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Emergency Department Psychiatric Assessment for Adults Discharged With a Principal Diagnosis of Schizophrenia in Maryland Community Hospitals With and Without inpatient Psychiatric Units

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Comments

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EMERGENCY DEPARTMENT PSYCHIATRIC ASSESSMENT FOR ADULTS DISCHARGED WITH
A PRINCIPAL DIAGNOSIS OF SCHIZOPHRENIA IN MARYLAND COMMUNITY HOSPITALS
WITH AND WITHOUT INPATIENT PSYCHIATRIC UNITS

Patricia A. White

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in

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Presented to the Faculties of the University of Pennsylvania

in

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Degree of Doctor of Philosophy

2011

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Patricia A. White

DEDICATION

This dissertation is dedicated to my husband, Dr. Gene D. White, Jr., whose unconditional love and support encouraged and sustained me throughout this process.

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I am forever indebted to my Chair, Dr. Ann L. O'Sullivan, for her steadfast support and encouragement. This dissertation would not have been possible without her leadership. I am also grateful to my Committee members, Drs. Lois Evans and Matthew McHugh, for sharing their time and expertise.

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Finally, I would like to remember my late father, William J. Morris, whose encouragement and belief in my abilities instilled in me a desire to succeed. This dissertation represents yet another successful outcome as a result of his guidance.

ABSTRACT

EMERGENCY DEPARTMENT PSYCHIATRIC ASSESSMENT FOR ADULTS
DISCHARGED WITH A PRINCIPAL DIAGNOSIS OF SCHIZOPHRENIA IN
MARYLAND COMMUNITY HOSPITALS WITH AND WITHOUT INPATIENT
PSYCHIATRIC UNITS

Patricia A. White

Ann L. O'Sullivan

For centuries, people with mental disorders in the United States (U.S.) have faced healthcare service delivery challenges. As the number of individuals with mental disorders continues to increase, the New Freedom Commission and the Institute of Medicine (IOM) have called for a restructuring of the U.S. healthcare system to meet the needs of this population. In the interim, the emergency department (ED) has become an important component of service delivery to individuals with mental disorders. As the number of individuals with mental disorders and no means to meet their healthcare needs continues to grow, costly ED use by this population also continues to rise. The American Psychiatric Association (APA) Practice Guideline for Treatment of Patients with Schizophrenia recommends a psychiatric history and mental status examination be conducted for individuals who present to the ED with mental disorders. Understanding the frequency of psychiatric assessment in the ED

for individuals with mental disorders is critical to solving the overwhelming problem of meeting service delivery challenges for this population. This cross-sectional secondary-data analysis used 2004 data from the Healthcare Cost and Utilization Project (HCUP)/ State Emergency Department Database (SEDD) and the American Hospital Association Annual Survey (AHA). Significant differences existed between the frequencies of psychiatric assessments of adults aged 18 to 64 with schizophrenia who were discharged directly from an ED in a hospital with or without an inpatient psychiatric unit (IPU). The psychiatric assessment considered was that documented as a psychiatric diagnostic interview examination (PDIE) using Current Procedural Terminology (CPT) code 90801.

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CHAPTER 1: INTRODUCTION

Since the mid-18th century, individuals with mental disorders¹ have faced service delivery challenges within the United States (U.S.) healthcare system. The first U.S. institutions constructed to provide mental health services were in Philadelphia, Pennsylvania, and Williamsburg, Virginia. The origins of general medical/primary mental health services to accept and treat those with mental disorders can be traced back to 1753 at the Pennsylvania Hospital in Philadelphia (Grob, 1994). The Eastern Lunatic Asylum in Williamsburg, Virginia, is where specialty mental health services originated in 1773, as the first state-supported mental institution in the U.S. (Dain, 1971).

More recently, a movement to "deinstitutionalize" those with mental disorders began in the U.S. (Grob, 1991). While the goal of the movement was to free persons with mental disorders from the overcrowded, unsafe, and sometimes inhumane conditions of inpatient institutional settings, many of the results have proved less than positive (Dear & Wolch, 1987). Deinstitutionalization was intended to improve quality of life for those with mental disorders and their families by moving the care and

¹ The definition of a 'mental disorder' can be found at: www.PsychiatryOnline.com (American Psychiatric Association, [APA], 2000).

treatment from the institution to the outpatient community setting (Brown, 1985). Unfortunately, plans for humane community support systems of care and treatment have never been fully actualized for this population, whose healthcare is fragmented at best, and at worst, non-existent (Castellani, 2005; Katz, 1983; New Freedom Commission on Mental Health, 2004). As the number of individuals with mental disorders and no means to meet their healthcare needs continues to grow (Brown, 1985; Castellani), costly emergency department (ED) use by this population also continues to rise (Brown, 2007; McGuire, Alegria, Cook, Wells, & Zaslavsky, 2006). Understanding the frequency of psychiatric assessment in the ED of individuals with mental disorders is critical to solving the overwhelming problem of delivering ED service to this population. Thorough assessment is essential for both proper treatment and reduction of increased morbidity and mortality related to schizophrenia (Sood & McStay, 2009). Assessment in the ED serves four purposes: to identify risk of harm for the patient or others, to establish a provisional diagnosis, or to confirm pre-existing diagnoses, and to formulate a treatment plan (American Psychiatric Association, 2004).

The *APA Practice Guideline for Treatment of Patients with Schizophrenia* (2004) recommends a psychiatric history

and mental status examination be conducted for individuals who present to the ED with psychiatric complaints. These guidelines underscore the importance of a thorough assessment for individuals with schizophrenia, especially when the client is being discharged directly from the ED rather than admitted for inpatient observation.

"Unfortunately ED physicians frequently perform less than ideal evaluations of patients presenting with psychiatric complaints" (Williams & Shepherd, 2000, p. 185).

In the 21st century, the ED has become an important component of service delivery for persons with mental disorders. At the same time, the ED has also been identified as an area facing challenges to its ability to deliver services, both to the general population and to individuals with mental disorders (Brown, 2007). These challenges emerge from two characteristics that make the ED a unique care setting. First, it never closes. Second, since passage of the Emergency Medical Treatment and Active Labor Act (EMTALA) of 1986, it is the only healthcare venue required to evaluate every individual, irrespective of presenting complaint or ability to pay (American College of Emergency Physicians, [ACEP], 2008; Kellerman & Haley, 2003). Three additional factors have the potential to increase service delivery challenges in the ED. First, the

number of adults visiting the ED, including those with mental disorders, has been on the rise since the early 1990s (Hazlett, McCarthy, Londner, & Onyike, 2004; Larkin, Claassen, Emond, Pelleier, & Camargo, 2005; McCaig & Burt, 2005). Second, providers are concerned that increased ED use by individuals with mental disorders strains resources and increases overcrowding (ACEP). Third, the number of U.S. hospitals opening freestanding EDs is growing. In 2005, one hundred fifty-four hospitals had freestanding EDs. By 2006, the number of freestanding EDs had grown to 189. This development has precipitated a debate related to the quality of care for all conditions, including mental disorders, when inpatient services and their associated resources are not available at the freestanding ED location (Bush, 2008).

In response to challenges in healthcare service delivery to individuals with mental disorders, two National reviews by the New Freedom Commission (2004) and by the Institute of Medicine [IOM] (2006) have called for restructuring of the health care delivery system for individuals with mental disorders. The New Freedom Commission "recommends fundamentally transforming how mental healthcare is delivered in America" (p. 5). One goal of this new recommendation includes "mental health

screening, assessment and referral..."(New Freedom Commission, p. 8), including assessment services such as a psychiatric diagnostic interview examination (PDIE).

This cross-sectional secondary-data analysis examined how frequently psychiatric assessment services are delivered in EDs. Before any restructuring plan can be suggested, such analysis is a necessary first step. The availability of an existing dataset permitted exploration of this question for individuals with one of the most serious of mental disorders, schizophrenia (Mechanic & Bilder, 2004; National Institute of Mental Health [NIMH], 2008). Numerous research studies have been published related to general service delivery to adults with schizophrenia (Baca-Garcia, et al., 2008; Boardman, McCann, & Clark, 2008; Daumit, Pratt, Crum, Powe, & Ford, 2002; Marshall, et al., 2001; Marshall, & Lockwood, 2007 [reprint from 1998]). Few studies focus on the services provided to this population in the ED (Callaghan, Boire, Lazo, McKenzie, & Cohn, 2009; Jensen, 2003), even though it has been reported that adults with schizophrenia tend to rely on the ED for general and mental healthcare services (McAlpine & Mechanic, 2000) to the exclusion of other venues (Carr et al., 2003; Lu, Yankos, Minsky, & Kiely, 2004). Prior to restructuring, it is necessary to

understand the frequency of two aspects of psychiatric assessment services: first, the psychiatric assessment in the ED through the use of the PDIE; and second, whether or not system and/or client characteristics have an effect on the likelihood of assessment through a PDIE for individuals with schizophrenia who present to the ED (Gordon, Billings, Asplin, & Rhodes, 2001). With an understanding of the frequency of assessment and whether client and/or system characteristics have an effect on the frequency of assessment, restructuring has the potential to result in improvements over current practice. The current state of knowledge related to psychiatric assessment in the ED was deficient in these areas. Assessments serve four purposes: to identify risk of harm for the patient or others, to establish a provisional diagnosis, or to confirm pre-existing diagnoses, and to formulate a treatment plan. When the principal diagnosis is schizophrenia, assessments are important to collect these components: to identify support systems in place; to note current treatment/s; to record factors related to cultural, environmental or social needs; and to determine the patients' ability and willingness to comply with treatment recommendations (APA, 2004). Conducting a PDIE has the potential to determine all of the aforementioned components of assessment. Due to variations

in coding in general, however, it is not known if all of the components of a PDIE were completed for every documented examination.

Study Purpose

This research assessed if the *APA Practice Guideline for Treatment of Patients with Schizophrenia (2004)* goal of assessment was met by examining whether differences exist in the frequency of psychiatric assessment of adults (aged 18 to 64 years) with schizophrenia discharged without an inpatient admission from Maryland EDs in 2004. The degree to which this goal was met was assessed in community hospitals with and without an inpatient psychiatric unit (IPU). This research also investigated the effects of selected system and client characteristics on the likelihood of psychiatric assessment.

A secondary purpose of this research was to describe selected system characteristics, including the number of EDs in hospitals with an IPU, the existence of psychiatric emergency services (PES) in a hospital, its total number of inpatient beds, its annual number of ED visits, its teaching status, its location (urban/rural), its ownership type, and its system membership. Additionally, selected client characteristics were described including age, race,

gender, co-morbidities, insurance status, and level of service of ED visits in hospitals with and without IPUs.

Specific Aims and Null Hypotheses

The specific aims and hypotheses were addressed using a merged file consisting of the HCUP/ SEDD and the AHA for Maryland in 2004.

Specific Aims

In a complete sample of Maryland community hospitals with and without an IPU that discharged a minimum of five adults with a principal diagnosis of schizophrenia, directly from the ED without an inpatient admission, in 2004:

1. Describe selected system and client characteristics of the EDs.
2. Explore if the frequency of psychiatric assessment differs for EDs in hospitals with and without IPUs.
3. Determine the effects of system and client characteristics on the likelihood of psychiatric assessment.

Null Hypothesis 1

1a: There is no difference in the system characteristics including availability of PES, total number of inpatient beds, annual number of ED visits, teaching

status, urban/rural location, ownership type, and system membership.

1b: There is no difference in the client characteristics including age, race, gender, co-morbidities, insurance status, and level of service.

Null Hypothesis 2

There is no difference in the frequency of psychiatric assessment.

Null Hypothesis 3

The system and client characteristics have no effect on the likelihood of psychiatric assessment.

Study Significance

This study found significant differences in the frequencies of PDIEs between EDs in hospitals with IPUs and EDs in hospitals without IPUs for adults discharged without an inpatient admission. This study determined that the goals of assessment according to the *APA Practice Guideline for Treatment of Patients with Schizophrenia (2004)* were rarely met.

One-hundred percent of the clients in this study were discharged directly from the ED without an inpatient admission. Of them, 60.2 percent had a documented level of service of high (99284) or highest (99285) severity, yet

only 15.7 percent of clients had a documented PDIE. That is not the quality, client-centered care the New Freedom Commission seeks. This research strongly supports the need for restructuring, beginning with a mandate for PDIE of every client discharged directly from the ED with a level of service of moderate severity or higher.

CHAPTER 2: BACKGROUND AND SIGNIFICANCE

This chapter begins with a discussion of the theoretical framework guiding this research. It then reviews the relevant literature related to psychiatric diagnostic interview examination (PDIE) and outcomes, system characteristics and outcomes, client characteristics and outcomes, epidemiology of schizophrenia, reasons individuals with schizophrenia use the emergency department (ED), psychiatric units in community hospitals, and psychiatric emergency services (PES). This chapter then defines the context of healthcare service delivery and outlines the *Practice Guideline for the Treatment of Patients with Schizophrenia*. Lastly, it identifies gaps in the existing literature.

