployed, while 91% of the sample who lived with others were unemployed. However, unemployment among males was equivalent to that of females.

Table 4.3. Distribution of Demographic Variables

	INSURANCE		MARITAL STATUS		2-WEEK READMISSION		4-WEEK READMISSION	
	Insured	Uninsured	Single	Others	Yes	No	Yes	No
Living Arrangement								
Alone	33.3% (2)	66.7% (4)	66.7% (4)	33.3% (2)	00% (0)	100% (6)	00% (0)	100% (6)
With Others	21.7% (5)	78.3% (18)	73.9% (17)	26.1% (6)	33.3% (2)	66.7% (4)	4.3% (1)	95.7% (22)
Education								
≤HS	25% (4)	75% (12)	81.3% (13)	18.8% (3)	6.3% (1)	93.8% (15)	6.3% (1)	93.7% (15)
>HS	23.1% (3)	76.9% (10)	61.5% (8)	38.5% (5)	7.7% (1)	92.3% (13)	00% (0)	100% (13)
Ethnicity								
White	30.8% (4)	69.2% (9)	61.5% (8)	38.5% (5)	7.7% (1)	92.3% (12)	00% (0)	100% (13)
All Others	23.5% (4)	76.5% (13)	76.5% (13)	23.5% (4)	5.9% (1)	94.1% (15)	5.9% (1)	94.1% (16)
Gender								
Male	18.8% (3)	81.3% (13)	75% (12)	25% (4)	12.5% (2)	81.3% (13)	6.3% (1)	93.8% (15)
Female	35.7% (5)	64.3% (9)	64.3% (9)	35% (5)	00% (0)	100% (14)	00% (0)	100% (14)
Insurance								
Insured			50% (4)	50% (4)	00% (0)	100% (8)	12.5% (1)	87.5% (7)
Uninsured			77.3% (17)	22.7% (5)	9.1% (2)	86.4% (19)	00% (0)	100% (22)
Employment								
Employed	33.3%	66.7%	66.7%	33.3%	00%	100%	00%	100%

	(1)	(2)	(2)	(1)	(0)	(3)	(0)	(3)
Unemployed	25.9% (7)	74.1% (20)	70.4% (19)	29.6% (8)	7.4% (2)	88.9% (24)	3.7% (1)	96.3% (26)

Table 4-3 indicates that only males were readmitted at both the 2- and 4-week time points. It is possible that innate male characteristics, stigma and societal expectations would predispose males to be less likely to request help or reveal vulnerability so they are seen as strong and self-sufficient while females will speak up and are less prideful in exposing their vulnerability; so they (females) are offered and accept favors more readily than their male counterparts. Males might not be the recipients of equivalent treatment as females in similar situations.

Interval Variables

Differences between demographic variables (marital status, HL, 2-week readmission [dichotomous], education, employment, ethnicity, gender, insurance status, and living arrangement) were assessed for correlation with age, inpatient length of stay, perceived social support, and total readmissions (Table 4.4 - 4.7) to rule out potential sources of covariation.

Age and Demographic Group Differences

Table 4-4 displays the assessment of group variables on age using independent t-tests, which revealed significant differences between marital status groups on age, with those living with others being generally older than singles. There was also a significant difference based on insurance status as it relates to age, with insured individuals being older than the uninsured. There were no other significant group differences for the age variable.

Table 4.4. Demographic Group Differences on Age

	Dependent Variable	Demographic Group (n)	Mean (SD)	Significance
AGE	Marital Status	33.6 (7.30)	t=4.89; p<.001	
	Single (21)	51.56 (12.74)		
	Living with Others (9)			
	Health Literacy	40.33 (18.90)		t=.573; p=.57
	Low (6)	37.18 (9.57)		
	Adequate (22)			
	2-Week Readmission	40 (16.52)		t=-.146; p=.885
	Yes (3)	38.89 (12.20)		
	No (27)			
	Education	35.94 (9.6)		t=1.16; p=.23
	≤ HS (16)	41 (13.79)		
	> HS (13)			
	Employment	34.67 (2.08)		t=-.64; p=.53
	Employed (3)	39.48 (12.0)		
	Unemployed (27)			
	Ethnicity			
	White (13)	38.23 (13.12)		t=-.29; p=.77
	All Other Races (17)	39.5 (12.04)		
	Gender	36.94 (12.16)		t=-.98; p=.34
	Male (16)	41.36 (12.51)		
	Female (14)			
	Insurance Status	48.38 (16.14)		t=2.79; p=.009
	Insured (8)	35.59 (8.77)		
	Uninsured (22)			
	Living Arrangement	40.67 (13.13)		t=.57; p=.57
	Lives Alone (6)	37.57 (11.58)		
	Lives with Others (23)			

Group Differences on Inpatient Length of Stay

When the demographic variables were compared on inpatient length of stay there were no significant differences as shown in Table 4.5. However, sample sizes in many categories were extremely small which would make reaching statistical significance very difficult. Therefore, it is worth noting various trend in the data. For instance, it appears that those who were readmitted at 2 weeks post discharge had a notably shorter length of stay of almost 3 full days suggesting a link between earlier discharge and risk of readmission that should be explored further. Similarly, those with lower HL also appear to be released earlier than those with adequate HL. Since low HL is associated with greater likelihood of readmission, failure to understand the implications of discharge may result in shorter stays and resulting higher rates of readmissions.

Table 4.5. Demographic Group Differences on Length of Stay

	Dependent Variable	Demographic Group (n)	Mean (SD)	Significance
LENGTH OF STAY	2-Week Readmission			
	Yes (3)	7.33 (3.22)		t=.97; p=.339
	No (27)	10.20 (4.92)		
	Education			
	≤ HS (16)	9.94 (4.84)		t=.090; p=.929
	> HS (13)	9.77 (5.20)		
	Employment			
	Employed (3)	5.67 (3.06)		t=-1.65; p=.110
	Unemployed (27)	10.37 (4.78)		
	Ethnicity			
	White (13)	9.23 (4.92)		t=-.659; p=.515
	All Other Races (17)	10.41 (4.82)		
	Gender			
	Male (16)	8.90 (4.20)		t=-1.26; p=.219
	Female (14)	11.07 (5.36)		
	Health Literacy			
	Low (6)	7.33 (2.20)		t= -1.36; p=.186
	Adequate (22)	10.36 (5.29)		
	Insurance Status			
	Insured (8)	9.50 (4.50)		t=.270; p=.789
	Uninsured (22)	10.05 (5.02)		

Living Arrangement		
Lives Alone (6)	12.00 (6.39)	t= 1.21; p=.236
Lives with Others (23)	9.30 (4.44)	
Marital Status		
Single (21)	9.00 (4.02)	t= 1.61; p= .120
Living with Others (9)	12.00 (6.04)	

Group Differences on Perceived Social Support

Table 4-6 displays the assessment of group differences on perceived social support. Two demographic groups had significant differences associated with this variable. Those having above a high school education reported less perceived social support than those with less than high school education. Those with low HL perceived higher social support than those with adequate HL.

Table 4.6. Demographic Group Differences on Perceived Social Support

Dependent Variable	Demographic Group (n)	Mean (SD)	Significance
Living Arrangement			
Lives Alone (6)	3.4 (1.68)	t= -1.82; p=.080	
Lives with Others (22)	5.00 (1.94)		
2-Week Readmission			
Yes (3)	6.58 (.722)	t= -1.88; p=.071	
No (25)	4.42 (1.95)		
Education			
≤ HS (15)	3.13 (2.00)	t=-2.22; p=.036	
> HS (13)	5.48 (1.65)		
Employment			
Employed (3)	4.50 (1.21)	t=-.141; p=.889	
Unemployed (25)	4.67 (2.06)		
MSPSS			
Ethnicity			
White (12)	4.47 (1.74)	t=-.398; p=.694	
All Other Races (16)	4.78 (2.18)		
Gender			
Male (15)	4.60 (2.00)	t=-.129; p=.899	
Female (13)	4.70 (2.00)		
Health Literacy			
Low (6)	6.05 (1.48)	t= 2.082; p=.047	
Adequate (22)	4.26 (1.94)		
Insurance Status			
Insured (6)	4.83 (2.18)	t= .256; p=.800	
Uninsured (22)	4.60 (1.97)		
Marital Status			t=.449; p= .657

Single (20)	4.54 (2.13)
Living with Others (8)	4.92 (1.62)

Group Differences on Total Number of Readmissions

Group demographic differences on total number of readmissions are displayed in Table 4-7. No statistically significant differences were found; however no readmissions were found among the employed, females and those living alone.

Table 4.7. Demographic Group Differences on Total Number of Readmissions

Dependent Variable	Demographic Group (n)	Mean (SD)	Significance
Education	≤ HS (16)	125 (.342)	t=.598; p=.555
	> HS (13)	.231 (.600)	
Employment	Employed (3)	000 (000)	t=-.653; p=.9
	Unemployed (27)	.185 (.483)	
Ethnicity	White (13)	.077 (.277)	t=-.930; p=.360
	All Other Races (17)	.235 (.562)	
TOTAL READMISSIONS	Gender		
	Male (16)	4.60 (2.00)	t=1.94; p=.063
	Female (14)	4.70 (2.00)	
	Insurance Status		
	Insured (8)	.125 (.354)	t=-.294; p=.771
	Uninsured (22)	.182 (.501)	
	Living Arrangement		
	Lives Alone (6)	000 (000)	t= -1.01; p=.320
	Lives with Others (23)	.220 (518)	
	Marital Status		
	Single (20)	.143 (.359)	t=.426; p= .673
	Living with Others (8)	.222 (.667)	

In addition to the preceding preliminary assessment of variables distribution, the evaluation of normality (kurtosis, skewness, Shapiro-Wilks) were conducted for the continuous variables (total HL, age, total readmissions, 2- and 4-week readmissions, and inpatient length of stay). There were indications that the data were not normally distributed. Variables with skewness greater than ± 2.0 and kurtosis estimates greater than ± 3.0 are considered outside the acceptable range for parametric tests and procedures. However, use of these analytical approaches to assess normality and distributions for small samples is highly likely to produce erroneous results. Visual inspection of the data is the recommended approach in this situation. Box plot analysis was employed to identify outliers, which were considered to be scores greater than three standard deviations above or below the group mean. No outliers met these criteria.