Theoretical Framework

The Quality Health Outcomes Model (QHOM), originally developed by Mitchell and colleagues (Mitchell, Ferketich, & Jennings, 1998), guided the choice and organization of the variables to be examined in this study. The QHOM builds on the previous work of Donabedian (1966). Donabedian produced a linear model, employed for over three decades, to assess quality of care by attending to structure, process, and outcomes. The QHOM is a four-component model

that includes system characteristics, client characteristics, interventions and outcomes. While there is no direct relationship between interventions and outcomes in the QHOM, both system and client characteristics can be seen to have a bi-directional effect on interventions and outcomes (Mitchell, et al.).

System characteristics refer to the structural components of healthcare delivery. For this study, system characteristics included the availability of an inpatient psychiatric unit (IPU) and psychiatric emergency services (PES), total number of inpatient beds, annual number of ED visits, teaching status, urban/rural location, ownership type, and system membership. These system characteristics will be examined for EDs in hospitals with and without IPUs. Because this study will analyze client characteristics, it can consider the effects of demographics and level of service needs on outcomes. This study assessed the effects of client age, race, gender, comorbidities, insurance status, and level of service on the likelihood of psychiatric assessment. Interventions account for the process of care and encompass actions taken by the healthcare provider. The aims of this study did not include the examination of any interventions. The outcome of interest to this study was whether or not a PDIE was

documented (using Current Procedural Terminology [CPT] code 90801) for those adults discharged directly from an ED without an inpatient admission and with a principal diagnosis of schizophrenia. That outcome was examined for EDs in hospitals with and without an IPU. Additionally, the effects of selected system and client characteristics on the frequency of psychiatric assessment were investigated. Figure 1 displays the study in the context of the QHOM.

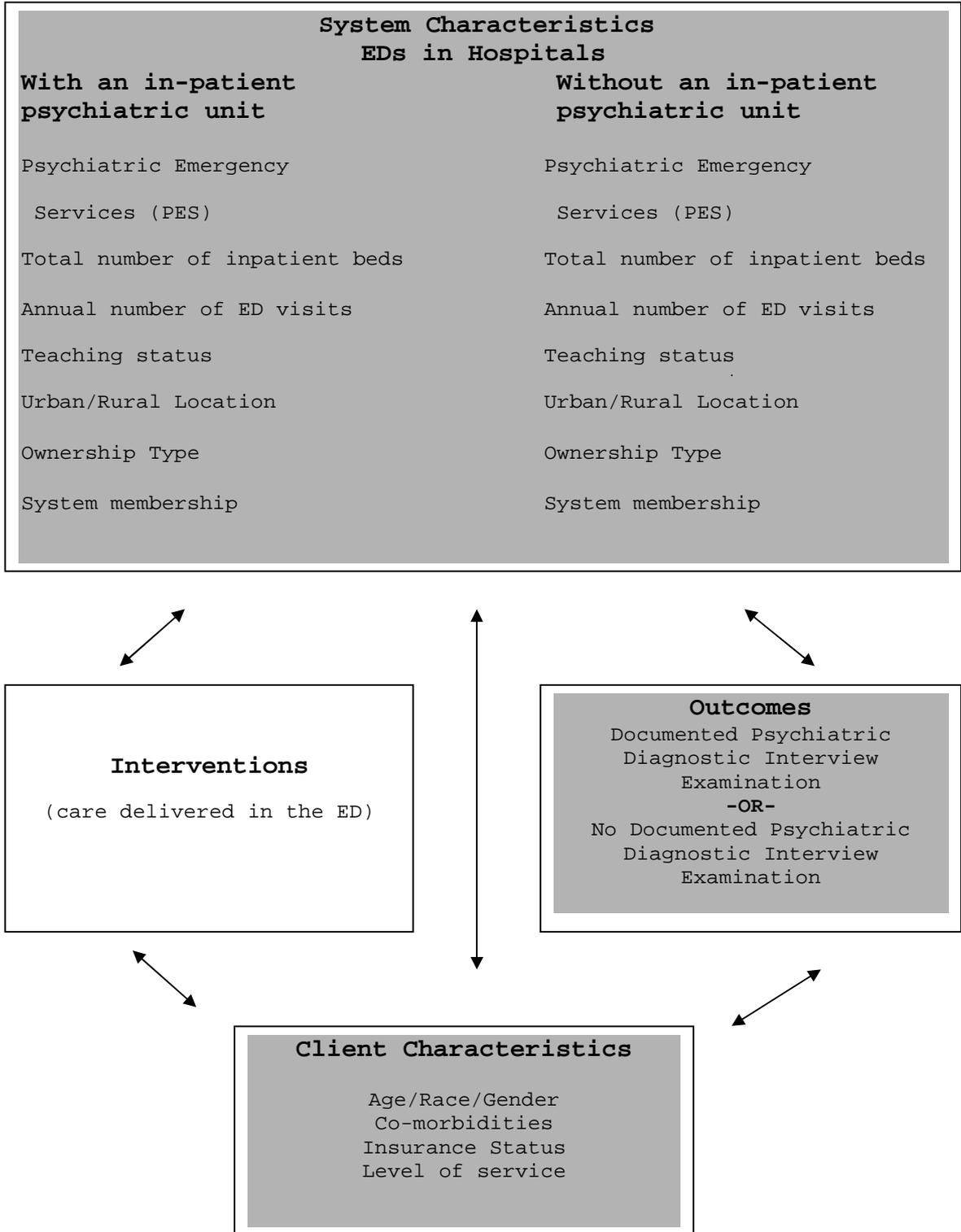


Figure 1: Diagram of Theoretical Framework and Study Variables adapted from Quality Health Outcomes Model (Mitchell, et al., 1998).

Review of Literature

The research literature on schizophrenia is plentiful. A July 30, 2010, PubMed Plus search yielded 89,286 articles using the key word 'schizophrenia'. Almost 30,000 (28,965) articles were identified when the search was limited to the last ten years and only those published in English. Research on the assessment of adults with schizophrenia in community hospital EDs, however, is limited. Most research focuses on "medical clearance." No empirical research was found on the psychiatric assessment of adults with schizophrenia who are discharged directly from a community hospital ED.

Psychiatric Diagnostic Interview Examination (PDIE) and Outcomes

Documentation of a PDIE determined how frequently the goal of assessment of adults with mental disorders, as recommended by the *American Psychiatric Association (APA) Practice Guideline for Treatment of Patients with Schizophrenia* and the New Freedom Commission, was met. Documentation of a PDIE will also inform the Institute of Medicine (IOM) recommendation for restructuring of healthcare delivery (APA, 2004; IOM, 2006; New Freedom Commission, 2004). Assessment allows for earlier

identification of schizophrenia which in turn has been found to result in better outcomes (Lieberman, et al., 2001; Marshall, et al., 2005).

In the Healthcare Cost and Utilization Project (HCUP), State Emergency Department Database (SEDD), psychiatric assessments including a psychiatric history and mental status examination² are recorded as a PDIE using the CPT code 90801 (HCUP/SEDD, 2006). Prior research using CPT code 90801 includes studies of reimbursement for neuropsychologists' services (Kanauss, Schatz, & Puente, 2005; Sweet, Peck, Abramowitz, & Etzweiler, 2003). The code 90801 was used also as one marker for prior psychiatric outpatient healthcare utilization in a study to assess initial dose effect of ziprasidone on persistent schizophrenia (Mullins, et al., 2006).

Baradell & Hanrahan (2000) reported "therapeutic procedure codes" to be "the most frequently used codes for claims submission by fiscal, administrative, and clinical staff delivering mental health services" (p. 299). CPT code 90801 is one example of a therapeutic procedure code (personal communication, W. Johnson, 2009). According to the CPT Handbook for Psychiatrists (2004):

² Available for purchase from Psychological Assessment Resources at <http://parinc.com/Products/Product.aspx?ProductIP=MMSE>.

Code 90801 is used for an initial diagnostic interview examination. It includes identification of a chief complaint, history of present illness, review of systems, family and psychosocial history, and a complete mental status examination, as well as the ordering and medical interpretation of laboratory or other diagnostic studies. Most insurers will reimburse for one PDIE per episode of illness. Medicare will pay for only one evaluation per year for an institutionalized patient, unless medical necessity can be established for additional evaluations. Medicare permits the use of this code or the appropriate [evaluation/management] E/M code to denote the initial evaluation or first-day services for hospitalized patients. It is important to note that code 90801 is not subject to the outpatient mental health services limitation under Medicare. This code is reimbursable at 80 percent rather than the 50 percent used for other psychiatric codes. While 90801 is not a timed code, the initial evaluation is generally considered to take between 45 minutes to one hour. In instances where it takes longer, use extender "22 - usual procedural services". Be sure to document

the extra time and explain why it was required (Schmidt, Yowell, & Jaffe, p. 10).

While descriptions of the components of psychiatric assessments in the literature are congruent with the CPT Handbook quoted above (APA, 2004; Ma, Cline, Tintinalli, Kelen, & Stapczynski, 2004), the literature on the documentation of psychiatric assessments is deficient. Numerous editorials and clinical papers discuss agreement with the APA Practice Guideline. Only two studies, however, were found to report the rate at which psychiatric assessments were implemented in the clinical setting (Tintinalli, Peacock, & Wright, 1994; Woo, Chan, Ghobrial, & Sevilla, 2007). A retrospective chart review of 298 ED patients admitted to an IPU of a community hospital reported more than half (56%) of the patients had no mental status examination documented in the ED. The most frequent process deficiencies were related to the neurological examination (Tintinalli, et al.). Another retrospective chart review of 100 involuntary PES patients and 100 involuntary patients admitted prior to the creation of PES reported a 95 percent rate of completion of the mental status exam with PES compared to a mental status exam completion rate of only 49 percent without PES. The 200

records were matched on primary diagnosis, age, gender, and ethnicity. All of the aforementioned patients were admitted through the ED (Woo, et al.). When patients are being discharged directly from the ED, a more extensive psychiatric evaluation may be necessary to ensure patient and community safety (Ma, et al.). No studies were found that examined if a PDIE had been documented when the individual was discharged directly from the ED without an inpatient admission.

Additionally, there is some indication that the frequency of assessments defined as diagnostic and/or screening services in general may be on the decline in the ED. During the period 1992 to 1999, 89.0 percent of all ED visits included diagnostic and/or screening services (McCaig & Burt, 2001). In 2001, the rates of diagnostic and/or screening services decreased to 85.4 percent (McCaig & Burt, 2003). The rate for diagnostic and/or screening services in the ED in 2005 was only 71.9 percent (Nawar, Niska, & Xu, 2007). No research was found to explain why the frequency of assessments, defined as diagnostic and/or screening services in the ED, has declined over time.

System Characteristics and Outcomes

The ability to segment hospital facilities by whether or not they have an IPU is important when assessing the services provided to adults with schizophrenia who are subsequently discharged from the ED. Facilities without IPUs may not have psychiatric physicians or nurse practitioners on staff to conduct PES. While having psychiatric practitioners on staff offers no guarantee that the ED has access to PES, the likelihood of accessing psychiatric practitioners in the ED is greater if the practitioners are on staff in association with an IPU at the institution (Brown, 2007).

No research exists to guide the selection of system characteristics that might affect the frequency of psychiatric assessment in community hospital EDs. In lieu of any research specific to the topic of whether or not a PDIE is documented when individuals with schizophrenia are discharged directly from a community hospital ED, the work of Brown (2005) which examined how hospital EDs determine whether or not to offer PES will be used to support the selected system characteristics to include in this analysis. Brown assessed how community hospital EDs determine which type of PES service to offer, if any, based

on system characteristics including the number of psychiatric beds, total number of inpatient beds, annual number of ED visits, availability of PES, teaching status, urban/rural location, ownership type, and system membership.

Client Characteristics and Outcomes

Age. Onset of schizophrenia before the age of 25 has been associated with more difficulty in the patient's early years. The disorder disrupts family, educational progress and employment achievements, and it interferes with the development of long-term social relationships. The social support that derives from positive family and social relationships has been associated with better outcomes for individuals with schizophrenia (Jablensky, et al., 1992).

Race. Numerous studies have found ED visit rates in general to be higher for Blacks than for Whites (Cunningham, 2006; Hazlett, McCarthy, Londner, & Onyike, 2004; Reeder, Locascio, Tucker, Czaplijski, Benson, et al., 2002; McCaig & Newar, 2006). Specific to Maryland, the most current information on the percentage of ED use by race was available for 2003, African Americans (41.7%) and Whites (52.5%) together accounted for almost 95 (94.2) percent of ED visits. American Indian and Asian visits accounted for

only 0.2 and 1.1 percent respectively. Race documented as "other" accounted for 3.8 percent of ED visits (Maryland Health Care Commission, 2008). Greater ED use for mental disorders throughout the U.S. was associated with minority groups, especially African Americans (Kunen, Niederhauser, Smith, Morris, & Marx, 2005; Young, et al., 2005). Hazlett et al., (2004) found significantly higher visit rates for African Americans compared to Whites for adult visits to United States (U. S.) EDs for mental disorders in 2000 (29/1,000; 95% CI = 27/1,000 to 31/1,000 and 23/1,000; 95% CI = 22/1,000 to 25, 1,000 respectively).

Gender. An analysis of the National Hospital Ambulatory Medical Care Survey (NHAMCS) found that while women make more ambulatory care visits in general, men have higher visit rates to the ED (McCaig & Newar, 2006). Another study of more than 60,000 adults 18-64 years of age utilizing mental health services in Los Angeles found more ED visits were made by men (Young, et al., 2005). In Maryland the reverse was reported for 2003: in general, women were more likely to visit an ED than men (Maryland Health Care Commission, 2008).

Co-morbidities. Studies supporting the importance of examining for existence of co-morbidity for individuals with a primary psychiatric diagnosis are plentiful,

primarily due to the recognition of increased mortality when co-morbidities often go untreated (Weber, Cowan, Millikan, & Niebuhr, 2009; Dixon, Postrado, Delahanty, Fischer, & Lehman, 1999; Carney, Jones, & Woolson, 2006; Reeves & Torres, 2003). Patients presenting to the ED for a psychiatric evaluation have a higher prevalence of co-morbidities than the general population (Vergare, Binder, Cook, Galanter, & Lu, 2005; American Psychiatric Association, 2004).

Adults with schizophrenia have been identified as high risk for multiple co-morbidities (Buckley, Miller, Lehrer, & Castle, 2009; Goff, et al., 2005). A literature review found almost 50 percent of individuals with schizophrenia have a co-morbid medical condition (Green, Canuso, Brenner, & Wojcik, 2003), even though "many are misdiagnosed or undiagnosed" (Goldman, 1999, p. 10). A small case-report study of 32 to 78 year olds found that a diagnosis of mental disorder impeded the correct diagnosis of somatic complaints and thereby lead to exacerbation of psychosis (Reeves & Torres, 2003).

The risk of death for individuals with schizophrenia is 2.5 to four times greater than for the general population (APA, 2000; Saha, Chant, & McGrath, 2007). A meta-analysis of sixty-one studies to assess the risk of

suicide in schizophrenia reported a lifetime risk of 4.9 percent, with the greatest risk found most often near the initial diagnosis of schizophrenia (Palmer, Pankratz, & Bostwick, 2005). Co-morbid substance abuse (Clark, Samnaliev, & McGovern, 2007; Curran, et al., 2003; Green, et al.), diabetes (Church, Stevens, & Fugate, 2009; Green, et al.; Sullivan, Han, Moore, & Kotria, 2006), metabolic syndrome (Henderson, 2005; McEvoy, et al., 2005) and smoking (Carney, et al., 2006) are common among adults with schizophrenia.

Antipsychotics are recommended for the treatment of schizophrenia. Today, several second generation (atypical) antipsychotics are available with the potential to treat both positive and negative symptoms with fewer side effects than generally found with older agents. The newer agents, however, come with new and different side-effects, such as the potential for diabetes and metabolic syndrome (Campanella, Lartey, & Shih, 2009; Church, et al., 2009; Ramaswamy, Masand, & Nasrallah, 2006).

Substance abuse among adults is much higher for those with schizophrenia than for the general population (Green, Canuso, Brenner, & Wojcik, 2003; Regier, et al., 1990). One randomized clinical trial found the lifetime prevalence of substance abuse for adults with schizophrenia to be 48%

(Regier, et al.). Of individuals with a current addictive disorder, almost half have a co-occurring mental disorder (Kessler, et al., 1996). A large epidemiologic sample (n=430) found almost 75 percent (74.4%) of adults with schizophrenia used nicotine. Additionally, a lifetime diagnosis of abuse or dependence was reported for alcohol (27.4%), cannabis (26.5%), and "other substances" (13.5 %) including amphetamines, LSD, heroin, tranquilizers, inhalants/solvents, cocaine and PCP (Kavanagh, et al., 2004). A secondary analysis of the Healthcare of Communities Survey for 1997 -1998 reported 3 percent of U.S. adults had a dual-diagnosis. Dual-diagnosis is defined as having both a mental disorder and an addictive disorder (Todd, et al., 2004). Individuals with dual-diagnosis have significantly more ED visits than those with mental disorder alone (Curran, Sullivan, Williams, et al, 2003).

Insurance status. A review of U.S. ED visits related to mental disorders for 2000 reported individuals covered by Medicaid accounted for twice as many visits as the uninsured and almost eight times that of privately insured adults (Hazlett, McCarthy, Londner, & Onyike, 2004). In 2002, Maryland ED payer source data for adults with a principal diagnosis of mental disorder reported a much different picture, with the majority of visits (31.2%)

covered by private insurance, 24.0 percent by Medicaid, 14.3 percent by Medicare, and 28.6 percent of visits being made by uninsured (self-pay & charity) individuals (Maryland Health Care Commission, 2008).

Level of service. In the ED, the level of service provided is documented in the patient record using one of five CPT codes (99281, 99282, 99283, 99284, and 99285). Codes range from the lowest (99281) to highest (99285) level of intensity of service provided. See Appendix B for a complete listing of all ED level of service CPT codes and the associated descriptors for each level of visit. Several studies have found analysis of these five CPT codes to be of value in examining the level of intensity of ED visits (Irvin, Fox, & Smude, 2003; Maningas, Hime, Parker, & McMurray, 2006; Wolinsky, Liu, Miller, Geweke, Kaskie, et al., 2008). An examination of ED use linked to Medicare claims for 4,310 older adults found the majority of these individuals (56.6%) never used the ED during the four-year period of study. For those older adults who did visit the ED, this four-year study found that 28.9% made only high-intensity visits (99283, 99284, 99285), compared to 5.7 percent who made only low-intensity visits (99281, 99282), and 8.7% who made a mixture of both high and low-intensity

visits (Wolinsky, et al.). Another study at one urban-teaching, level-1 trauma center examined the level of service by using the CPT codes as an acuity of care marker to assess differences in the proportion of ED visits across insurance status for a total of 152,379 visits over a two-year period. CPT codes 99281 and 99282 defined low-acuity visits, and code 99285 defined high-acuity visits. An additional code, 99291, was used as a high-acuity marker. Code 99291 is intended for critical care, however, and not for ED use (Irvin, et al.). A final study confirmed inter-rater reliability and validity for a new five-level rapid triage system using a retrospective review of 33,850 patients triaged over an eight month period (Maningas, et al.). While all of the aforementioned studies evaluated the acuity level of ED use, none were specific to use of the ED by adults with mental disorders.

Epidemiology of Schizophrenia

Despite widespread study of schizophrenia, the etiology continues to be unknown (DeLisi, 2008; National Institute of Mental Health [NIMH], 2008; Tandon, Keshavan, & Nasrallah, 2008). Described as one of the most debilitating diseases in the developed world (DeLisi; Murray & Lopez, 1996; NIMH; Saha, Chant, Welham, & McGrath,

2005), schizophrenia is a chronic, severe functional and structural brain disorder (NIMH).

Schizophrenia exhibits a constellation of positive, negative and cognitive symptoms (APA, 2000). Positive symptoms include hallucinations, delusions, disorganized speech and behavior, and movement disorders. Negative symptoms are common and difficult to assess because they occur on a continuum with normality, are usually nonspecific, and may be a result of environmental factors related to side effects of medication, demoralization, depression and understimulation. Thought to account for much of the morbidity related to schizophrenia, negative symptoms include avolition, affective flattening and alogia. Cognitive symptoms include problems with executive functioning, attention, and memory. The inability to earn a living is often associated with the cognitive symptoms of schizophrenia. These symptom constellations often make it impossible for the individual to participate fully as an independent and productive member of society (NIMH, 2008).

Even after years of study there is disagreement among epidemiologic and clinical research related to the incidence of schizophrenia (Mueser & McGurk, 2004). Based on a systematic review of 158 studies from 33 countries,

the median incidence rate of schizophrenia is 15.2 per 100,000 (Aleman, Kahn, & Selten, 2003). Schizophrenia affects approximately 24 million people worldwide from all races and from all social and economic groups (World Health Organization [WHO], 2010). Schizophrenia affects approximately one percent of the U.S. population, or more than two million Americans (NIMH, 2008).

The economic burden of schizophrenia is disproportionately large compared to costs associated with other more prevalent conditions such as anxiety, affective disorders (Rice, 1999; Stiles, Boothroyd, Dhont, Beiler, & Green, 2009), and medical disorders (Bartels, Clark, Peacock, Dums, & Pratt, 2003). With approximately 80 percent of adults with schizophrenia unemployed, lost productivity costs are high (Mangalore & Knapp, 2007). Annual overall costs attributed to schizophrenia in the U.S. were estimated at \$62.7 billion for 2002 (McEvoy, 2007; Wu, et al., 2005).

Remission of the symptoms associated with schizophrenia is rare with less than 20 percent of patients ever reaching full functional recovery (Buckley, Miller, Lehrer, & Castle, 2009; Saha, Chant, Welham, & McGrath, 2005). More favorable outcomes have been associated with

early detection and treatment (Lieberman, et al., 2001; Marshall, et al., 2005). The Schizophrenia Patient Outcomes Research Team (PORT) study, a landmark five-year cross-sectional investigation of 582 individuals with schizophrenia found, however, that treatment and services delivered to this population are substandard, citing improper dosing of medication and a lack of education and support for clients and family as having a negative effect on outcomes for individuals with schizophrenia (Buchanan, Kreyenbuhl, Zito, & Lehman, 2002).

Why Individuals with Schizophrenia Use the ED

Problems securing and maintaining health insurance coverage (Kellerman & Haley, 2003) and high rates of unemployment (McEvoy, 2007) resulting in loss of healthcare coverage may leave some individuals with schizophrenia without healthcare services and dependent upon EDs to meet their psychiatric and medical healthcare needs. Substandard treatment and services, misuse of medication, lack of education and support for clients and family may result in exacerbation of symptoms resulting in crisis (Buchanan, et al., 2002; Graber, et al., 2000; Nasrallah, et al., 2006). Additionally, perceived barriers to accessing primary care services (Hackman, et al, 2006; Levinson, Druss,

Dombrowski, & Rosenheck, 2003) may result in such individuals turning increasingly to the ED for healthcare services as a last resort. A cross-sectional study of 200 18 to 65 year-olds receiving community-based psychiatric services reported 59 percent perceived at least one barrier to receipt of healthcare for somatic complaints. Those with schizophrenia were three times more likely than the general population to perceive barriers to primary care services (Dickerson, et al., 2003). Stigma related to serious mental disorders [SMD] (Corrigan, et al., 2003) may contribute to individuals with schizophrenia putting off needed care until a crisis arises, in which case the ED becomes the care delivery site of last resort (Kellerman & Haley). In a study with 1,824 individuals with SMD, 52% reported being discriminated against (Corrigan, et al.). Another study conducted with 1,301 persons with SMD across the U.S. found almost 80% had experienced stigma (Wahl, 1999).

The majority of research related to schizophrenia in community hospital EDs focused on treatment of medication side effects (Campanella, et al., 2009; Church, et al., 2009; Farwell, et al., 2004; Hurdle & Moss, 2009; Mularski, Grazer, Santoni, Strother, & Bizovi, 2006). Mental disorders are often overlooked or untreated in the

community hospital ED because of its focus on emergent physical care (Kunen, Niederhauser, Smith, Morris, & Marx 2005; Tintinalli, Peacock, & Wright, 1994). One study of peripheral interest found that 30 percent of 500 patients consecutively admitted in France to a Paris ED screened positive for a secondary mental disorder when their reason for the ED visit was a somatic complaint; an additional eight percent had presented with a primary mental disorder complaint. This research confirmed the need to assess all adults in the ED for mental disorders (Saliou, Fichelle, McLoughlin, Thauvin, & Lejoyeux, 2005).

Psychiatric Units in Community Hospitals

Community hospitals are currently the largest providers of inpatient psychiatric services in the U.S., based on the number of admissions and the number of psychiatrists employed (Foley, et al., 2006). Since the first units opened in the 1930s, research related to IPUs in community hospitals reports fluctuations in capacity, usually driven by economic issues. The emergence of psychiatric units in community hospitals in the 1930s responded to concerns about healthcare costs and pressures to reform psychiatric and medical education (Summergrad & Hackett, 1987). Community hospital psychiatric units soon

became "a major resource for quick and effective treatment" (Lebenshon, 1980, p.500) close to family and community resources which were perceived as central to the therapeutic environment (Summergard & Hackett).