EVALUATION OF THE STUDY SPECIFIC AIMS AND RESEARCH QUESTIONS

Following preliminary analyses, t-tests for independent samples, one-way ANCOVA, repeated measures ANCOVA, and multiple regressions were employed to explore the proposed research questions. ANCOVAs and t-tests were used to compare group differences across variables, and regression analysis identified significant predictors of total, 2-week, and 4-week readmissions. Grouping variables with small numbers were pooled to enable appropriate analyses.

Specific Aim 1

Specific Aim 1 explored the functional HL status (total score; levels: inadequate/marginal and adequate) of patients diagnosed with bipolar disorder using the Test of Functional Health Literacy in Adults.

AIM 1: RESEARCH QUESTION 1

RQ 1.1. What is the functional health literacy total score in patients diagnosed with bipolar disorder prior to discharge from psychiatric inpatient facility?

Overall, the mean total functional HL was 30.61 (SD = 7.40, n = 28). Table 4-8 displays differences in functional HL between demographic groups. Significant differences in functional HL were found for ethnic groups, with whites having a higher group mean as compared to the combination of all other races. As previously noted, when HL was dichotomized (low, adequate) there was a statistically significant difference between low and adequate HL on perceived social support (Table 4-6), with participants with low HL reporting greater perceived social support than those with adequate HL. There were no statistically significant differences in HL levels based on inpatient length of stay or participant age.

Table 4.8. Demographic Group Differences on Total Health Literacy

Dependent Variable	Demographic Group (n)	Mean (SD)	Significance
TOTAL FUNCTIONAL HEALTH LITERACY	2-Week Readmission		
	Yes (3)	19.33 (12.06)	t = 3.30; p = .003
	No (25)	31.96 (5.60)	
	Education		
	≤ HS (15)	31.87 (5.68)	t = .970; p = .341
	> HS (13)	29.15 (8.97)	
	Employment		
	Employed (3)	29.67 (9.30)	t = -.230; p = .820
	Unemployed (25)	30.72 (7.34)	
	Ethnicity		
	White (12)	33.75 (3.93)	t = 2.068; p = .033
	All Other Races (16)	28.25 (8.53)	
	Gender		
	Male (15)	29.27 (8.92)	t = 1.03; p = .310
	Female (13)	32.15 (4.96)	
	Insurance Status		
	Insured (6)	29.0 (7.54)	t = .595; p = .557
	Uninsured (22)	31.0 (7.45)	

Living Arrangement			
Lives Alone (6)	31.50 (6.30)		t = .329; p = .745
Lives with Others (22)	30.36 (7.76)		
Marital Status			
Single (20)	31.3 (6.44)		t = -.780; p = .442
Living with Others (8)	28.88 (9.6)		

AIM 1: RESEARCH QUESTION 2

RQ 1.2. What is the distribution of functional health literacy levels in patients diagnosed with bipolar disorder?

Two participants had incomplete information on the S-TOFHLA, but 28 subjects completed the test. Assessment of the 28 participants with HL data showed that six (21.4%) had low HL and 22 (78.6%) had adequate HL. Table 4-9 displays the distribution of HL levels across demographic variables. Significant associations were observed between HL and readmissions at 2 and 4 weeks.

Table 4.9. Distribution of Health Literacy Across Demographic Variables

Demographic Group (n)	Health Literacy		χ^2	P-value
	Low (%, n)	Adequate (%, n)		
Insurance Status				
Insured	33.3% (2)	18.2% (4)	.64	.58
Uninsured	66.7% (4)	81.8% (18)		
Marital Status				
Single	66.7% (4)	72.7% (16)	.09	.77
Living with Others	33.3% (2)	27.3% (6)		
2-Week Readmission				
Yes	33.3% (2)	4.5% (1)	4.08	.043
No	66.7% (4)	95.5% (21)		
4-Week Readmission				
Yes	16.7% (1)	4.5% (1)	3.80	.05
No	83.3% (5)	95.5% (21)		
Living Arrangement				
Lives Alone	16.7% (1)	22.7% (5)	.64	.58
Lives with Others	83% (5)	77.3% (17)		
Education				
\leq HS	33.3% (2)	54% (13)	1.30	.37
> HS	66.7% (4)	41% (9)		

Ethnicity				
White	16.7% (1)	50% (11)	2.14	.14
All Other Races	83.3% (5)	50% (11)		
Gender				
Male	66.7% (4)	50% (11)	.53	.66
Female	33.3% (2)	50% (11)		
Employment				
Employed	16.7% (1)	9.1% (2)	.28	1.00
Unemployed	83.3% (5)	90.9% (20)		

The distribution of low HL had twice as many males than females, whereas those with adequate HL are more evenly distributed. Low HL is also more highly represented in those living with others, unemployed, and—surprisingly—those with higher education. However, sample size in all these categories is extremely low, and is not likely representative and should be not generalized. Results indicate that 33.3% of those with low HL were readmitted within 2 weeks, while only 4.5% of those with adequate HL were admitted within the same time frame. The data indicate that there were no readmissions of those with adequate HL at 4 weeks, compared to 16.7% of those with low HL.

Specific Aim 2

Specific Aim 2 explored the relationship between HL total scores and readmission frequency at 2- and 4-week intervals post discharge in patients diagnosed with bipolar disorder.

AIM 2: RESEARCH QUESTION 1

RQ 2.1. What is the relationship between HL and psychiatric hospital readmissions at 2- and 4-week intervals post discharge in patients diagnosed with bipolar disorder?

The relationship between total HL scores (as measured by the S-TOFHLA) and total number of readmissions (measured by the number of times participants were readmitted) was investigated using the Pearson product moment correlation coefficient. There was a strong negative correlation between the HL and total hospital readmissions variables ($r = -.73$, $n = 28$, $p < .01$), representing a large effect size. This result indicates that HL contributes to 53% of the variance in total readmissions, with lower HL associated with higher readmissions.

There was also a strong statistically significant relationship between HL scores and 2-week readmissions ($r = -.63$, $n = 28$, $p < .01$), reflecting a moderate shared variance of 40%, with lower HL associated with higher 2-week readmissions. Health literacy and 4-week readmissions showed a similar pattern, although not statistically significant ($r = -.34$, $n = 28$, $p = .08$) with a smaller shared variance of 11.6%, lower HL was associated with higher 4-week readmission rates.

Specific Aim 3

Specific Aim 3 examined the differences between HL groups (inadequate/marginal and adequate) on total readmissions and readmissions across two time intervals, 2 and 4 weeks post discharge, controlling for age.

AIM 3: RESEARCH QUESTION 1

RQ 3.1. What are the differences between HL groups (inadequate/marginal and adequate) in total number of readmissions for patients diagnosed with bipolar disorder, controlling for age?

A one-way ANCOVA was used to assess the differences between the two HL categories (low HL and adequate HL) on total readmissions (Table 4-10). There was a statistically significant difference between the two HL groups on total number of readmissions ($F [1, 25] = 10.36$, $p = .004$, partial $\eta^2 = .293$), reflecting a large effect size (Cohen, 1988, as cited in Pallant, 2013), with those having low HL reporting higher readmission rates than those with adequate HL.

Table 4.10. ANCOVA: Means for HL Groups on Total Readmissions Controlling for Age

HL Groups	Unadjusted Means (n)	SD	Adjusted Means	SE
Low HL	.670 (6)	.820	.664	.170
Adequate HL	.046 (22)	.213	.046	.088

*Age in the model evaluated at 37.86 years.

The HL factor accounted for 29% of the variance of the dependent variable (total readmission), holding constant the participants' age—although age was not a statistically significant covariate.

AIM 3: RESEARCH QUESTION 2

RQ 3.2. What are the differences between health literacy groups (inadequate/marginal and adequate) in readmissions across two time intervals, 2 and 4 weeks post discharge, for patients diagnosed with bipolar disorder, controlling for age?

Of interest was change in readmission rates across two time intervals, 2 and 4 weeks post discharge, for the two HL groups controlling for age. However, only one individual was readmitted at 4 weeks post discharge, which precluded the opportunity to explore this aspect because at least two subjects were needed at each time point in order to calculate variance.

Specific Aim 4

Specific Aim 4 explored the best predictors of hospital readmission (total and at 2 and 4 weeks) from among demographic variables (social support, age, and gender) and HL scores within the sample of post discharge patients diagnosed with bipolar disorder.

AIM 4: RESEARCH QUESTION 1

RQ 4.1. What are the best predictors of readmission (total, 2 weeks, and 4 weeks) among social support, age, gender, and health literacy for post discharge patients diagnosed with bipolar disorder?

A review of the relationships between predictors and between the predictors and criteria (Table 4-11) demonstrated low correlations between predictors that were desired to avoid multicollinearity. Correlations between predictors and criteria variables (total readmissions, 2-week, and 4-week readmissions) were weak to moderate.