The 1960s was a time of dramatic change for healthcare in general including mental healthcare delivery. Community hospitals saw an increase in psychiatric inpatient care with the creation of the Medicare and Medicaid programs in 1965. This increase was a result of more favorable reimbursement for community hospital inpatient psychiatric care than was available to specialty psychiatric hospitals. By the end of the 1970s, 58 percent of psychiatric inpatient stays occurred in community hospital psychiatric units (Schulberg & Burns, 1985).

In the 1990s, as managed care expanded, hospitals consolidated. Because the locus of care was shifting from state mental hospitals to community hospitals, mental healthcare expenditures showed a striking increase in community hospitals and a decrease in specialty psychiatric hospitals. Between 1993 and 2003, expenditures for inpatient psychiatric care in community hospitals increased from 5 to 24 percent (Cuellar & Haas-Wilson, 2009). Community hospitals are now the largest providers of

psychiatric inpatient care, and the ED is the point of entrance for inpatient psychiatric care in community hospitals (Geraty, 1995).

Psychiatric Emergency Services (PES)

Psychiatric emergency services (PES) were created as an alternative to the traditional consultation model of psychiatric care, in response to ED overcrowding and a focus on physical care in the ED (Woo, et al., 2007). PES encompasses many services including extended observation units, mobile assessment units, EDs, law enforcement, telephone crisis hotlines, crisis residences, and disaster response teams. Although limited, current evidence on the structure of PES in the ED suggests patient care in psychiatric emergencies is driven more by institutional rather than patient factors (Allen, 2007). The research literature on PES is primarily descriptive and most studies are limited to one setting or institution (Brown, 2005).

Defining the Context of Health Care Service Delivery

The merger of HCUP/SEDD and American Hospital Association (AHA) data. A patient of the same age, race, gender and diagnosis can receive different services depending upon the institution from which the services were received (Baca-Garcia, et al., 2008; Brown, 2007; Daumit,

et al., 2002). These potential variations in the provision of healthcare services cannot be fully assessed out of context. For example, when the annual number of ED visits, location of IPUs, and availability of PES are known, analysis can include those variables along with client characteristics for each ED encounter. This additional information can help to elucidate differences and similarities predicting PDIE documentation in the HCUP/SEDD file.

Prior to the introduction of the HCUP/SEDD, the study of ED encounters was limited either to the National Hospital Ambulatory Medical Care Survey (NHAMCS) or to primary collection at each individual facility. NHAMCS data offers some information on medications and disposition that are not always available in the HCUP/SEDD (U. S. Department of Health and Human Services, 2007). NHAMCS is a national probability sample database; it cannot be matched to individual AHA facility data and does not include CPT codes. NHAMCS could not, therefore, answer the primary aim of this research. The HCUP/SEDD, however, contains information gleaned from actual ED encounters for the entire year from the majority of community hospitals in each participating state. Those data can be matched to

individual AHA facility data and includes CPT codes (HCUP/SEDD, 2006), making it the best database to answer the primary aim of this research.

The HCUP/SEDD masks the identification of the facility from which the data are collected, thereby leaving the context of care (system characteristics) unattainable if using the HCUP/SEDD files alone. To describe a more complete context of care, the HCUP/SEDD file can be complemented by the addition of the AHA. Without understanding the full context of care delivery, it is impossible to move forward with any real analysis about adults with schizophrenia and whether or not these patients received a PDIE when they presented to the ED and are then discharged without an inpatient admission. The AHA data can improve the clarity of the picture regarding both patients and clinical or hospital characteristics as reported in the HCUP/SEDD. The AHA provides data about the availability of PES, the number of inpatient beds, the annual number of ED visits, teaching status, urban/rural location, ownership type, system membership and whether or not an IPU is available for the facilities in question.

Studies conducted using HCUP/SEDD and AHA databases.

Literature searches were conducted in the PUBMED, Psych Info, CINAHL, EMBASE, Cochrane, and ISI Web of Science

databases using these key words: Healthcare Cost and Utilization Project (HCUP), State Emergency Department Databases (SEDD), American Hospital Association (AHA), HCUP, HCUP/SEDD, HCUP, and AHA. Searches were restricted to research, human subjects, and articles written in English. A total of 88 articles were identified for initial review. Articles included in the final sample were restricted to those using an HCUP file merged with an AHA file. The final sample meeting the inclusion criteria was nine. Of these articles, four used multiple HCUP databases including the SEDD data merged with the AHA data to assess the utility of HCUP data for outcomes research (Best, 1999; Bosco, 2001; Jiang, et al., 2001; Steiner, Elixhauser, & Schnaier, 2002); one used SEDD with AHA to assess the disposition from the ED for transient ischemic attack (TIA) patients (Coben, Owens, Steiner, & Crocco, 2008). The remaining four studies used State Inpatient Data (SID) merged with AHA to study the relationship of costs and quality for appendectomy (Brooks, Dor, & Wong, 1997), mastectomy (Case, Johantgen, & Steiner, 2001), pediatric care (Chevarley, et al., 2006), and urban hospitals (Clement, Lindrooth, Chukmaitov, & Chen, 2007). None of these articles discussed how the HCUP and AHA datasets were merged or whether they encountered any problems in merging the two files. The only

information provided on merging datasets was that the HCUP and AHA files had been merged. Neither HCUP User Support (C. Brady, personal communication, July 6, 2007) nor the AHA Resource Center had knowledge of any issues related to merging the HCUP/SEDD and the AHA files (S. Beazley, personal communication, March 28, 2007).

APA Practice Guideline for the Treatment of Patients with Schizophrenia

In 2004, the APA published practice guidelines for the treatment of patients with schizophrenia. After an extensive review of the literature related to schizophrenia or schizoaffective disorders, these guidelines were developed by a workgroup of six psychiatrists, representing both research and clinical experience with patients diagnosed with schizophrenia, and one consultant pharmacist (APA, 2004). The resulting *APA Practice Guideline for the Treatment of Patients with Schizophrenia* recommends as thorough an evaluation (assessment) as the patient's condition permits. This recommendation for assessment was coded a "level one" - "recommended with substantial clinical confidence" (APA, p. 10).

Gaps in the Literature

The review of the literature exposed several gaps. Most notable is the lack of studies related to the documentation of a psychiatric assessment for adults with a principal diagnosis of schizophrenia who were discharged directly from community hospital EDs without an inpatient admission. Substandard care, stigma and perceived barriers to accessing primary care services result in the ED being used as the healthcare delivery locus of last resort in times of crisis. Schizophrenia affects all races and all social and economic groups, and it results in higher morbidity and mortality rates than for the general population (NIMH, 2008). The disproportionately large economic burden of schizophrenia and the research reporting that less than 20 percent of patients with schizophrenia experience full functional recovery (Buckley, et al., 2009; Saha, et al., 2005) support the need for assessment as is recommended by the *APA Practice Guideline for the Treatment of Patients with Schizophrenia*. Assessment allows for earlier identification of schizophrenia which in turn has been found to result in better outcomes (Lieberman, et al., 2001; Marshall, et al., 2005).

Prior to considering any mental healthcare delivery restructuring plan, it is important to examine the effects

of system and client characteristics on the likelihood of psychiatric assessment. Specifically, this study filled the gap by determining that differences do exist in the rate of psychiatric assessment when the ED is in a hospital with or without an IPU.

CHAPTER 3: METHODS

This chapter describes the research design, sample, data sources, procedures, study variables, and statistical analyses. In addition, limitations, and human subjects' assurance are discussed.

Research Design

This study was a cross-sectional examination of a subset of visits from the 2004 Healthcare Cost and Utilization Project (HCUP)/State Emergency Department Database (SEDD) merged with the American Hospital Association (AHA) file to determine if any differences existed in the frequency of psychiatric assessment of adults (aged 18 to 64 years) with schizophrenia discharged from emergency departments (EDs) in Maryland community hospitals with or without an inpatient psychiatric unit (IPU). This research also investigated the effects of selected system and client characteristics on the likelihood of psychiatric assessment.

The research aimed to determine whether there were statistically significant differences between the defined groups. Accordingly, the research design incorporated tests of formal null hypotheses. The conventional $\alpha = .05$ level was applied to provide evidence to reject the null hypotheses and infer statistical significance. The American

Psychiatric Association (APA) Task Force on Statistical Inference (Wilkinson, 1999) recommends that researchers always provide effect size estimates when reporting p values. This research followed the APA recommendation, and so the effect sizes indicating the magnitude of the observed effect of the variable(s) were computed and reported. The conventional distinctions between "small", "medium" and "large" categories of effect size defined by Cohen (1992) were applied in this study. The null hypotheses from Chapter 1 are restated below.

With respect to Maryland community hospitals with and without IPUs that discharged a minimum of five adults directly from the ED with a principal diagnosis of schizophrenia in 2004:

Aim 1

Aim 1 was to describe selected system and client characteristics of the EDs.

Null Hypothesis 1

H0#1a. There is no statistically significant difference in the system characteristics including availability of psychiatric emergency services (PES), total inpatient beds, annual ED visits, teaching status,

urban/rural location, ownership type, and system membership.

H0#1b. There is no statistically significant difference in the client characteristics including age, race, gender, co-morbidities, insurance status, and level of service.

Aim 2

Aim 2 was to explore if the frequency of psychiatric assessment differs in EDs in hospitals with and without IPUs.

Null Hypothesis 2

H0#2. There is no statistically significant difference in the frequency of psychiatric assessment.

Aim 3

Aim 3 was to determine the effects of system and client characteristics on the likelihood of psychiatric assessment.

Null Hypothesis 3

H0#3. The system and client characteristics have no statistically significant effect on the likelihood of psychiatric assessment.

Sample

The aims of this research required sampling at two levels. The first level was hospitals in Maryland with EDs

in existence during calendar year 2004. The second level was clients discharged with a principal diagnosis of schizophrenia (ICD-9-CM³ 295.0-295.90) from the aforementioned EDs in hospitals in Maryland (HCUP/SEDD, 2006).

Hospitals

Hospitals that met the inclusion criteria were (a) community hospital to include all nonfederal, short-term general and special hospitals, including university medical centers, whose facilities and services are available to the public (AHA, 2006); (b) with an operational ED during calendar year 2004; (c) in the state of Maryland (N= 46). Excluded were hospitals that discharged fewer than five adults with a principal diagnosis of schizophrenia directly from the ED without an inpatient admission during 2004. The group size limitation was based on the smallest acceptable group size found in the literature for multilevel regression analysis (Maas & Hox, 2004).

Clients

Clients met the inclusion criteria of (a) being discharged directly from the ED of a community hospital in Maryland in 2004; (b) having a principal diagnosis of

³ International Classification of Diseases, Ninth Edition, Clinical Modification (ICD-9-CM)

schizophrenia determined by any of the following ICD-9-CM codes: 295.10 disorganized type, 295.20 catatonic type, 295.30 paranoid type, 295.40 schizophreniform type, 295.60 residual type, 295.70 schizoaffective disorder, and 295.90 undifferentiated type in the principal diagnosis field of the HCUP/SEDD record; (c) being between 18 and 64 years of age, and (d) having at least one of five levels of service documented in the record (N = 3,139).

Excluded were clients (a) with other psychotic disorders with the potential for presentation to include hallucinations and/or delusions as the principal diagnosis. See Appendix A for a complete listing of psychotic disorders excluded from the sample and their respective ICD-9-CM codes. Also excluded were (b) client records with a blank (no data) in the principal diagnosis field of the HCUP/SEDD, (c) records for clients discharged from community hospital EDs that did not meet the minimum of five adults discharged with a principal diagnosis of schizophrenia, and (d) records of clients with no level of service documented. The Maryland HCUP/SEDD variables of interest to this study were organized by an adaptation of the Quality Health Outcome Model (QHOM) (Mitchell, et al., 1998), including system characteristics, client characteristics, and outcomes.

Data Sources

Study variables were generated from two data sources. First, the annual survey of hospitals conducted by the AHA for 2004 provided system characteristics including these: whether or not the hospital had an IPU; the hospital's availability of PES; its total number of inpatient beds; its annual number of ED visits; its teaching status, its location whether urban or rural; its ownership type; and system membership for the 46 institutions in the hospital sample. Second, the 2004 HCUP / SEDD, an administrative database of discharge abstracts, provided information on ED visits for the client sample comprised of 3,139 clients discharged directly from an ED without an inpatient admission.

The American Hospital Association (AHA) Annual Hospital Survey

The American Hospital Association (AHA) survey has been conducted on an annual basis for more than 60 consecutive years (AHA, 2006). This survey includes over 700 data elements on hospital facilities, organizational structure, services, utilization, staffing, and finances (AHA, 2009). The AHA file was purchased directly from the American Hospital Association.