Table 4.11. Correlated Variables in Research Question 4

Variables	Correlations
2-Week Readmission * MSPSS	.342
2-Week Readmission * Total HL	-.632
2-Week Readmission * Gender	-.292
HL (Total) * MSPSS	-.368
Total Readmission* Total Health Literacy	-.729
Total Readmission * Gender	-.344
Total Readmission * MSPSS	.415

Using total readmissions as the criterion variable and total TOFHLa, gender, age, and perceived social support as predictors in the forward and backward regression approaches, a significant model was obtained ($F[1, 26]=29.48, p<.001$; adjusted $R^2=.51$)

that accounted for 51% of the variance in total readmissions by total HL scores. A beta value of -.729 (Table 4-12) indicates that for every SD (unit) increase in total HL, there would be a 73% SD fall in total readmissions. Backward regression analysis confirmed the results of the forward regression method.

Table 4.12. Significant Predictor of Total Readmission

Predictor	B	SE of B	β	P-value	CI
Constant	1.56	.264	-	<.001	1.02 to 2.10
Total TOFHL	-.046	.008	-.729	<.001	-.063 to -.028

Forward and backward regression analyses were then conducted with the predictors gender, age, test of functional HL (total), and perceived social support on the criterion variable, 2-week readmission. A significant model emerged ($F[1, 26] = 17.29, p < .001$) adjusted $R^2 = .38$) accounting for approximately 38% of the variance in 2-week readmissions by total HL. Backward regression analysis confirmed the results of the forward method. There were insufficient cases in the 4-week readmission variable to conduct a meaningful regression analysis. In all analyses in which TOFHLA was used as a predictor of readmissions, HL emerged as a statistically significant predictor.

SUMMARY OF RESULTS

The study sample consisted of 30 participants with an average age of 39 years; most were single, non-White, had less than a high school education, and lived with others. Specific Aim 1 examined the scores of participants (RQ 1.1) and the distribution of HL across demographic variables (RQ 1.2). After combining the marginal and inadequate HL groups, 20% of the sample ($n = 6$) had low HL, 73.3% ($n = 22$) had

adequate HL, and 6.7% ($n = 2$) were missing. A case summary review of those readmitted at 2 and 4 weeks (Table 4-13) shows that two of the six individuals with low HL were readmitted in the 2-week period following discharge. One participant with low HL was admitted twice within the 2-week period. Among the 2-week readmissions, there was one participant with adequate HL. At 4 weeks post discharge, the only readmission was a patient with low HL.

Table 4.13. Case Summary of Readmissions and Health Literacy Levels

ID	2-Week Readmission	4-Week Readmissions	HL Level
A	0	1	Low
B	1	0	Low
C	2	0	Low
D	1	0	Adequate
Total	4	1	-

Specific Aim 2 (RQ 1.2) examined the relationship between HL and readmissions using the Pearson Product Moment correlation (RQ 2.1). There were significant negative correlations between HL and 2-week readmissions, and between HL and total readmissions. However, there was no statistically significant correlation between HL and 4-week readmissions.

Specific Aim 3 explored the differences in means between HL and total readmissions, and between HL and 2-week readmissions, while controlling for age, using ANCOVA (RQ 3.1) and RM-ANCOVA (RQ 3.2). There was a statistically significant difference between the two HL groups on total number of readmissions using the ANCOVA. The RM-ANCOVA did not demonstrate a significant change across time for HL groups on readmissions at the 2- and 4-week post discharge time points.

Specific Aim 4 explored four predictor variables (TOFHLA, MSPSS, gender, and age) to explore their unique contributions to 2-week and total readmissions (RQ 4.1). Health literacy was a significant predictor in both 2-week and total readmissions. The contribution of predictors to 4-week readmissions was not assessed because of the inadequate number of cases available for analysis (i.e., only one participant was readmitted at 4 weeks post discharge).

Chapter 5 Conclusions, Discussion, and Recommendations

This study examined the role of HL in psychiatric hospital readmissions in a sample of 30 patients diagnosed with bipolar disorder. In this chapter, the results from the study and their relatedness to the theoretical framework and existing literature will be presented. The study's limitations and recommendations for future research are also presented. The chapter concludes with nursing implications.

DISCUSSION OF MAJOR FINDINGS AND CONCLUSIONS

The sample for this study consisted of 30 participants, 16 males (mean age = 47 years) and 14 females (mean age = 53 years). The sample was composed of 43% whites ($n = 13$) and 57% non-whites ($n = 17$; African American $n = 10$ (33.3%); Hispanics $n = 6$ (20%); Asian $n = 1$ (3.3%). Statistically significant differences were observed for age across insurance status. The mean age of those insured was 48 years, and for the uninsured the mean age was 36 years. The high percentage of uninsured could reflect the high percentage of unemployed (90%) participants in the sample and may also be associated with low socioeconomic levels. Low socioeconomic levels and poverty have been previously identified as high risk for low HL and hospital readmissions (USDHHS, 2011; The Moran Company, 2013).

Perceived Social Support

Participants with above high school education reported less perceived social support than those with less than high school education. Participants with low HL felt they had greater social support than those with adequate HL; however, the data also demonstrated that individuals who lived with others and those who were readmitted

perceived less social support than their counterparts, although not statistically significant, raising questions about the potential contribution of living with others to perceived social support.

Total Readmissions

The mean age of those readmitted within 2 weeks of discharge was 40 years and mean age for those who were not readmitted was 39 years. Health literacy level was the only statistically significant factor, with participants having low HL being readmitted more frequently than participants with adequate HL. Interestingly, there were no readmissions among the employed, those who lived alone, or among females.

Major Study Variables

Because this pilot study used a small sample size, groups were collapsed to be analytically feasible, including the variables of interest (HL and readmissions). In addition to being analyzed at the interval level, 2- and 4-week readmissions were also transformed into dichotomous variables; however, there was only one 4-week readmission in the sample, which precluded most meaningful analyses for that time point. Total and 2-week readmissions were analyzed for HL, which was a better representation of the data. In addition, one participant was admitted twice within a 2-week period, representing correlated incidences.

Of the total number of readmissions, 60-80% had low HL. Given that 20% of the current sample had low HL, greater than the 14% reported in the 2003 US Department of Education study, clearly a disproportionate number of patients being readmitted also have low HL.

Overall, readmission patterns tend to agree with a study conducted by The Moran Company (2013), which reported that inpatient psychiatric hospital readmissions tend to be younger and male, and that 5.4% of patients discharged from these facilities were readmitted within 7 days. This study did not isolate 7-day readmissions for comparison and 100% of those readmitted were males. Fleury, Ngui, Bamvita, Grenier, and Caron (2014) also identified being male as a risk factor for readmission to psychiatric hospitals. Montgomery & Kirkpatrick (2012) reported that 30-40% of the mentally ill were readmitted within 6 months of discharge from inpatient psychiatric facilities, while in this study 17% were readmitted within a 30-day period.

SPECIFIC AIM 1

Research Question 1.1: Total Health Literacy Scores Among Participants

The first research question was derived based on the premise that if a patient has neurocognitive deficit (as is documented in the case of patients with bipolar disorder), inadequate or low HL scores would be demonstrated in a significant proportion of the sample. Additionally, neurocognitive deficits in patients with bipolar disorder extend beyond acute episodes and into euthymic states (APA, 2013), predisposing this group of patients to multiple negative health/illness outcomes (Cloonan et al., 2013; Krishan et al., 2012; USDHHS, 2011). According to the United States Department of Health and Human Services (USDHHS, 2011), HL is impacted by a number of domains including age over 65 years, ethnicity minority, refugee or immigrant status, socioeconomic status, those with less than high school education, and younger males. In this study, 20% of the sample exhibited low HL as compared with the findings of Krishan et al. (2012), in which 46% of the sample had low HL. However, this study had a much smaller sample

size than the Krishan et al. (2012) study and may not be representative of the population studied.

Research Question 1.2: Distribution of Health Literacy

FUNCTIONAL HL AND DEMOGRAPHIC DIFFERENCE

An examination of HL across demographic risk factors failed to identify a significant difference across HL groups (low and adequate) on age. However, there were statistically significant differences in perceived social support, with the low HL group having a higher group mean (6.05) than the adequate HL group (4.26). This result may reflect a greater awareness of need for social support of individuals with low HL compared to individuals with adequate HL. While there were no statistically significant differences in perceived social support based on living arrangements, those living with others trended toward less perceived social support than those living alone. Additionally, those with greater than high school education also perceived less social support than those having less than high school education. Both factors would be congruent with those having more resources available (living with others and more educated) being perceived as needing less social support, resulting in their under-estimation of support received.

Furthermore, the theoretical framework for this study addresses cognitive overload as a potential factor contributing to readmission, low HL, and poor self-care. With social support and living arrangement trending toward significance in some sub-groups, patients may become perplexed by pending discharge. Uncertainty regarding post discharge living arrangements coupled with cognitive deficits may generate cognitive overload, which could precipitate aggressive behavior and/or early discharge

and readmission. These types of patients are at a disadvantage with respect to early discharge as well as early readmission. The patient may have been scheduled for discharge, but feel unsupported with respect to post discharge living arrangements. For patients not yet scheduled for discharge, there is an increased probability of discharge resulting from disruptive behavior.

This situation is illustrated by the case of participant X, who was faced with discharge within 2 days but was aware that placement at a hostel was cancelled because of a missed appointment due to the hospitalization. During testing, the patient asked whether the investigator could help with housing but was informed that the nurse, social worker, or her physician would address her concern. When the patient asked a second time and was given the same explanation by the investigator, there was an instant change in mood and the patient mumbled that no one cared about her. When the investigator went to the nurses' station to inform the nurse of the potential for escalation, the patient flipped an oversized bench/table combination set onto its side, damaging the legs. A special response team was called, but the patient retreated to her room before the team arrived. Patient X was discharged the following day. Because friends and family play a vital role in perceived social support, pending discharge with no residential placement or social support may have exceeded Patient X's level of cognition, resulting in this act of aggression.

FUNCTIONAL HL

T-test analyses indicated significant differences in functional HL scores based on ethnicity and 2-week readmissions. Whites scored higher on the TOFHLA than all other races combined, although other races comprised 56% of the sample. This result is

consistent with the USDHHS (2011) report that identified racial and ethnic groups other than whites as being at greater risk for low HL. A statistically significant difference in functional HL based on 2-week readmissions was identified using t-test analysis, with participants who were not readmitted within 2 weeks after initial discharge having higher functional HL scores.

LENGTH OF STAY

There was no significant difference in HL based on inpatient length of stay; however, the difference in means trended toward a correlation between low HL and shorter length of stay. Participants who lived alone tended to have a longer length of stay than those who shared a residence, and participants who were married or were in a relationship tended to have longer hospital stays than singles. These patterns suggest that access to others does not uniformly translate into shorter hospital stay. Further research should explore whether different living arrangements (e.g., with spouse, in a group home, with family members) differentially affect perceptions of social support and length of stay in addition to HL.

SPECIFIC AIM 2

Research Question 2.1: Relationship Between HL and Readmissions

This research question embodies the essence of this study. It was assumed that low HL would have an impact on psychiatric inpatient readmissions. This assumption was supported by the correlations between HL and 2-week readmissions, as well as between HL and total readmissions. There was a significant negative correlation between HL and total readmissions in which HL total scores explained 53% of the variation in

total readmissions. In addition, a significant negative correlation was found between HL and 2-week readmissions, with a substantive percentage (40%) of the total variance in 2-week readmissions accounted for by HL scores. These results indicate that 2-week readmissions and total readmissions increase with low HL. The number of cases in 4-week readmissions was too small for meaningful analysis. Based on the preceding analyses, younger and unemployed males who live alone are at high risk for readmissions, yet they also have higher perceived social support that could actually impede help for this at-risk group. Because they believe they have adequate social support, it could be difficult to motivate this group to achieve greater independence and self-care.

SPECIFIC AIM 3

Research Question 3.1: Differences Between HL Groups and Total Number of Readmissions, Controlling for Age

Results of one-way ANCOVA partially supported the assumption that differences existed between low and adequate HL groups on total readmissions and that age was a cofactor. There was a large statistically significant difference in total readmissions between low and adequate HL groups, with participants scoring low in HL showing higher total readmissions than those with higher HL. Age, however, was not a significant covariate. These results affirmed the greater overall risk of readmissions for patients with low HL, but did not support age as a risk factor.

SPECIFIC AIM 4

Research Question 4.1: Best Predictors of Readmissions

The main question of this study involved the role of HL in psychiatric hospitalization. The data generated in this study indicated that HL is one of the best predictors of readmission.

PREDICTION OF 2-WEEK READMISSIONS

Using a set of four predictor variables (total HL, perceived social support, age, and gender) with 2-week readmission as criterion, forward and backward regression analyses produced a significant model in which total HL accounted for 38% of the variance in 2-week readmissions. For every SD unit change in functional HL (the predictor), 2-week readmissions decreased by .632 SD points. The backward regression method confirmed the results of the forward method, confirming HL as a strong negative predictor of 2-week readmissions.

PREDICTION OF TOTAL READMISSIONS

Using total readmission as the criterion variable (summed across both 2- and 4-week time periods) and TOFH LA, gender, age, and social support as predictors, forward and backward regression methods similarly yielded a significant model with total HL contributing 53% of the variance in total readmissions. For every SD increase in total HL, total readmissions would fall by .73 SD points according to this model. Backward regression analysis also confirmed the results of the forward method.

This pilot study has demonstrated that HL is a very strong negative predictor of 2-week and total readmissions in the sample studied. The study also identified high and moderate correlations between HL and readmission, as well as significant differences between HL groups on readmissions. There are numerous studies indicating that

individuals with low HL experience low overall health status (Behavioral Health, United States, 2012); higher rates of post discharge hospital utilization (Mitchell et al., 2012); decreased capacity to manage chronic diseases; poor health outcomes; and poor self-care management (AHA, 2012; Everett et al., 2008). Addition of cognitive deficits and other elements such as frequent readmissions, high unemployment, and singleness (as identified in this study) to the list of negative risk factors provides strong support for further investigation of this topic in the future.

LIMITATIONS AND FUTURE RESEARCH RECOMMENDATIONS

The results of this study are not generalizable given the small sample size and the evaluation of only one facility in a geographic area with numerous psychiatric facilities that offer this patient population many treatment options. Collaboration is essential to optimize results in a study of this nature and should be highly prioritized for future studies. The convenience sampling method and inclusion of only English-speaking subjects also limited the study findings. Self-reporting, cognition, and follow-up were all anticipated limitations, but were not expected to the extent encountered in this study. Even with the promise of an end of study gift card, follow-up calls had a small number of responses at both 2 and 4 weeks raising concerns about the accuracy of readmission data. Patients may have returned to their old habits and ways of living, gone to long term rehabilitation facilities after discharge, or experienced cognition changes, all of which could have limited the response rate. Others may have been hospitalized elsewhere for psychiatric or medical illnesses. Repeated readmission of the same patients should also be considered. Self-report may be the only means of obtaining information in this type of research. Participants provided release of information and alternate contact telephone

which were utilized for follow-up and verification: however in almost every instant, their contact was unaware of their whereabouts. New researchers should be aware of these potential limitations.

Subjects with unstable living arrangements or homelessness were excluded from participation, however seven homeless participants entered the study by reporting that they had stable living arrangements during the preliminary interviews. Data obtained from their EMRs and follow-up calls indicated that this was not the case, which resulted in their removal from the study. Retention of unstable living arrangements as an important criterion for future studies will require closer screening for residential status beyond self-report. Stigma could have contributed to the inaccurate reporting of residential status. Almost every patient had a cellular phone, although some were not activated at the time of hospitalization. Because of the unpredictability of the psychiatric population, valuable readmission data may have been lost because of incomplete follow-up.

The levels of cognition measured by the screening MMSE might have been suboptimal because lengths of stay for some participants may have precluded optimal cognitive functioning at the time of assessment, or the patient may have reached his/her maximal cognitive functional level (plateau). It was not possible to differentiate the two conditions (plateau vs. suboptimal cognitive state) within the context of the short-term facility in which this study was conducted. A larger sample size and a better method of tracking participants for follow-up could result in a more robust study.

CONCLUSIONS AND IMPLICATIONS FOR NURSING

Significant findings from this study strongly support that functional HL is highly correlated with 2-week readmissions and total readmissions in this sample of adult patients diagnosed with bipolar disorder. The findings also indicate that patients with low HL are more frequently readmitted for psychiatric treatment than those with adequate HL, and that males are readmitted more frequently than females. Development of a short, valid instrument to assess HL at the time of psychiatric admission or soon thereafter would provide the mental health treatment team with necessary information to adequately prepare patients for discharge. It may also be beneficial to initiate HL instruction when patients are stable instead of advocating discharge at the point of assessed stability to decrease HL-related readmissions. This may be the time when patients with this bipolar disorder are most cognitively capable of comprehending health information, although it may be necessary to increase patients' lengths of stay or provide more comprehensive case management.

As a result, this study may have implications for patient and nursing education, length of stay, and discharge planning. With 90% of this population unemployed, living arrangements could be high priority. The high mean age of 39 years and 77% living in the residence of others is an indication of lack of independence in the sample and is a call to action for nursing to provide patient education that is appropriate to HL levels. This is especially true considering cognitive load theory and the report of Zubieta et al. (2001) that even in euthymic states bipolar patients have cognitive deficits in areas of verbal learning. Murphy and Sahakian (2001) and Sweeney et al. (2000) reported deficits in executive functioning in patients with bipolar disorder, especially in planning, problem solving, concept formation, and set shifting. This could be a factor in the population

studied and may support cognitively appropriate education and treatment to meet their needs.

Because patients with unstable living situations could provide the most necessary and significant insight into the real impact of their illness, excluding them from participation may be a mistake. Elimination of follow-up calls or implementation of more reliable methods to monitor readmission information such as electronic devices or institutional collaborations may be necessary. Future studies could also include family members or significant others, with patient consent, or incorporate collaboration with institutions that accept Medicare or Medicaid payments to verify readmission to other institutions using CMS common working files.

Appendix A: Consent Forms

The University of Texas Medical Branch at Galveston CONSENT FORM

Title: Health Literacy and Psychiatric Hospital Readmissions

IRB Number: UTMB 16-0237; UTHSC-SN 16 0744

Principal Investigator: Edna M. Lewin, The University of Texas Medical Branch at Galveston, Graduate School of Biomedical Sciences, 301 University Blvd., Galveston, TX 77555-1029. Telephone: 713-534-3204 E-mail: emlewin@utmb.edu

Why am I being asked to take part in this research study?

You are being asked to take part in this study because the researcher is interested in knowing the level of ease or difficulty you experience in finding and using health information and health resources that can help you care for yourself better. Your participation in this study is completely voluntary. You may refuse to participate or stop participating in this research study at any time without penalty, loss of benefits, or jeopardizing your medical care at HCPC.

What is the purpose of this research study?

The purpose of this pilot study (small study) is to examine the levels of health literacy in adult patients diagnosed with bipolar disorder. Health literacy is, “The ability to obtain, process and understand basic health information and services needed to make appropriate health decisions.” This small study will also examine whether your ability to find and use health information affects the number of times you need to return to the hospital for psychiatric care. It will also help us determine how we can best conduct a larger study in the same manner.

What procedures are involved as a part of this research study?