With the help of the Centers for Medicare and Medicaid Services (CMS) and federal, state and local governing bodies and organizations, the AHA identifies the universe of hospitals in the U.S. According to the latest AHA survey information, that universe of hospitals numbered approximately 6,300, of which 98 percent were AHA registered hospitals. Each December, AHA surveys hospitals for information on the most recent fiscal year. Completing the AHA survey is voluntary. Encouragement to participate and assistance with completion of the survey are offered to hospitals through state hospital associations. State hospital associations are independent organizations, not chapters of AHA. The nationwide survey response rate from community hospitals for 2004 was 85 percent. For Maryland community hospitals with EDs, the survey response rate for 2004 was 99 percent (personal communication, S. Beazley, AHA, April 24, 2009).

When AHA survey results are analyzed, missing data may be imputed by the data provider using estimates generated from the previous year. Two major approaches are used for estimations. For nine key variables (total admissions, total inpatient days, total births, total full-time employees, total part-time employees, total surgical operations, total outpatient visits, total expenses and

total revenue) estimates are generated to predict the current year missing value using regression models. Estimates for missing data are also generated from a matrix of estimators from hospitals which are similar in size, primary services provided, length of stay, and type of governing board. The number of beds, services provided, length of stay, and type of governing board are never estimated but obtained from the AHA master facility inventory system of all institutions registered to operate as hospitals in the U.S. The management of the AHA master inventory system is independent of the Annual Survey process. Any unusual changes from year to year are compared for agreement and consistency with all other information reported in the survey. Next, data are aggregated by size, type and geographic area to compare trends from previous years. When no historical data are available for a particular hospital, comparisons are made to data reported by hospitals of similar size, type and geographic area. Hospital staffs are contacted directly for clarification of unresolved concerns. AHA survey data are used by hospitals, academic researchers, commercial research and data companies, all levels of government, state hospital associations, and policy analysts (AHA, 2009). Initial analysis of primary analytic variables found less than 5

percent of cases had data missing. Given the large sample size, cases missing primary analytic variables were deleted from analysis.

To differentiate the context of ED care delivery across hospitals, this research included individual hospital information from the AHA Annual Hospital Survey. Individual hospital information included identifiers such as the AHA identification number matched to the hospital name with city, state, and zip code. The AHA identification number was used to link the HCUP/SEDD and the AHA files (AHA, 2006). Linking the HCUP/SEDD with the AHA was required to describe the hospital characteristics because the HCUP/SEDD file did not include these variables (HCUP/SEDD, 2004). To differentiate facilities by capacity for ED services, the annual number of ED visits was captured for analysis. To differentiate facilities by availability of psychiatric services, the hospital characteristics of (a) having an IPU or not and (b) availability of PES were included in the analysis (AHA).

Agency for Healthcare Research and Quality (AHRQ)

Healthcare Cost and Utilization Project (HCUP) / State

Emergency Department Database (SEDD)

Increases in the number of ED visits since the early 1990s (Burt, McCaig, & Rechtsteiner, 2007; McCaig & Burt,

2005) have resulted in federal government sponsorship of several administrative databases available for research describing ED care. Administrative databases are records generated during the course of conducting daily business that have been released in a computerized format, so that the information can be used for another purpose (Billings, 2003).

AHRQ provides data to support health services research, which complements the National Institutes of Health (NIH) biomedical research efforts of the U.S. federal government (AHRQ, 2007). In an effort to fulfill its mission to improve the nation's healthcare delivery system, AHRQ sponsors the HCUP family of five databases, the database of interest to this study is the State Emergency Department Databases (SEDD) introduced in 1999. HCUP data were specifically created to fulfill the AHRQ mission as it pertains to improving the effectiveness, efficiency, quality and safety of the healthcare system in the U.S. (AHRQ).

The Healthcare Cost and Utilization Project (HCUP) provides multi-state databases and analysis products for use in research and healthcare decision making at the federal, state, and community levels (AHRQ, 2007). HCUP and all of its databases, including the HCUP/SEDD and HCUP/SID,

are products of federal, state, and healthcare industry partnerships. HCUP is the only source of ED client encounter-level hospital information available for public use that includes all payers (AHRQ).

State emergency department database (SEDD). The HCUP/SEDD provided the only ED client encounter-level data that was available for public purchase concerning persons who were discharged directly from the ED rather than admitted for inpatient services. Not all ED visits were included in the HCUP/SEDD. Due to payer restrictions, when a client was admitted to an inpatient bed from the ED, the services delivered in the ED were purged from the record and the inpatient stay was reported in the HCUP/SID file. For HCUP/SEDD, federal sponsorship came from the AHRQ; state participation included 27 states that agreed to provide data for release in HCUP from the majority, and in some cases, all of their community hospitals (AHRQ, 2007).

As a subset of HCUP, the SEDD files were first released for purchase with 2004 data. HCUP/SEDD began with hospital billing information found in the individual discharge summaries for all ED encounters that resulted in discharge directly from the ED without an inpatient hospital admission (AHRQ, 2007). For 2004 data, the HCUP/SEDD offered a consistent format for 107 data elements

(HCUP/SEDD, 2006). The HCUP/SEDD databases were split into three files: the "core" file, the "charges" file, and the "AHA linkage" file (HCUP/SEDD, p. 8). The "core" file included the bulk of the HCUP/SEDD information on individual client encounters. The "charges" file included detailed information on hospital charges related to the client encounters reported in the "core" file. Finally, the "AHA linkage" file contained the AHA hospital identifiers used to link the AHA and HCUP/SEDD files together for analysis (HCUP/SEDD, p. 9). For purposes of this study only the HCUP/SEDD core and AHA linkage files were utilized.

Data were submitted from each participating state to AHRQ for inclusion in the HCUP/SEDD through an intermediary "data organization" (HCUP/SEDD, 2006, p. 4). The "data organization", which acted on behalf of the state of Maryland by processing and delivering the HCUP/SEDD data to AHRQ, was the Maryland Health Services Cost Review Commission. Each state had the power to determine which pieces of information that fit into the AHRQ/HCUP format were released to the 'data organization'. It was also the prerogative of each state to determine the comprehensiveness of the data they delivered to AHRQ. In 2004, the HCUP/SEDD for Maryland provided data for release from 46 of 50 community hospitals. Data from the remaining

four community hospitals were not available in HCUP/SEDD because these hospitals did not have EDs at the time of data collection (HCUP/SEDD).

Maryland 2004 HCUP/SEDD data used for this study were obtained on CD-ROM from AHRQ after acceptance of a signed data use agreement. The CD-ROM included all data (1,783,233 records) from Maryland community hospitals for individuals discharged from the ED without an inpatient admission. In addition, introductions to the SEDD, its file composition, coding practices, quality control procedures, file specifications, descriptions of its data elements, and a program to facilitate loading the data into a SAS statistical analysis program were provided.

Rationale for studying Maryland HCUP/SEDD. HCUP/SEDD data for 2004 were available for the states of Maryland, Massachusetts, and Nebraska. In general, minorities, especially African-American males, are more likely to be diagnosed with schizophrenia (Sohler, Bromet, Lavelle, Craig, & Mjotabai, 2004) and more likely to use the ED (Burt, McCaig, & Rechtsteiner, 2007). Of the available HCUP/SEDD data, a comparison was made to determine which state had the greatest number of African-Americans, based on data from the American Community Survey, (U.S. Census Bureau, 2004). African Americans accounted for only 373,729

or six percent of the population in Massachusetts and only 60,619 (3.5%) for Nebraska in 2004 (U.S. Census Bureau). Of the three states releasing data to HCUP/SEDD for 2004, the Maryland HCUP/SEDD data were selected because Maryland data enabled race to be considered in the analysis. The reason that race could be considered with these data is that Maryland's population had the largest number (1,624,858) and percentage (28.9%) of persons identified as Black or African American in 2004 (Maryland Department of Health & Mental Hygiene, 2005). Of the twenty-four jurisdictions in Maryland, four had minority populations greater than 30%. These minorities were overwhelmingly African-American (Maryland Department of Health & Mental Hygiene, 2008).

Procedures

HCUP/SEDD records were reduced from the original 1,783,233 records for all discharges from the EDs to 3,139 by limiting clients to 18 to 64 year olds with a principal diagnosis of schizophrenia and an HCUP/SEDD indicator of ED use without inpatient admission. HCUP/SEDD data were merged with AHA data for Maryland community hospitals using the hospital identifiers from the AHA linkage file supplied with the HCUP/SEDD dataset. Diagnosis of schizophrenia was determined by ICD-9-CM codes.

Study Variables

The variables used to measure the outcome (PDIE), system characteristics, and client characteristics and their sources are summarized in Table 1. These variables were coded and analyzed with SAS version 9.1 using methods described by Delwiche & Slaughter (2008).

Table 1

Variables and sources of data

Variables	Sources	
	HCUP/SEDD	AHA
Outcome	Psychiatric Diagnostic Interview Examination (PDIE)	
System Characteristics		Inpatient Psychiatric Unit (IPU) Psychiatric Emergency Services (PES) Inpatient Beds Annual ED visits Teaching Status Urban/Rural Location Ownership Type System Membership
Client Characteristics	Age Race Gender Co-morbidities Insurance Status Level of Service	

Note. HCUP/SEDD = Healthcare Cost and Utilization Project / State Emergency Department Databases; AHA = American Hospital Association (AHA) Annual Survey.

Outcome

The primary dependent variable or outcome of this study was measured at the nominal level. It identified whether or not a PDIE had been documented on the visit records of clients discharged directly from the ED with a principal diagnosis of schizophrenia. The most frequently used CPT code to document a psychiatric assessment was CPT 90801 (Goldberg, 2004). For purposes of statistical analysis, a dichotomous variable was constructed based on whether or not a PDIE was documented using CPT code 90801 in the HCUP/SEDD database. The two possible outcomes were expressed as a dummy binary variable: where 1 = yes, there was a documentation of a PDIE; or 0 = no, there was no documentation of a PDIE. Although CPT code 90801 was the best available record to answer the specific aims, it was not without limitations. CPT codes are of variable quality based on differences in hospital requirements for thorough and accurate recording (Edelberg, 2004; Iezzoni, 1997).

System characteristics

The variables reported in the literature that may influence client outcomes specific to outpatient mental healthcare systems included the availability of an IPU and PES, and the annual number of ED visits. The availability

of an IPU was hypothesized to have the main effect on the outcome and was therefore classified as a primary independent variable (Table 3). PES, inpatient beds, annual ED visits, teaching status, urban/rural location, ownership type, and system membership were considered as upper level control variables. The effects of those seven variables on the outcome were considered to be secondary, and they were controlled for purposes of statistical analysis (Table 2).

Inpatient psychiatric unit (IPU). IPU refers to the nominal variable representing the availability of an inpatient psychiatric unit (coded as 0 = No and 1 = Yes).

Psychiatric Emergency Service (PES). PES refers to the availability of PES (coded as 0 = No and 1 = Yes) reported as a nominal response from the AHA survey.

Inpatient beds. Total inpatient beds is a continuous variable calculated as the sum of all individual bed counts on the AHA survey.

Annual ED visits. The number of annual ED visits from the AHA survey.

Teaching status. Teaching status is a categorical variable based on the AHA survey response to questions of residency training/medical school affiliation (coded as 0 = No and 1 = Yes).

Urban/rural location. Urban/rural location is determined based on whether or not the hospital is located in a metropolitan statistical area (MSA) and is coded as 0 = rural and 1 = urban.

Ownership type. Ownership type identifies hospital ownership, including for-profit and not-for-profit status from the AHA survey and is coded as 0 = not-for-profit and 1 = for profit.

System membership. System membership identifies hospitals with a hospital system affiliation based on the AHA survey and is coded as 0 = no system affiliation and 1 = system affiliation.

Table 2

Independent variables (system characteristics)

Variable	Definition	Measurement	Numerical codes for categorical variables	Hypotheses
Inpatient Psychiatric Unit (IPU)	Availability of IPU	Categorical (nominal)	0 = No 1 = Yes	H ₀ #2, H ₀ #3
Psychiatric Emergency Service (PES)	Availability of PES	Categorical (nominal)	0 = No 1 = Yes	H ₀ #1a, H ₀ #3
Inpatient Beds	Total number of inpatient beds	Continuous (scale/Interval)		H ₀ #1a, H ₀ #3
Annual ED Visits	Annual number of ED visits	Continuous (scale/Interval)		H ₀ #1a, H ₀ #3
Teaching Status	Residency training/medical school affiliation	Categorical (nominal)	0 = No 1 = Yes	H ₀ #1a, H ₀ #3
Urban/rural Location	Urban/rural location based on MSA	Categorical (nominal)	0 = rural 1 = urban	H ₀ #1a, H ₀ #3
Ownership Type	Hospital ownership	Categorical (nominal)	0 = not-for-profit 1 = for-profit	H ₀ #1a, H ₀ #3
System Membership	Hospital system membership	Categorical (nominal)	0 = No 1 = Yes	H ₀ #1a, H ₀ #3

Note. MSA = Metropolitan Statistical Area

Client Characteristics

The personal characteristics of the clients (Table 3) were also classified as independent variables since they were hypothesized to influence the variability in the dependent variable. The client characteristics found in the literature associated with ED mental health outcomes collected for the purposes of this study included age, race, gender, co-morbidities, insurance status, and level of service. Since the effects of these variables on the dependent variable may be controlled for purposes of statistical analysis, they were classified as lower level control variables.