This study does not include any invasive procedures. If you agree to participate, you will be asked to sign this consent form and to do the following:

- Complete a mental status evaluation to make sure you are able to complete the study questionnaires

If you qualify for the rest of the study, you will be asked to do the following:

- Complete a demographic data sheet
- Fill out 2 short questionnaires called “The Short Test of Functional Literacy in Adults,” and the “Multidimensional Scale of Perceived Social Support”. The Short Test of Functional Literacy in Adults has 36 questions and takes approximately seven minutes, and the Multidimensional Scale of Perceived Social Support consists of 12 questions and takes approximately three to five minutes to complete.
- Sign a form giving the investigator permission to access your medical information and contact you by telephone two times after you are discharged: Once after two weeks and again at four weeks after your discharge from the hospital. At that time,

all we will ask you is whether you have had to return to any kind of hospital or other facility for your bipolar depression since you were discharged, and when and where that was. The total estimated time for screening, filling out the demographic data sheet, completion of two questionnaires, and the two telephone calls, is approximately one hour and thirty minutes at most for the entire study.

What are the possible risks of choosing to participate in this research study?

There is minimal physical risk of participation. You may feel tired or mild exhaustion from answering the questionnaires. You may also experience mild anxiety caused by sharing your information with a stranger and concerns about the use of your demographic information. The researcher will maintain your confidentiality by using a random code to identify your data instead of your name. A master list will be maintained to make sure that all your data is correctly linked and then destroyed after your final telephone call. Maximum precautions will be taken to protect your confidentiality, but there is always a minimal risk that confidentiality will be breached.

What are the potential benefits for participating in this research study?

If you agree to participate in this study, you will not receive any direct benefits, but we hope the information learned from this study will benefit future patients diagnosed with bipolar disorder.

Is there an alternative treatment/procedure to the study?

There is no treatment involved in this study. All the questionnaires you will fill out are for the purposes of this study only. Nothing will be entered into your medical chart. Your data will be deidentified so that it will be impossible to identify you. The alternative is not to participate in the study.

Will I be compensated for participating in this research study?

However, if you agree to participate in the study, you will be asked to complete a mental status evaluation to assess your ability to complete the rest of the questionnaires. If you do not qualify to participate at this time, you will receive a five-dollar (\$5.00) gift card to thank you for your time, interest, and inconvenience. If you do qualify for the rest of the study, you will receive a ten-dollar (\$10.00) gift card upon completion of the questionnaires to thank you for your participation. If you qualify for the study but for some reason do not complete the required questionnaires, you will only receive the five-dollar (\$5.00) gift card for your time and effort. The funds will be available to you immediately and can be used at your discretion; however if you lose your gift card there will be no replacement.

How will my information be protected?

All data obtained in this study will be kept confidential and only available to the investigator. Your individual information will not be reported, only the combined results of all participants as a group will be used. These questionnaires will have no personal information about you.

How will my privacy be protected?

We have to follow rules to protect information about you, including federal and state laws and federal medical privacy rules. By signing this form, you provide your permission to access your information, also called “authorization” for the use and

disclosure of information protected by the privacy rules. The researcher will collect information from you, including things learned from the questionnaires described in this consent form and information from your medical record such as other illnesses, insurance status, and current health status that will only be reported as group data. The researcher will also collect other information including your name, address, date of birth, phone number or other contact information but this information will only be kept and used to contact you at 2 weeks and 4 weeks after discharge and then destroyed. The investigator will know your identity and that you are participating in the research study. However, only the people identified in this form will have access to the study data and no one but the investigator will have access to the master list that links your name to the data. People outside of HCPC, such as members of my research committee at UTMB, may view the data from this study, but will not have access to the master list that links your identification number with your name.

The investigator cannot perform this study without your authorization to use your information. You do not have to give your authorization. If you do not, then you cannot participate in this study. The investigator will use and disclose the study data only as described in this form; however, people outside HCPC who receive the data may not be covered by this promise or by federal privacy rules. The investigator will try to make sure that everyone who needs to see the data keeps it confidential but cannot guarantee that the data will not be re-disclosed.

The use of your identity information will be limited to the duration of this study, and only until data collection is complete. All of your personal identifying information will be destroyed at the end of the study. You may revoke (cancel) your agreement to use and disclose your information at any time by notifying the researcher by phone or in writing. If you contact the investigator by phone, you must follow up with a written request and your contact information. The researcher's name, address, phone, and email address are included on the first page of this consent form. If you cancel your authorization to use and disclose your information, your participation in this study will end and no further information about you will be collected. Your revocation (cancellation) will not affect information already collected or information you disclosed before you notified the investigator that you wanted to cancel your authorization.

PLEASE INDICATE YOUR AUTHORIZATION BELOW:

I specifically authorize the access and use of my private health information including information about psychiatric and other health conditions for the above-described purposes. Initial: _____

Who can I contact with questions about this research study?

If you have any questions, concerns, or complaints before, during, or after the study, or if you need to report any project-related adverse effect, you may contact Edna Lewin at 713-534-3204.

This study has been approved by the UTMB Institutional Review Board (IRB), the HCPC Research Committee and the UT-Houston Institutional Review Board (IRB). If you have any complaints, concerns, input, or questions regarding your rights as a participant in this research study or if you would like more information about the protection of human

subjects in research, you may contact the UTMB IRB Office at 409-266-9475 or irb@utmb.edu.

CONSENT TO PARTICIPATE:

The purpose of this research study, procedure to be followed, risks, and benefits have been explained to me. I have been given the opportunity to ask questions and my questions have been answered to my satisfaction. I have been told who to contact if I have additional questions. By signing this form, I am confirming that I have read this consent form and voluntarily agree to participate in this study.

Patient Signature

Date

Using language that is understandable and appropriate, I have discussed this project and the items listed above with the patient.

Signature of Person Obtaining Consent

Date

Time



University of Texas Health Science Center at Houston/Memorial Hermann Healthcare System

INFORMED CONSENT FORM TO TAKE PART IN RESEARCH

PROTOCOL TITLE: Health Literacy and Psychiatric Hospital Readmissions

HSC-SN-16-0744

Adult

INVITATION TO TAKE PART

You are invited to take part in a research project called "Health Literacy and Psychiatric Hospital Readmissions" conducted by Edna Lewin of University of Texas Health Science Center at Houston (UTHealth) and The University of Texas Medical Branch at Galveston (UTMB-Galveston). For this research project, she will be called the Principal Investigator or PI.

Your decision to take part is voluntary. You may refuse to take part or choose to stop taking part, at any time. A decision not to take part or to stop being a part of the research project will not change the services available to you from HCPC staff nor with the University of Texas Health Science Center at Houston (UTHealth).

You may refuse to answer any questions asked or written on any forms. This research project has been reviewed by the Committee for the Protection of Human Subjects (CPHS) of the University of Texas Health Science Center at Houston as
HSC_____

PURPOSE

The purpose of this pilot study (small study) is to examine the levels of health literacy in adult patients diagnosed with bipolar disorder. Health literacy is, "The ability to obtain, process and understand basic health information and services needed to make appropriate health decisions." This small study will also examine whether your ability to find and use health information affects the number of times you need to return to the hospital for psychiatric care. It will also help us determine how we can best conduct a larger study in the same manner. You have been invited to join this research study because you are diagnosed with bipolar disorder, you are between the ages of 21 and 65 years and you read and understand English.

This is a local study with one location (HCPC). The study will enroll a total of 25 to 30 people. The PI is paying twenty dollars to individuals who are eligible and complete all aspects of the study.

PROCEDURES

This study does not include any invasive procedures. If you agree to participate, you will be asked to sign this consent form and to do the following:

- Complete a mental status evaluation to make sure you are able to complete the study questionnaires.

If you qualify for the rest of the study, you will be asked to do the following:

- Complete a demographic data sheet.
- Fill out 2 short questionnaires called “The Short Test of Functional Literacy in Adults,” and the “Multidimensional Scale of Perceived Social Support.” The Short Test of Functional Literacy in Adults has 36 questions and takes approximately seven minutes, and the Multidimensional Scale of Perceived Social Support consists of 12 questions and takes approximately three to five minutes to complete.
- Sign a form giving the investigator permission to access your medical information and contact you by telephone two times after you are discharged: Once after two weeks and again at four weeks after your discharge from the hospital. At that time, all we will ask you is whether you have had to return to any kind of hospital or other facility for your bipolar depression since you were discharged, and when and where that was.

PROCEDURE

Procedure	Visit #1	2-Weeks After Discharge	4-Weeks After Discharge	After 4-Weeks
Explaining of the Study	X			
Consent Process	X			
Consent Signing	X			
Screening (MMSE)	X			
Completing Questionnaires	X			
Follow-up Calls		X	X	
Collect Compensation				X

TIME COMMITMENT

The total estimated time for screening, filling out the demographic data sheet, completion of two questionnaires, and the two telephone calls, is approximately one hour and thirty minutes at most for the entire study.

BENEFITS

If you agree to participate in this study, you will not receive any direct benefits, but we hope the information learned from this study will benefit future patients diagnosed with bipolar disorder.

RISKS AND/OR DISCOMFORTS

There is minimal physical risk of participation. You may feel tired or mild exhaustion from answering the questionnaires. You may also experience mild anxiety caused by sharing your information with a stranger and concerns about the use of your demographic information.

FEMALE: Being part of this study while pregnant will not expose the unborn child to any risks. Therefore, pregnant women will be included in the study.

MALE: Your taking part in this research study will not damage your sperm, and will not cause harm to a child that you may father while in this study.

The research will not hurt an embryo or fetus based on our current knowledge.

There is no blood draw in this study.

Confidentiality: All data obtained in this study will be kept confidential and only available to the investigator. Your individual information will not be reported, only the combined results of all participants as a group will be used. These questionnaires will have no personal information about you. The researcher will maintain your confidentiality by using a random code to identify your data instead of your name. A master list will be maintained to make sure that all your data is correctly linked and then destroyed after the final telephone call. Maximum precautions will be taken to protect your confidentiality, but there is always a minimal risk that confidentiality will be breached.