Age. A continuous variable, client age in years at admission was reported in the HCUP/SEDD dataset (HCUP/SEDD, 2006). The 18 to 64 years of age limitation was based on the Maryland Commission's State Health Plan definition of "adult" (Maryland Health Care Commission, 2008).

Race. A nominal categorical variable, client race was reported as Caucasian, African-American, Asian / Pacific Islander, Native American, or Other in the HCUP/SEDD database. Maryland reports race and ethnicity coded under the one variable 'RACE' (HCUP/SEDD, 2006). Dummy variables were constructed using 'Caucasian' as the reference category.

Gender. As reported by the data source in the HCUP/SEDD dataset, client gender was constructed as a nominal binary variable (coded 0 = male, 1 = female). All "other" values for gender were set to missing (HCUP/SEDD, 2006).

Co-morbidities. Whether an individual has a secondary diagnosis of a psychiatric or somatic nature (co-morbidity) is an important component to consider in outcomes research (Iezzoni, 2003). The presence of selected physical or psychiatric co-morbidities was identified by the ICD-9 code/s in secondary and tertiary diagnosis by Clinical Classification System (CCS) fields of the HCUP/SEDD file. The presence or absence of selected co-morbidities was reported as a nominal binary variable. Physical co-morbidities examined included substance abuse (including alcohol and other substances of abuse) identified by ICD-9 code (coded as 0 = No and 1 = Yes). Psychiatric co-morbidities included affective disorders, other psychoses, anxiety, somatoform, dissociative, and personality disorders, and other mental disorders as identified by CCS, (coded as 0 = No and 1 = Yes). All other co-morbidities over and above the previously noted physical and psychiatric co-morbidities on each record (coded as 0 = No and 1 = Yes) were reported.

Insurance status. The insurance status or expected primary payer in the HCUP/SEDD data was constructed as a categorical variable labeled Medicare, Medicaid, private, none, unknown and other. Medicare included fee for service and managed care. Medicaid also included fee for service and managed care. Private insurance included Blue Cross, commercial carriers, private health maintenance organizations (HMOs) and preferred provider organizations (PPOs). Self-pay was collapsed under "none" (HCUP/SEDD, 2004). Unknown was used for a blank in the primary payer field of the HCUP/SEDD file (HCUP/SEDD, 2004). "Other" includes Worker's Compensation, the Civilian Health and Medical Program of the Uniformed Services in the U.S. (CHAMPUS), the Civilian Health and Medical Program of the Department of Veterans Affairs (CHAMPVA), Maternal and Child Health Services Block Grant (Title V), and other government programs.

Level of service. First published by the American Medical Association in 1966, CPT codes are the most accepted medical terminology system of standard terms and descriptors available. CPT codes are used to communicate the delivery of medical services for reimbursement in both private and public health insurance programs, to manage claims processing, to develop guidelines for medical

review, and to conduct health services research. CPT codes are maintained by a CPT Editorial Board of 17 members responsible for the review, approval and dissemination of annual updates (American Medical Association, 2007).

The level of service provided during the ED visit is identified by an Evaluation & Management (E & M) code. E & M codes for ED services are a group of five CPT codes ranging from "self limited or minor" to "immediate significant threat to life" (Edelberg, 2004, p. 138; Schmidt, Yowell, & Jaffe, 2004, no page #). Appendix B provides a full description of the five CPT codes related to E & M. Dummy variables were constructed for E & M codes using 99285 as the reference category.

Table 3

Independent variables (client characteristics)

Variable	Definition	Measurement	Numerical codes for categorical variables	Hypotheses
Age	Age of client (18 to 64 years)	Continuous (scale/interval)		H ₀ #1b, H ₀ #3
Race	Ethnic group of client	Categorical (nominal)	Caucasian=0, African American=1, Other=2	H ₀ #1b, H ₀ #3
Gender	Sex of client	Categorical (nominal)	0=Male, 1=Female	H ₀ #1b, H ₀ #3
Co-Morbidities	Selected co-morbidities	Categorical (nominal)	0 or 1 Psychiatric, Substance Abuse, Other	H ₀ #1b, H ₀ #3
Insurance Status	Payer source	Categorical (nominal)	Medicare=0, Medicaid=1, Private=2, None=3, Unknown=4, Other=5	H ₀ #1b, H ₀ #3
Level of Service	Client E & M for ED visit	Categorical (nominal)	CPT 99281=1, CPT 99282=2, CPT 99283=3, CPT 99284=4, CPT 99285=5	H ₀ #1b, H ₀ #3

Note. E & M = Evaluation & Management.

Statistical Analysis

The data were cleaned and conditioned prior to analysis using SAS version 9.1.

Data Cleaning and Conditioning

Duplicate records were identified using a re-identified and encrypted medical record number [MR] (HCUP/SEDD, 2006). Duplicate records were anticipated for any client who visited the same ED more than once during calendar year 2004. A limitation was that multiple visits to different EDs could not be assessed. Only the initial visit, based on calendar year date, was included in the analysis as the primary case for any records found to have multiple visits to the same ED during 2004. This determination of the primary case was based on duplicate re-identified and encrypted MR numbers. Use of only the initial visit as the primary case was based on prior research that had reported a tendency for ED personnel to assume clients who make multiple visits to the same ED do not need another psychiatric assessment at each subsequent visit (Breslow, Klinger, & Erickson, 1997). The statistical analysis assumed that the continuous variables (age, number of inpatient beds and number of ED visits) did not include extreme values or outliers that might bias the magnitudes of the test statistics and the results of null hypothesis significance tests.

The first stage of the analysis, therefore, was to screen the continuous variables for outliers. Continuous variables having Z scores (deviations from the mean divided by the

standard deviation) greater than 3.0 were assessed for possible exclusion (Tabachnik & Fidell, 2007).

The statistical analysis included only conditioned data, i.e., those variables of interest to the study or required for quality control. Blank fields and variables not selected for inclusion in the analysis and/or not required to assess quality control were deleted. Variable measure labels were assessed and corrected to confirm that they were assigned appropriately.

Appropriate parametric or non-parametric statistical analyses supported by SAS were chosen and used to test the null hypotheses with respect to the measurement levels of the dependent and independent variables and the shapes of their frequency distributions (Delwiche & Slaughter, 2008).

Descriptive Statistics

Summary statistics were computed to summarize the outcome (PDIE), the system characteristics and the client characteristics used to describe the sample. Continuous variables (age, number of inpatient beds, and annual number of ED visits) were summarized using means and standard deviations (SDs). Categorical variables (documentation of PDIE, availability of an IPU and PES, teaching status, urban/rural location, ownership type, system membership, race, gender, co-morbidities, insurance status, and level of service) were

summarized using frequencies and percentages within each category.

Null Hypothesis Significance Tests

The generalized null hypotheses stated above in chapter 1 were decomposed so that they apply to individual variables (Table 4). Each null hypothesis was addressed using an independent samples t test, a Chi square or Fisher's exact test, or binary logistic regression with generalized estimating equations (Table 4).

Table 4

Null hypothesis significance tests

<p>With respect to Maryland community hospitals with and without inpatient psychiatric units that discharged a minimum of five adults directly from the ED without an inpatient admission with a principal diagnosis of schizophrenia in 2004:</p>	<p>Null hypothesis Significance test</p>
--	--

<p>There is no difference in the total number of inpatient beds</p>	<p>Independent samples <i>t</i> test</p>
<p>There is no difference in the number of annual ED visits</p>	
<p>There is no difference in age</p>	
<p>There are no correlations between the total number of inpatient beds, number of annual ED visits, and the ages</p>	<p>Pearson's correlation analysis</p>
<p>There is no difference in availability of psychiatric emergency services (PES)</p>	<p>Chi square*</p>
<p>There is no difference in teaching status</p>	
<p>There is no difference in urban/rural location</p>	
<p>There is no difference in ownership type</p>	
<p>There is no difference in system membership</p>	
<p>There is no difference in race</p>	
<p>There is no difference in gender</p>	
<p>There is no difference in co-morbidities</p>	

Table 4 (continued)

With respect to Maryland community hospitals with and without inpatient psychiatric units that discharged a minimum of five adults directly from the ED without an inpatient admission with a principal diagnosis of schizophrenia in 2004:	Null hypothesis Significance test
There is no difference in insurance Status	
There is no difference in level of service	
There is no difference in psychiatric assessment (PDIE)	
There are no associations between PES, teaching status, urban/rural location, ownership type, system membership, race, gender, co-morbidities, insurance status, level of service, and psychiatric assessment	Chi square*
The system and client characteristics have no effect on the likelihood of psychiatric assessment	Logistic regression with Generalized Estimating Equations (GEE)

*For counts less than 5, Fisher's exact test was used.

Independent samples t test. Independent samples *t tests* were used to test the null hypothesis that there are no differences between the mean number of inpatient beds, the mean number of annual ED visits, and the mean ages in the sample with respect to the availability of psychiatric inpatient units (Table 5). The decision rule was to reject the

null hypothesis if the p values of the t test statistics were $< .05$. Given the available sample size ($n=3139$), the t test would produce valid results even in the face of non-normally distributed variables. Although t tests are robust in the face of skewed distributions, they are sensitive to inequality of variance (Field, 2009). Levene's test was used to check for equality of variance. The results of the t tests were interpreted depending on whether equal variances could be assumed or not assumed. Cohen's d and η^2 statistics were computed to provide measures of effect size.

Pearson's correlation analysis. Pearson's correlation analysis was used to test the null hypotheses that there are no correlations between the mean number of inpatient beds, the mean number of annual ED visits, and the mean ages of the sample with respect to the availability of psychiatric inpatient units (IPUs) (Table 5). The decision rule was to reject the null hypothesis if the p values of the Pearson's r statistics were $< .05$. For larger datasets, the Central Limit Theorem suggests that correlation analysis would produce valid results even in the face of non-normally distributed variables (Field, 2009). The r statistics provided estimates of effect size.

Chi square. The most commonly used non-parametric test of significance for categorical variables is the *Chi square*

procedure (Agresti, 2007). *Chi square* was performed to investigate the possibility of associations between the categorical variables, including availability of PES, teaching status, urban/rural location, ownership type, and system membership at hospitals with and without an IPU (Table 8). The decision rule was to reject the null hypothesis of no association if $p < .05$ for the *Chi square* test statistic with degrees of freedom calculated as $(r - 1)(c - 1)$, where r is the number of rows and c is the number of columns in the cross-tabulation used to calculate the *Chi square* statistic. A limitation of *Chi square* is that the test is may be invalid when the expected frequency in any cell is less than 5 (Agresti). The null was rejected for the availability of inpatient psychiatric units (IPU) and psychiatric emergency services (PES). The null hypothesis could not be rejected for teaching status, urban/rural location, ownership type, or system membership at hospitals with and without IPU units, as no significant associations were found between these variables (Table 8).

Logistic Regression. Binary logistic regression is a technique for making predictions when the dependent variable is categorical, with a dichotomous or binary outcome, and the independent or predictor variables are continuous and/or categorical (Hosmer & Lemeshow, 2000). The dependent variable

in this study was the likelihood of psychiatric assessment (PDIE), which has a binary outcome (1 = yes or 0 = no). The predictor variables were the system and client characteristics which were both continuous (ages, total number of inpatient beds, number of annual ED visits) and categorical (availability of inpatient psychiatric unit and PES, teaching status, urban/rural location, ownership type, system membership, race, gender, co-morbidities, insurance status, and level of service).

Logistic regression combined the independent variables to estimate the probability that an outcome would occur, i.e., that a client would be a member of one of the two groups defined by the dichotomous dependent variable. In SAS, a logistic regression model is constructed to predict the probability of the group with the highest numeric code. Since the outcomes were coded 1 = yes and 0 = no, SAS was used to predict the probability of membership in the yes category, i.e., those clients who received psychiatric assessment (PDIE).

Generalized Estimating Equations. To account for the nested structure of the sample, clients within hospitals, generalized estimating equations (GEE) were justified. GEEs are estimation methods available in SAS using the PROC GENMOD command. The REPEATED statement was specified which uses the

Huber-White (or Sandwich) estimator as the default (SAS). GEE provides robust standard error estimates that adjust for correlations among observations (Allison, 1999). Logistic regression models were constructed in PROC GENMOD to predict the probability of a PDIE.