Questionnaire: You may get tired when we are asking you questions or you are completing questionnaires. You do not have to answer any questions you do not want to answer.

ALTERNATIVES

There is no treatment involved in this study. All the questionnaires you will fill out are for the purposes of this study only. Nothing will be entered into your medical chart.

Your data will be deidentified so that it will be impossible to identify you. The alternative is not to participate in the study.

STUDY WITHDRAWAL

Your decision to take part is voluntary. You may decide to stop taking part in the study at any time. A decision not to take part or to stop being a part of the research project will not change the services available to you from HCPC and the hospital staff.

Also, there may be instances where the PI may withdraw you from the research study. They include not meeting the criteria at the time of screening. They will explain to you the procedures to allow you to stop taking part in the research study in the safest manner. If you cancel your authorization to use and disclose your information, your participation in this study will end and no further information about you will be collected. Your revocation (cancellation) will not affect information already collected or information you disclosed before you notified the PI that you wanted to cancel your authorization.

COSTS, REIMBURSEMENT AND COMPENSATION

If you decide to take part in this research study, you will not incur any additional costs. If you agree to participate in the study and qualify to participate you will receive a twenty-dollar (\$20.00) gift card at the completion of the study to thank you for your participation. The funds will be available to you after the second phone call at the end of four weeks after your discharge from HCPC and can be used at your discretion; however, if you lose your gift card there will be no replacement. The gift card will be available for you with proper ID and signature at the HCPC front desk after your 4-week follow-up call.

If you receive a bill that you believe is related to your taking part in this research study, please contact Edna M. Lewin, at 713 634 3204 or the research coordinator at 713 741 8655 with any questions.

CONFIDENTIALITY

Please understand that representatives of the University of Texas Health Science Center at Houston, The University of Texas Medical Branch at Galveston and the PI of this research may review your research and/or medical records for the purposes of verifying research data, and will see personal identifiers. However, identifying information will not appear on records retained by the PI, with the exception of your date of birth, your initials, and treatment/service dates. You will not be personally identified in any reports or publications that may result from this study. There is a separate section in this consent form that you will be asked to sign which details the use and disclosure of your protected health information.

Conflict of Interest: There is no conflict of interest to declare.

QUESTIONS

If you have questions at any time about this research study, please feel free to contact the PI Edna M. Lewin at 713 534 3204 or study coordinator Allison Engstrom at 713 741 8655, as they will be glad to answer your questions. You can contact the study team to discuss problems, voice concerns, obtain information, and offer input in addition to asking questions about the research.

**AUTHORIZATION TO USE AND DISCLOSE
PROTECTED HEALTH INFORMATION FOR RESEARCH
UT HEALTH AND/OR MEMORIAL HERMANN HEALTHCARE SYSTEM**

PATIENT NAME: _____

Protocol Number and Title: *HSC-SN-16-0744; Health Literacy and Psychiatric Hospital Readmissions.*

Principal Investigator: *Edna M. Lewin RN MSN, PMH-CNS-BC*

If you sign this document, you give permission to The University of Texas Health Science Center at Houston AND The University of Texas Medical Branch at Galveston permission to use or disclose (release) your health information that identifies you for the research study named above.

The health information that we may use or disclose (release) for this research includes your medical and psychiatric diagnoses, age, your dates of service, insurance status, marital status, education, ethnicity, employment status. The health information listed above may be used by and/or disclosed (released) to researchers, coordinators and supervisors. The researchers may disclose information to employees at The University of Texas Health Science Center at Houston and The University of Texas Medical Branch at Galveston for the purposes of verifying research records. The researchers may also disclose information to the following entity:

- Data Safety Monitoring Board

The University of Texas Health Science Center at Houston and The University of Texas Medical Branch at Galveston are required by law to protect your health information. By signing this document, you authorize The University of Texas Health Science Center at Houston and The University of Texas Medical Branch at Galveston to use and/or disclose (release) your health information for this research. Those persons who receive your health information may not be required by Federal privacy laws (such as the Privacy Rule) to protect it and may share your information with others without your permission, if permitted by laws governing them.

If all information that does or can identify you is removed from your health information, the remaining information will no longer be subject to this authorization and may be used or disclosed for other purposes. No publication or public presentation about the research described above will reveal your identity without another authorization from you.

Please note that health information used and disclosed may include information relating to HIV infection; treatment for or history of drug or alcohol abuse; or mental or behavioral health or psychiatric care. In case of an adverse event related to or resulting from taking part in this study, you give permission to the researchers involved in this research to access test, treatment and outcome information related to the adverse event from the treating facility.

Please note that you do not have to sign this Authorization, but if you do not, you may not participate in this research study. The University of Texas Health Science Center at

Houston/HCPC and The University of Texas Medical Branch at Galveston may not withhold treatment or refuse treating you if you do not sign this Authorization. You may change your mind and revoke (take back) this Authorization at any time. Even if you revoke this Authorization, researchers may still use or disclose health information they already have obtained about you as necessary to maintain the integrity or reliability of the current research. To revoke this Authorization, you must write to:

PI Name: Edna M. Lewin
The University of Texas Health Science Center at
Houston
Address: 6901 Bertner Ave. 7th Floor
Houston, Texas 77030-3901
PI Fax: 281-372 8752

OR

PI: Edna M. Lewin
The University of Texas Medical Branch at
Galveston
School of Nursing
301 University Blvd.
Galveston, Texas 77555

AND

Privacy Officer
Memorial Hermann Healthcare System
909 Frostwood
Houston, Texas 77074
Fax: 713-338-4542

This Authorization will expire six (6) years after the end of the study.

SIGNATURES

Sign below only if you understand the information given to you about the research and you choose to take part. Make sure that any questions have been answered and that you understand the study. If you have any questions or concerns about your rights as a research subject, call the Committee for the Protection of Human Subjects at (713) 500-7943. You may also call the Committee if you wish to discuss problems, concerns, and questions; obtain information about the research; and offer input about current or past participation in a research study. If you decide to take part in this research study, a copy of this signed consent form will be given to you.

Printed Name of Subject	Signature of Subject	Date	
Printed Name of Legally Authorized Representative	Signature of Legally Authorized Representative	Date	Time
Printed Name of Person Obtaining Informed Consent	Signature of Person Obtaining Informed Consent	Date	Time

CPHS STATEMENT: This study (HSC-SN- 16-0744) has been reviewed by the Committee for the Protection of Human Subjects (CPHS) of the University of Texas Health Science Center at Houston. For any questions about research subject's rights, or to report a research-related injury, call the CPHS at (713) 500-7943.

Appendix B: Mini Mental Status Examination

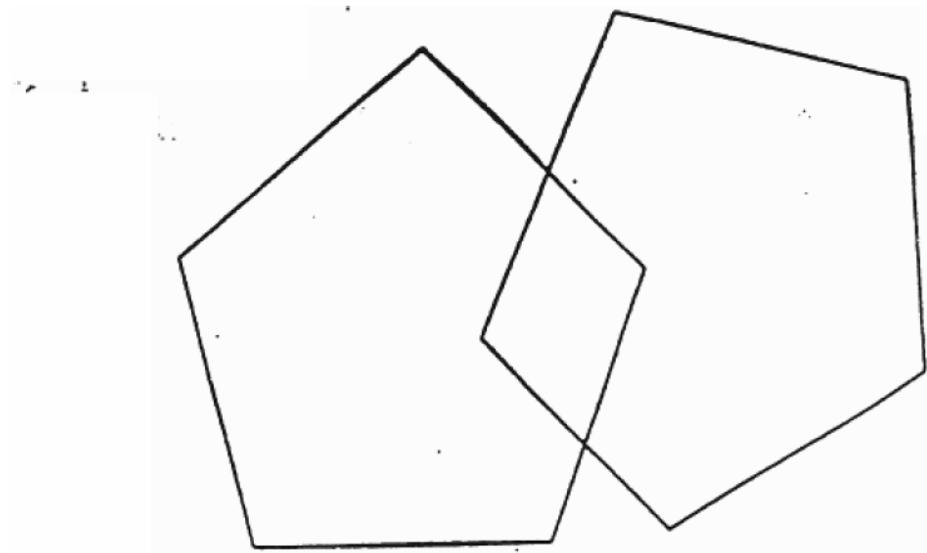
Folstein Mini-Mental State Exam			
I. ORIENTATION (Ask the following questions; correct = <input checked="" type="checkbox"/>)		Record Each Answer:	
What is today's date?	Date (eg, May 21)	(Maximum Score = 10) 1 <input type="checkbox"/>	
What is today's year?	Year	1 <input type="checkbox"/>	
What is the month?	Month	1 <input type="checkbox"/>	
What day is today?	Day (eg, Monday)	1 <input type="checkbox"/>	
Can you also tell me what season it is?	Season	1 <input type="checkbox"/>	
Can you also tell me the name of this hospital/clinic?	Hospital/Clinic	1 <input type="checkbox"/>	
What floor are we on?	Floor	1 <input type="checkbox"/>	
What city are we in?	City	1 <input type="checkbox"/>	
What county are we in?	County	1 <input type="checkbox"/>	
What state are we in?	State	1 <input type="checkbox"/>	
II. IMMEDIATE RECALL		(correct = <input checked="" type="checkbox"/>)	
Ask the subject if you may test his/her memory. Say "ball," "flag," "tree" clearly and slowly, about one second for each. Then ask the subject to repeat them. Check the box at right for each correct response. The first repetition determines the score. If he/she does not repeat all three correctly, keep saying them up to six tries until he/she can repeat them		Ball	1 <input type="checkbox"/>
		Flag	1 <input type="checkbox"/>
		Tree	1 <input type="checkbox"/>
III. ATTENTION AND CALCULATION			
A. Counting Backwards Test		(Record each response, correct = <input checked="" type="checkbox"/>)	
Ask the subject to begin with 100 and count backwards by 7. Record each response. Check one box at right for each correct response. Any response 7 or less than the previous response is a correct response. The score is the number of correct subtractions. For example, 93, 86, 80, 72, 65 is a score of 4; 93, 86, 78, 70, 62, is 2; 92, 87, 78, 70, 65 is 0.		93	1 <input type="checkbox"/>
		86	1 <input type="checkbox"/>
		79	1 <input type="checkbox"/>
		72	1 <input type="checkbox"/>
		65	1 <input type="checkbox"/>
B. Spelling Backwards Test			
Ask the subject to spell the word "WORLD" backwards. Record each response. Use the instructions to determine which are correct responses, and check one box at right for each correct response.		D	1 <input type="checkbox"/>
		L	1 <input type="checkbox"/>
		R	1 <input type="checkbox"/>
C. Final Score		O	1 <input type="checkbox"/>
Compare the scores of the Counting Backwards and Spelling Backwards tests. Write the greater of the two scores in the box labeled FINAL SCORE at right, and use it in deriving the TOTAL SCORE .		W	1 <input type="checkbox"/>

IV. RECALL	(correct = <input checked="" type="checkbox"/>)	(Maximum Score = 3)
Ask the subject to recall the three words you previously asked him/her to remember. Check the Box at right for each correct response.	Ball <input type="checkbox"/> Flag <input type="checkbox"/> Tree <input type="checkbox"/>	1 <input type="checkbox"/> 1 <input type="checkbox"/> 1 <input type="checkbox"/>
V. Language	(correct = <input checked="" type="checkbox"/>)	(Maximum Score = 9)
Naming	Watch <input type="checkbox"/>	1 <input type="checkbox"/>
Show the subject a wrist watch and ask him/her what it is. Repeat for a pencil.	Pencil <input type="checkbox"/>	1 <input type="checkbox"/>
Repetition		
Ask the subject to repeat "No, ifs, ands, or buts."	Repetition <input type="checkbox"/>	1 <input type="checkbox"/>
Three -Stage Command		
Establish the subject's dominant hand. Give the subject a sheet of blank paper and say, "Take the paper in your right/left hand, fold it in half and put it on the floor."	Takes paper in hand <input type="checkbox"/> Folds paper in half <input type="checkbox"/> Puts paper on floor <input type="checkbox"/>	1 <input type="checkbox"/> 1 <input type="checkbox"/> 1 <input type="checkbox"/>
Reading		
Hold up the card that reads, "Close your eyes." So the subject can see it clearly. Ask him/her to read it and do what it says. Check the box at right only if he/she actually closes his/her eyes.	Closes eyes <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/>
Writing		
Give the subject a sheet of blank paper and ask him/her to write a sentence. It is to be written spontaneously. If the sentence contains a subject and a verb, and is sensible, check the box at right. Correct grammar and punctuation are not necessary.	Writes sentence <input type="checkbox"/>	1 <input type="checkbox"/>
Copying		
Show the subject the drawing of the intersecting pentagons. Ask him/her to draw the pentagons (about one inch each side) on the paper provided. If ten angles are present and two intersect, check the box at right. Ignore tremor and rotation.	Copies pentagons <input type="checkbox"/> <input type="checkbox"/>	1 <input type="checkbox"/>

DERIVING THE TOTAL SCORE

Add the number of correct responses. The maximum is 30.	TOTAL SCORE _____
23-30 = Normal / 19-23 = Borderline / <19 = Impaired	Up to Grade 8 Level

Folstein MF, Folstein SE, and McHugh PR, 1975



Appendix C: Demographic Data Sheet

Demographic Data Sheet

PI: Edna M. Lewin IRB # UTMB:-16-0237; UT-HSC SN: 16-0744

TITLE: Health Literacy and Psychiatric Hospital Readmission

Please provide the information that best describes you

Your Full Name: _____ **ID:** _____
GENDER: _____ Female _____ Male _____ **Your Date of Birth:** _____

Address:		Unit #:
City: _____	State: _____	Zip: _____
Phone Number: _____	Alternate Phone Number: _____	Email address: _____
<input type="checkbox"/> Home <input type="checkbox"/> Work <input type="checkbox"/> Cell <input type="checkbox"/> Other	<input type="checkbox"/> Home <input type="checkbox"/> Work <input type="checkbox"/> Cell <input type="checkbox"/> Other	
Preferred method of contact: _____		

Emergency Contact:

Name: _____		Unit #: _____
Address:		Zip: _____
City: _____	State: _____	Email address: _____
Phone Number: _____	Alternate Phone Number: _____	
<input type="checkbox"/> Home <input type="checkbox"/> Work <input type="checkbox"/> Cell <input type="checkbox"/> Other	<input type="checkbox"/> Home <input type="checkbox"/> Work <input type="checkbox"/> Cell <input type="checkbox"/> Other	
Preferred method of contact: _____		

MARITAL STATUS: _____ Single _____ Married/Living with Other _____ Divorced

_____ Separated _____ Widowed

EMPLOYMENT STATUS: _____ Employed _____ Unemployed _____ Retired _____

ETHNICITY: _____ Hispanic or Latino _____ Not Hispanic or Latino

RACIAL GROUPS:

_____ American Indian or Alaskan native

_____ Asian

_____ Black or African American

_____ Native Hawaiian or Other Pacific Islander

_____ White

OTHER _____

EDUCATION: _____ Grade School _____ High School _____ GED _____ Some College

_____ Associates Degree _____ Bachelors Degree _____ Masters Degree _____ Doctorate/Other

With whom do you live? _____

Do you have Health Insurance? _____

Do you have any physical illness (e.g. Diabetes, High Blood Pressure, Heart Disease, Cancer)? _____

If yes; what is the names of the illness? _____

How long have you been diagnosed with this illness? _____

How long have you been diagnosed with mental illness? _____

Appendix D: Follow-Up Information Sheet

INITIALS

--	--	--

ID

--	--	--

--	--

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--	--

Month

Day

Year

Two-Week and Four-Week Telephone Contact

Telephone contact not performed

If Telephone contact not performed, Indicate in the comment section

	Date of Contact Attempt			Time	Contact Occurred	Outcome
	Month (MO)	Day (DD)	Year (YYYY)			
Contact Attempt #1				<input type="checkbox"/> ¹ AM <input type="checkbox"/> ² PM	<input type="checkbox"/> ¹ Yes <input type="checkbox"/> ⁰ No	<input type="checkbox"/> ¹ No answer <input type="checkbox"/> ² Left Voice message <input type="checkbox"/> ³ Left Message w/ <input type="checkbox"/> ⁴ Line Busy <input type="checkbox"/> ⁵ Other: _____
Contact Attempt #2				<input type="checkbox"/> ¹ AM <input type="checkbox"/> ² PM	<input type="checkbox"/> ¹ Yes <input type="checkbox"/> ⁰ No	<input type="checkbox"/> ¹ No answer <input type="checkbox"/> ² Left Voice message <input type="checkbox"/> ³ Left Message w/ <input type="checkbox"/> ⁴ Line Busy <input type="checkbox"/> ⁵ Other: _____
Contact Attempt #3				<input type="checkbox"/> ¹ AM <input type="checkbox"/> ² PM	<input type="checkbox"/> ¹ Yes <input type="checkbox"/> ⁰ No	<input type="checkbox"/> ¹ No answer <input type="checkbox"/> ² Left Voice message <input type="checkbox"/> ³ Left Message w/ <input type="checkbox"/> ⁴ Line Busy <input type="checkbox"/> ⁵ Other: _____
Contact Attempt #4				<input type="checkbox"/> ¹ AM <input type="checkbox"/> ² PM	<input type="checkbox"/> ¹ Yes <input type="checkbox"/> ⁰ No	<input type="checkbox"/> ¹ No answer <input type="checkbox"/> ² Left Voice message <input type="checkbox"/> ³ Left Message w/ <input type="checkbox"/> ⁴ Line Busy <input type="checkbox"/> ⁵ Other: _____

Date telephone contact completed:
Month Day Year

/

--	--

--	--

--	--

Telephone Contact (continued)

TWO-WEEK FOLLOW-UP DUE DATE _____
FOUR-WEEK FOLLOW-UP DUE DATE _____

QUESTION(S) TO BE ASKED	Form No.	
Since your last study contact, have you had any changes in health status?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Was there any Psychiatric Hospitalization?		<input type="checkbox"/> Yes <input type="checkbox"/> No
To which Hospital were you admitted?		
What date were you admitted?		
Were there Psychiatric Emergency Visit?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Which emergency Department did you visit?		
When was your Emergency Department Visit?		
Did you have a new Medical diagnosis /Conditions?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Were you hospitalized for this condition?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Which Hospital were you admitted for the medical condition?		
When were you hospitalized for this visit?		<input type="checkbox"/> Yes <input type="checkbox"/> No
How are you doing/feeling now?		<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No
Subject payment confirmed		<input type="checkbox"/> Yes <input type="checkbox"/> No
		<input type="checkbox"/> Yes <input type="checkbox"/> No

COMMENTS:

TELEPHONE CONTACT CONDUCTED BY: _____

FORM COMPLETED BY: _____ **DATE:** _____

Appendix E: TOFHLA



Test of Functional Health Literacy in Adults

Short Test of Functional Health Literacy in Adults (STOFHLA)

**STOFHLA
Large Print Version
English, 14 point font**

Short Test of Functional Literacy in Adults
STOFHLA
READING COMPREHENSION

**HAND PATIENT THE READING COMPREHENSION PASSAGES TO BE
COMPLETED. FOLD BACK THE PAGE OPPOSITE THE TEXT SO THAT THE
PATIENT SEES ONLY THE TEXT.**

PREFACE THE READING COMPREHENSION EXERCISE WITH:

"Here are some other medical instructions that you or anybody might see around the hospital. These instructions are in sentences that have some of the words missing. Where a word is missing, a blank line is drawn, and 4 possible words that could go in the blank appear just below it. I want you to figure out which of those 4 words should go in the blank, which word makes the sentence make sense. When you think you know which one it is, circle the letter in front of that word, and go on to the next one. When you finish the page, turn the page and keep going until you finish all the pages."