The GEEs for the dichotomous outcome of PDIE followed the general

$$\text{form of: } G(E[Y_{ij}]) = B_0 + Bx_{ij}$$

Where g is the link function, $E[Y_{ij}]$ is the expected outcome j for client i , B_0 is a constant. The β s are parameters for the covariates, and x_{ij} are vectors of the hospital variables and relevant interactions terms for the i th client at the j th hospital. Since the outcome was binary, the logit link was selected. For ease of interpretation, coefficients were transformed into odds ratios.

The individual p -values of the Wald χ^2 statistics for the β coefficients of each of the independent variables explained which system or client characteristics had a statistically significant effect on the probability of PDIE. The decision rule was to reject the null hypothesis that the β coefficient was not a significant predictor of PDIE if the p value of the Wald χ^2 statistic were $< .05$. For ease of interpretation the individual β coefficients are expressed as odds ratios, i.e., the change in the

probability of PDIE associated with a one-unit change in the independent variable.

R Square statistics provide approximate measures of effect size; however, the pseudo R square measures, e.g., Nagelkerke's R^2 output, does not provide much information about the goodness of fit of a logistic regression model to the observed data. A more useful measure than R^2 to assess the validity of the logistic regression models was applied. This assessment was the classification accuracy, which compared the group membership predicted by the logistic model against the actual known group membership, i.e., the observed values of the dependent variable (Field, 2009).

Logistic regression assumes that the independent variables are uncorrelated with each other, i.e., that they are not multi-collinear (Homer & Lemeshow, 2000). Since multicollinearity biases the values of the regression coefficients and odds ratios, sometimes extremely so, correlated variables were examined for possible multicollinearity. The results of the REG procedure diagnostics were assessed to determine if multicollinearity was an issue. No clear evidence of multicollinearity was found by assessment of tolerance, variance inflation, and proportion of variation values.

Logistic regression is very sensitive to outliers, and

outliers must be excluded to avoid biased regression coefficients and erroneous odds ratios (Homer & Lemeshow, 2000). Continuous variable outliers identified using *Z* scores were assessed for possible exclusion from the analysis.

Adequate sample size is required for logistic regression. The sample of clients ($n = 3139$) in this study was expected to be more than adequate. A power analysis (Hsieh, Block & Larsen, 1998) predicted that a sample size of 1147 cases (of which 30% are in group 0 and 70% are in group 1) would achieve 80% power at the .05 significance level to detect a change in the log odds from 0.5 to 0.6, corresponding to an odds ratio of 1.5 (Table 5).

Table 5

Results of power analysis for logistic regression analysis

Power	N	Percent N		Odds		R		
		(X = 1)	P ₀	P ₁	Ratio	Squared	Alpha	Beta
0.79949	1147	70.0	0.5	0.6	1.5	0.2	0.05	0.20051
0.79949	1311	70.0	0.5	0.6	1.5	0.3	0.05	0.20051
0.79949	1530	70.0	0.5	0.6	1.5	0.4	0.05	0.20051
0.79991	1836	70.0	0.5	0.6	1.5	0.5	0.05	0.20009
0.79991	2295	70.0	0.5	0.6	1.5	0.6	0.05	0.20009
0.79991	3060	70.0	0.5	0.6	1.5	0.7	0.05	0.20009
0.79991	4591	70.0	0.5	0.6	1.5	0.8	0.05	0.20009
0.79991	9182	70.0	0.5	0.6	1.5	0.9	0.05	0.20009

Note. Report Definitions: Power is the probability of rejecting a false null hypothesis when the alternative hypothesis is true. It should be close to 1.0, but 0.8 is the minimum recommended power. N is the size of the sample drawn from the population. P₀ is the response probability at the mean of X. P₁ is the response probability when X is increased to one standard deviation above the mean. Odds Ratio is the odds ratio when P₁ is the denominator, i.e., $[P_1 / (1 - P_1)] / [P_0 / (1 - P_0)]$. R-Squared is the R² achieved when X is regressed on other independent variables. Alpha is the probability of rejecting a true null hypothesis. Beta is the probability of accepting a false null hypothesis (Hsieh, et al., 1998).

Human Subjects Assurance

Approval was received from the University Of Pennsylvania Office Of Regulatory Affairs for "Exempt Status," category four. This is defined as: "Research that involves the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens if these sources are publicly available" (www.upenn.edu/regulatoryaffairs/human/guidance/claimofexemption 2006, p. 1).

Data files, both pre and post analysis, were maintained on the hard drive of a restricted-access computer. Original data on CD as received from AHRQ (HCUP/SEDD) and AHA were stored in a locked file cabinet in a locked office with access limited to the researcher responsible for conducting the analysis. All client identifiers were encrypted; participants were not identifiable by name. Analysis and dissemination of results were limited to aggregate data. No identifying information for hospitals or individual clients are included in the datasets or reports of research findings.

CHAPTER 4: RESULTS

The purpose of this study was to determine if the *APA Practice Guideline for Treatment of Patients with Schizophrenia* (2004) goal of assessment was met by examining whether differences exist in the frequency of psychiatric assessment of adults (aged 18 to 64 years) with schizophrenia discharged without an inpatient admission from Maryland emergency departments (EDs) in 2004. The degree to which this goal was met was assessed in community hospitals with and without an inpatient psychiatric unit (IPU) during 2004. This research also investigated the effects of selected system and client characteristics on the likelihood of psychiatric assessment and described selected system and client characteristics.

This chapter presents the results of the study beginning with a determination and description of the sample and assessment of relationships between variables. Results will be presented as they pertain to the specific aims and hypotheses addressed by this study. Finally, a summary of the results is presented as they pertain to the study hypotheses, followed by the conclusion.

Determination and Description of the Sample

The American Hospital Association (AHA) database for 2004 was merged with the Agency for Healthcare Research and

Quality (AHRQ) / Healthcare Cost and Utilization Project (HCUP) / State Emergency Department Database (SEDD) administrative database, providing abstracts for all clients discharged from each ED with a principal diagnosis of schizophrenia. The hospital identifiers (ID) from the AHA linkage file and the patient key codes supplied with the AHRQ/HCUP/SEDD dataset facilitated the alignment of all information for each client within the 46 hospitals into one database.

Screening to identify duplicate client records was initially performed using the patient key codes. All cases identified by the key codes were primary cases, i.e., there were no duplicates. The total number of client records identified by the patient key codes was $N = 3188$. The sample population was defined as Maryland hospitals that discharged a minimum of 5 clients aged between 18 and 64 with a principal diagnosis of schizophrenia. Eight clients aged over 64 years were deleted, so that the total number of client records identified by patient key codes was reduced to $N = 3180$. Three hospitals discharged fewer than 5 clients; these were deleted so that the total number of client records was reduced to $N = 3175$ and the total number of hospitals was reduced to $N = 43$.

A total of $N = 3139$ client records documented with five CPT codes (99281, 99282, 99283, 99284, and/or 99285) were extracted from the database. All client records not documented with at least one of these five CPT codes were excluded (Figure 2).

Descriptive statistics calculated to answer Null Hypothesis #2 revealed that only 492 (15.7%) clients from the original sample of 3,139 clients in 43 hospitals had a documented PDIE. The frequency distributions of clients for whom psychiatric assessment was documented varied significantly with respect to whether or not the hospitals had IPUs, indicated by *Chi square 155.61, $p < 0.0001$* . The main reason for this statistically significant difference, reported in Table 6, was that the frequency of a PDIE for clients discharged from hospitals with an IPU ($n = 451$, 21.3%) was significantly greater than the corresponding frequency of clients discharged from hospitals without an IPU ($n = 41$, 4.0%).

The 492 clients with a documented PDIE came from only 9 of the 43 hospitals. Logistic regression analysis of such a skewed sample (only 492 clients with a documented PDIE compared to 2647 clients without a documented PDIE) would not produce reliable results. To correct this problem, the sample size was reduced to only those clients from the 9

hospitals with at least one PDIE documented, resulting in a sample size of $N = 881$ client records.

The database also included medical record numbers (MR) for each client, but the calendar date of service for each client was not available, and some MR numbers had more than one discharge in any given quarter, so that all of the clients could not be properly de-duplicated using the MR numbers as originally planned. When the database was de-duplicated using only the first record for each MR as the primary case, then the number of client records was reduced from $N = 881$ to a final sample of $N = 682$.

3,188 clients - 46 hospitals
Principal diagnosis of schizophrenia discharged from
Maryland community hospital EDs in 2004

3,180 clients - 46 hospitals
Aged between 16 and 64 years

3,175 clients - 43 hospitals
Three hospitals that discharged less
than 5 clients were excluded reducing the
client and hospital samples

3,139 clients - 43 hospitals
At least one of 5 levels of
service documented (**Original Sample**)

881 clients - 9 hospitals
Hospitals with at least one
PDIE* documented

682 clients - 9 hospitals
De-duplicated by MR#
(Final Sample)

Figure 2. Graphic depiction of determination of sample, * psychiatric diagnostic interview examination (PDIE).

Table 6

Comparison of PDIE for 3139 clients with respect to availability of IPUs at 43 hospitals (Original Sample)

	Inpatient Psychiatric Unit (IPU)			Statistical Test
	No	IPU	Total	Chi - square
<hr/>				
No PDIE				
Frequency	980	1667	2647	
Percent	96.0%	78.7%	84.3%	
<hr/>				
PDIE				155.61***
Frequency	41	451	492	
Percent	4.0%	21.3%	15.7%	
<hr/>				
Total Count	1021	2118	3139	
Percent	100.0%	100.0%	100.0%	

*** $p < 0.001$.

Since there was not enough variation in the original sample of 3,139 clients from 43 hospitals to pick up any significant statistical significance, a comparison of the system and client characteristics for three sample sizes is presented as Appendix C. The three sample sizes include the original sample of 3,139 clients from 43 hospitals, the de-duplicated sample of 2,031 clients from the 34 hospitals with no PDIEs documented and the final sample of 682 clients from the 9 hospitals with at least one PDIE documented. Statistical analysis of the 34 hospital and 9 hospital samples revealed no statistically significant associations except for the client characteristics of race, insurance, and level of service. More African-Americans had a PDIE documented than expected and more White-Caucasians had no PDIE documented than expected. More individuals with Medicare and No insurance had a PDIE documented than expected. Fewer individuals with Medicaid and private insurance had a PDIE documented than expected. At levels of service 99281, 99283, 99284, and 99285 fewer individuals had a PDIE documented than expected. At level of service 99282, more individuals had a PDIE documented than expected. Statistical analysis to compare the original sample of 3,139 clients from 43 hospitals with the 34 hospital and 9 hospital samples was not possible as the 34

hospital sample and the final 9 hospital sample were subsets of the original 43 hospital sample.

The focus of subsequent discussions is based on the final sample of 682 clients from 9 hospitals with at least one PDIE documented.

Screening to identify outliers identified Z scores ranging from a minimum of -2.2 to a maximum of +3.1. The standard deviations either side of the means were within the expected normal limits of ± 3.3 (Tabachnik & Fidell, 2007). There was no justification to exclude any cases from the statistical analysis due to the presence of univariate outliers.

Hospitals

The average number of inpatient beds was 338. The average number of annual ED visits was 55,483. All of the hospitals in the sample offered psychiatric emergency services [PES] ($n = 9, 100\%$), and were non-profit ($n = 9, 100\%$). The majority of hospitals in the sample had an IPU ($n = 8, 88.9\%$), were located in an urban area ($n = 7, 77.8\%$), and belonged to a hospital system ($n = 6, 66.7\%$). Two-thirds ($n = 6, 66.6\%$) of the hospitals had a residency training/medical school affiliation (Table 7).

Table 7

Characteristics of hospitals (N=9)

Characteristics		Frequency (%) Number of Hospitals	Mean [SD]
Inpatient Psychiatric Unit (IPU)	Yes	8 (88.9)	
	No	1 (11.1)	
Psychiatric Emergency Services (PES)	Yes	9 (100)	
	No	0	
Total inpatient beds, mean [SD]			338 [194.8]
Annual ED visits, mean [SD]			55483[16112]
Teaching Status (Residency Training/Medical School Affiliation)	Yes	6 (66.6)	
	No	3 (33.3)	
Urban/Rural Location	Urban	7 (77.8)	
	Rural	2 (22.2)	
Ownership Type	Non- Profit	9 (100)	
	For Profit	0	
System Membership	Yes	6 (66.6)	
	No	3 (33.3)	

Clients

With the exception of co-morbidities, all of the client characteristics were mutually exclusive; therefore the sum of each of their percent frequencies equal 100% (Table 8). The average age was 39.31 years. Nearly two-thirds of the clients (n = 413, 60.6 %) were male. Over half (n = 423, 62%) were African-American, while over one-third (n = 235, 34.5%) were White-Caucasian, and less than 4% were other races. The expected primary payers for over two-thirds of the clients (n = 455, 66.7%) were Medicaid and Medicare, while just over one-fifth (n = 160, 23.5 %) had no medical insurance. Less than one-tenth (n = 55, 8.1%) had private insurance. The highest level of service (i.e., the most severe) for each client was recorded. The most frequently recorded level of service (n = 230, 33.7%) was for CPT 99284 (high severity), while the least frequent (n = 18, 2.6%) was for CPT 99281 (self-limited or minor).