STOP AT THE END OF 7 MINUTES

PASSAGE A: X-RAY PREPARATION

PASSAGE B: MEDICAID RIGHTS AND RESPONSIBILITIES

PASSAGE A

Your doctor has sent you to have a _____ X-ray.

- a. stomach
- b. diabetes
- c. stitches
- d. germs

You must have an _____ stomach when you come for _____.

- | | |
|-----------|--------|
| a. asthma | a. is. |
| b. empty | b. am. |
| c. incest | c. if. |
| d. anemia | d. it. |

The X-ray will _____ from 1 to 3 _____ to do.

- | | |
|---------|-----------|
| a. take | a. beds |
| b. view | b. brains |
| c. talk | c. hours |
| d. look | d. diets |

THE DAY BEFORE THE X-RAY.

For supper have only a _____ snack of fruit, _____ and jelly,

- | | |
|-----------|-----------|
| a. little | a. toes |
| b. broth | b. throat |
| c. attack | c. toast |
| d. nausea | d. thigh |

with coffee or tea.

After _____, you must not _____ or drink

- | | |
|--------------|----------|
| a. minute, | a. easy |
| b. midnight, | b. ate |
| c. during, | c. drank |
| d. before, | d. eat |

anything at _____ until after you have _____ the X-ray.

- | | |
|---------|--------|
| a. ill | a. are |
| b. all | b. has |
| c. each | c. had |
| d. any | d. was |

THE DAY OF THE X-RAY.

Do not eat _____.

- a. appointment.
- b. walk-in.
- c. breakfast.
- d. clinic.

Do not _____, even _____.

- | | |
|-----------|------------|
| a. drive, | a. heart. |
| b. drink, | b. breath. |
| c. dress, | c. water. |
| d. dose, | d. cancer. |

If you have any _____, call the X-ray _____ at 616-4500.

- | | |
|---------------|---------------|
| a. answers, | a. Department |
| b. exercises, | b. Sprain |
| c. tracts, | c. Pharmacy |
| d. questions, | d. Toothache |

PASSAGE B

I agree to give correct information to _____ if I can receive Medicaid.

- a. hair
- b. salt
- c. see
- d. ache

I _____ to provide the county information to _____ any

- a. agree
- b. probe
- c. send
- d. gain
- a. hide
- b. risk
- c. discharge
- d. prove

statements given in this _____ and hereby give permission to

- a. emphysema
- b. application
- c. gallbladder
- d. relationship

the _____ to get such proof. I _____ that for

- a. inflammation
- b. religion
- c. iron
- d. county
- a. investigate
- b. entertain
- c. understand
- d. establish

Medicaid I must report any _____ in my circumstances

- a. changes
- b. hormones
- c. antacids
- d. charges

within _____ (10) days of becoming _____ of the change.

- | | |
|----------|----------|
| a. three | a. award |
| b. one | b. aware |
| c. five | c. away |
| d. ten | d. await |

I understand _____ if I DO NOT like the _____ made on my

- | | |
|---------|---------------|
| a. thus | a. marital |
| b. this | b. occupation |
| c. that | c. adult |
| d. than | d. decision |

case, I have the _____ to a fair hearing. I can _____ a

- | | |
|-----------|------------|
| a. bright | a. request |
| b. left | b. refuse |
| c. wrong | c. fail |
| d. right | d. mend |

hearing by writing or _____ the county where I applied.

- | |
|-------------|
| a. counting |
| b. reading |
| c. calling |
| d. smelling |

If you _____ TANF for any family _____, you will have to

- | | |
|----------|--------------|
| a. wash | a. member, |
| b. want | b. history, |
| c. cover | c. weight, |
| d. tape | d. seatbelt, |

_____ a different application form. _____, we will use

- | | |
|-----------|-------------|
| a. relax | a. Since, |
| b. break | b. Whether, |
| c. inhale | c. However, |
| d. sign | d. Because, |

the _____ on this form to determine your _____.

- | | |
|-----------|-------------------|
| a. lung | a. hypoglycemia. |
| b. date | b. eligibility. |
| c. meal | c. osteoporosis. |
| d. pelvic | d. schizophrenia. |

Short Test of Functional Health Literacy in Adults (STOFHLA)

Joanne R. Nurss, Ph.D., Ruth M. Parker, M.D., Mark V. Williams, M.D., & David W. Baker, M.D., M.P.H.

TOFHLA is a measure of the patient's ability to read and understand health care information, their functional health literacy. TOFHLA Numeracy assesses their understanding of prescription labels, appointment slips, and glucose monitoring. TOFHLA Reading Comprehension assesses their understanding of health care texts such as preparation for a diagnostic procedure and Medicare Rights & Responsibilities.

Date ____ / ____ / ____

Name _____ M ____ F

Birthdate ____ / ____ / ____ Age ____ SSN or ID# _____

Hospital or Health-care Setting _____

City, State _____

Short Form Administered: ____ English ____ Spanish

STOFHLA - Score

TOFHLA Total Score:
Reading Comprehension Raw Score (0-36)

Functional Health Literacy Level:

0 - 16 -- Inadequate Functional Health Literacy

17 - 22 -- Marginal Functional Health Literacy

23 - 36 -- Adequate Functional Health Literacy

July 1995
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Appendix F: Multidimensional Scale of Perceived Social Support (MSPSS)

Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet & Farley, 1988)

Instructions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

Circle the “1” if you **Very Strongly Disagree**
Circle the “2” if you **Strongly Disagree**
Circle the “3” if you **Mildly Disagree**
Circle the “4” if you are **Neutral**
Circle the “5” if you **Mildly Agree**
Circle the “6” if you **Strongly Agree**
Circle the “7” if you **Very Strongly Agree**

- | | | | | | | | | |
|---|---|---|---|---|---|---|---|-----|
| 1. There is a special person who is around when I am in need. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SO |
| 2. There is a special person with whom I can share my joys and sorrows. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SO |
| 3. My family really tries to help me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Fam |
| 4. I get the emotional help and support I need from my family. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Fam |
| 5. I have a special person who is a real source of comfort to me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SO |
| 6. My friends really try to help me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Fri |
| 7. I can count on my friends when things go wrong. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Fri |
| 8. I can talk about my problems with my family. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Fam |
| 9. I have friends with whom I can share my joys and sorrows. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Fri |
| 10. There is a special person in my life who cares about my feelings. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | SO |
| 11. My family is willing to help me make decisions. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Fam |
| 12. I can talk about my problems with my friends. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Fri |

The items tended to divide into factor groups relating to the source of the social support, namely family (Fam), friends (Fri) or significant other (SO).

Appendix G: Supplementary Tables

Table G 1: Chi Square Analysis of Total Sample

Variables	χ^2	(df, n)	P-Value
HL * Living Arrangement	.103	(1, 28)	1.00
HL* Education	1.26	(1, 28)	.372
HL* 4-Week Readmissions	3.80	(1,28)	.214
HL*2-Week Readmission	4.08	(1, 28)	.043*
HL * Marital Status	.085	(1, 28)	.771*
HL* Insurance	.643	(1, 28)	.581
HL* Employment	.283	(1, 28)	1.00
HL* Gender	.526	(1,28)	.655
HL*Ethnicity	2.14	(1, 28)	.144*
Living Arrangement*Education	.404	(1,28)	.663
Living Arrangement* Ethnicity	.202	(1,29)	1.00
Living Arrangement *Employment	.326	(1,29)	1.00
Living Arrangement * Gender	1.02	(1, 29)	.390
Living Arrangement *Insurance	.349	(1,29)	.612
Living Arrangement*Marital Status	.125	(1,29)	1.00
Living Arrangement* 2-Week Readmission	.873	(1, 29)	.585
Living Arrangement* 4-Week Readmission	.270	(1,29)	1.00
Education * Marital Status	1.34	(1, 29)	.406
Education*Ethnicity	.221	(1, 29)	.638*
Education* Employment	.179	(1,29)	1.00
Education * Gender	1.66	(1, 29)	.198*
Education * Insurance	.014	(1, 29)	1.00
Education* 2-Week Readmission	.645	(1, 29)	.573
Education* 4-Week Readmission	.842	(1, 29)	1.00
Ethnicity* Employment	.739	(1,30)	.565
Ethnicity * Insurance	.197	(1, 30)	.698
Ethnicity * Gender	.621	(1, 30)	.484
Ethnicity * Marital Status	.782	(1, 30)	.443
Ethnicity * 2-Week Readmission	.136	(1,30)	1.00
Ethnicity * 4-Week Readmission	.791	(1,30)	1.00
Gender* Insurance	1.10	(1,30)	.417
Gender*Marital Status	.408	(1,30)	.694
Gender*2-Week Readmission	2.92	(1,30)	.228
Gender* 4-Week Readmission	.905	(1,30)	1.00
Insurance* Marital Status	2.10	(1,30)	.195
Insurance*2-Week Readmission	1.21	(1,30)	.545
Insurance * 4-Week readmission	2.85	(1,30)	.267
Employment*Gender	.238	(1,30)	1.00
Employment*Insurance	.076	(1,30)	1.00
Employment*Marital Status	.018	(1,30)	1.00
2-Week Readmission*Marital Status	.018	(1,30)	1.00
4-Week Readmission*marital Status	.443	(1,30)	1.00
2-Week *4-Week Readmission	.115	(1,30)	1.00

*Not Fisher Exact

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Vita

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