Individual co-morbidities were recorded for more than half (n = 414, 60.7%) of the clients. One-quarter of the clients (n = 171, 25%) had only one co-morbidity documented. About one-seventh (n = 100, 14.6%) of clients had two co-morbidities documented. Less than 5 percent (n = 22, 3.2%) of clients had three co-morbidities documented.

Psychiatric conditions in addition to schizophrenia, including affective disorders, other psychoses, anxiety, somatoform, dissociative, personality disorders, pre-adult disorders, and other mental disorders were documented for almost one-quarter of the clients (n = 168, 24.6%). Abuse of alcohol and other substances were documented for more than one-fifth of the clients (n = 153, 22.4%). Other co-morbidities (over and above the previously mentioned psychiatric and substance co-morbidities) were documented most frequently (n = 258, 37.8%), (Table 8).

Table 8

Characteristics of 682 clients

Characteristics	Frequency (%) Number of Clients	Mean [SD]
Age, mean [SD]		39.31 [11.17]
Race		
African-American	423 (62.0)	
White-Caucasian	245 (34.5)	
Other	24 (3.5)	
Gender		
Male	413 (60.6)	
Female	269 (39.4)	
Co-morbidities ^a		
Other psychiatric	168 (24.6)	
Alcohol/substance Abuse	153 (22.4)	
Other co-morbidities	258 (37.8)	
Insurance		
Medicare	257 (37.7)	
Medicaid	198 (29.0)	
None	160 (23.5)	
Private	55 (8.1)	
Other	12 (1.7)	
Level of Service		
CPT 99285 (highest severity)	217 (31.8)	
CPT 99284 (high severity)	230 (33.7)	
CPT 99283 (moderate severity)	154 (22.6)	
CPT 99282 (low to moderate severity)	63 (9.2)	
CPT 99281 (self- limited or minor)	18 (2.6)	

Note. ^a multiple co-morbidities per client were recorded

Assessment of Relationships between Variables

Before the logistic regression analysis could be performed, the predictor variables were screened to determine if they violated the critical assumptions that (a) they must not be collinear (i.e., they must not be significantly correlated or associated with each other) and that (b) no categorical variables containing zero frequencies should be included.

Correlation Analysis

A matrix of Pearson's correlation coefficients was computed to determine if the quantitative variables describing each of the hospitals and the client ages were correlated. A statistically significant positive correlation between the number of emergency department (ED) visits and the number of inpatient beds was identified (Table 9).

Pearson's correlation coefficients provide an indication of the strength of association (Agresti, 2007). The conventional interpretation of Pearson's correlation coefficient was applied, i.e., less than 0.1 indicated little, if any, meaningful association between the two variables; 0.1 to 0.3 indicated weak or low association; 0.3 to 0.5 indicated moderate association; and greater than 0.5 indicated a high or strong association (Agresti).

The correlation indicated by Pearson's $r = .711$ reflected a strong positive association between the number of inpatient beds and the number of ED visits, as expected (Table 9).

Table 9

Pearson's correlation coefficients among 682 clients in 9 hospitals

	Client Age	Number of ED Visits
Number of ED Visits	.110**	
Number of Inpatient Beds	.091*	.711***

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

System Characteristics

A series of two-way cross tabulation analyses were performed, the results of which are presented in Table 10.

Table 10

Pearson's chi square statistics for system characteristics for 9 hospitals

	IPU	Urban/Rural Location	Teaching Status	System Membership
IPU	-			
Urban/Rural Location	383.11***	-		
Teaching Status	72.36***	128.81***	-	
System Membership	10.04**	17.87***	185.80***	-

Note.** $p < 0.01$, *** $p < 0.001$.

It was not unexpected to find that all of the categorical system characteristics were associated. Statistically significant associations were identified for IPU and urban/rural location, teaching status, and system membership. Associations between teaching status and urban/rural location and between system membership and urban/rural location and teaching status were statistically significant. Linear relationships among independent variables referred to as multicollinearity is an issue requiring investigation prior to logistic regression. If two variables are collinear, the coefficients may be more

unstable and the estimated standard errors may be inflated. When multicollinearity exists, the effects of each variable will be inaccurately estimated, resulting in the possibility of concluding that the two variables have no effect, when, as a group, they may have a strong effect (Allison, 1999). The PROC REG procedure was run to assess multicollinearity on the system characteristics. PROC REG diagnostics were assessed to determine if multicollinearity was an issue (Allison, 1999). No clear evidence of multicollinearity was found by assessment of tolerance, variance inflation, and proportion of variation values.

Eight of the nine hospitals had an inpatient unit (IPU), only one did not. All of the 9 hospitals supported psychiatric emergency services (PES). No statistical association was computed because PES had less than two non-missing levels due to all hospitals in the sample offering PES. Since PES had only one level, it was excluded from the logistic regression. IPU was also excluded because only one hospital did not have an IPU, and the logistic regression models would not converge with this frequency imbalance (Table 11).

Table 11

Cross tabulation of PES x IPU at 9 hospitals

		Psychiatric Emergency Services (PES)		
		No	Yes	Total
Inpatient Psychiatric Unit (IPU)	No	0	1	1
	Yes	0	8	8
Total		0	9	9

For a similar reason, the hospital ownership categories were also excluded because no clients were discharged from hospitals that were owned for profit where a PDIE was also conducted, indicated by the zero frequency in the cross tabulation (Table 12).

Table 12

Cross tabulation of documentation of PDIE x hospital ownership for 682 clients from 9 hospitals

Documentation of Psychiatric Diagnostic Interview Examination (PDIE)	Ownership		Total
	Not for Profit	For Profit	
No	314	0	314
Yes	368	0	368
Total	682	0	682

Client Characteristics

In order to comply with the assumptions of Chi square (specifically the need for the frequencies to be greater than or equal to 1 for all cells, with no more than 20% of cells having frequencies of less than 5), three categories were collapsed. The client ages were collapsed into five approximately equal-sized ordinal categories (1 = 18 to 27; 2 = 28 to 37; 3 = 38 to 43; 4 = 44 to 49; and 5 = 50+). Race was collapsed into two categories, specifically Not African-American and African-American; the justification for this was that over half of the clients (n

= 423, 62.0%) were African-American, so that African-American was the main category relative to the Not African-American group (i.e., the White-Caucasian and other races). The insurance status was collapsed into two nominal categories, specifically "Yes" = Medicaid, Medicare, private, and other public insurances and "No" = no insurance or unknown; the justification for this was that most of the clients (n = 522, 76.5%) had some form of medical insurance, so that Insurance = "Yes" was the main category, relative to the "None" category. Nevertheless, the minimum sample size requirement for each cell of a multi-way cross-tabulation was violated. A series of two-way cross-tabulation analyses was performed to calculate *Pearson's Chi square*. With the exception of the associations between gender and insurance, and substance/alcohol and other co-morbidities, there was little evidence (Table 13) to indicate associations of practical significance among the client characteristics (race, gender, co-morbidities, insurance status, and level of service). Consequently, few if any, collinearity problems would be expected if these categorical variables are included as predictors in a regression model. As a check for possible multicollinearities between gender and insurance, and substance/alcohol abuse and other co-

morbidities, regression models were run with and without these variables, and with and without their interactions. No changes in the models were found from any of the combinations of these variables when they were included in the regressions.

Table 13

Pearson's chi square test results for client characteristics

	Race	Gender	Ins Status	Level of Service	Other Psych	Sub/Al Abuse	Other Co-morb
Race	-	1.73	4.63	19.61*	0.03	1.51	8.80*
Gender		-	7.80**	3.52	0.74	0.19	0.04
Insurance Status			-	13.20*	0.01	0.00	0.42
Level of Service				-	2.07	4.69	3.10
<u>Co-morbidities</u>							
Other psychiatric disorders					-	3.93*	2.40
Alcohol/ Substance Abuse						-	13.10**
Other co-morbidities							-

Note.* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

A four-way cross-tabulation between the categorical client characteristics (race, gender, insurance status, and level of service) was constructed (Table 14). A higher proportion of African Americans are represented at all five levels of service (89.4% at level 99281, 65.1% at level 99282, 53.2% at level 99283, 65.2% at level 99284, and 61.6% at level 99285) compared to non-African Americans. Almost one-third of African American men in this sample are uninsured (n = 79, 29.9%), followed by African American women (n = 30, 18.9%). Of non-African Americans in this sample, one-fifth (n = 33, 22.1 %) of men are uninsured compared to only (n = 18) 16.4% of women.

Table 14

Four-way cross tabulation between categorical characteristics of 682 clients

Level of Service	Race	Insurance Status	Gender		Totals by Race	Totals by Level of Service
			Male	Female		
CPT 99281 (Self-limited or minor)	Not AA	No	0	0	2	18
		Yes	0	2		
	AA	No	3	0	16	
		Yes	9	4		
CPT 99282 (Low or moderate severity)	Not AA	No	2	2	22	63
		Yes	11	7		
	AA	No	5	6	41	
		Yes	22	8		
CPT 99283 (Moderate Severity)	Not AA	No	6	4	72	154
		Yes	32	30		
	AA	No	12	6	82	
		Yes	37	27		
CPT 99284 (High Severity)	Not AA	No	10	5	80	230
		Yes	39	26		
	AA	No	26	4	150	
		Yes	73	47		
CPT 99285 (Highest Severity)	Not AA	No	15	7	83	217
		Yes	34	27		
	AA	No	33	14	134	
		Yes	44	43		

Specific Aims and Hypotheses

With respect to Maryland community hospitals with and without IPUs that discharged a minimum of five adults directly from the ED with a principal diagnosis of schizophrenia in 2004:

Aim 1

Aim 1 was to describe selected system and client characteristics of the EDs.

Null Hypothesis 1

H0#1a. There is no *statistically significant* difference in the system characteristics including availability of PES, total inpatient beds, annual ED visits, teaching status, urban/rural location, ownership type, and system membership.

Continuous variables (total inpatient beds and annual ED visits) are displayed using means and standard deviations. Frequencies and percentages are used to present the categorical variables (availability of PES, teaching status, urban/rural location, ownership type, and system membership).

All hospitals with an IPU (n = 8, 88.9%) offered PES and were non-profit (n = 8, 88.9%). The majority of

hospitals with an IPU were located in an urban area (n = 7, 87.6%). Just over half of the hospitals with an IPU belonged to a hospital system (n = 5, 55.6%). Less than half (n = 3, 33.3%) of the hospitals with an IPU had a residency training/medical school affiliation. The average number of inpatient beds was 262. The average number of annual ED visits was 49,960 (Table 15).

The one hospital without an IPU offered PES, was non-profit, belonged to a hospital system, was located in a rural area and had no residency training/medical school affiliation. The hospital without an IPU was smaller than the hospitals with an IPU, with only 111 inpatient beds and 39,038 annual ED visits (Table 15).

Independent samples t tests were performed to compare the mean number of inpatient beds and the mean number of annual ED visits at hospitals with and without an IPU (Table 15). The null hypothesis could not be rejected. There was no significant difference between the mean number of inpatient beds or the mean number of annual ED visits at hospitals with and without an IPU.

The categorical system characteristics did not meet the assumptions for *Chi square* analysis as originally proposed. *Fisher's Exact* tests were performed to compare the categorical variables, including teaching status, urban/rural

location, and system membership at hospitals with and without an IPU (Table 15). The null hypothesis could not be rejected. Based on the *Fisher's Exact* test, the system characteristics were independent of hospitals with or without an IPU (Table 15).

Table 15

Characteristics of 9 hospitals with and without an IPU

Characteristics	[N, (%)]		Test Statistics	
	Hospitals with an IPU N = 8 (88.9%)	Hospitals without an IPU N = 1 (11.1%)	<i>t</i> test	<i>Fisher's Exact</i> (<i>p</i> values)
PES Available	8 (88.9)	1 (11.1)		
Total inpatient Beds, mean, [SD]	262 [182]	111	.45	
Annual ED visits, Mean, [SD]	49960 [19525]	39038	.61	
Teaching Status (residency/training, Medical school affiliation)	3 (33.3)	0		1.000
No Teaching	5 (55.6)	1 (11.1)		
Urban Location	7 (87.6)	0		.22
Rural Location	1 (11.1)	1 (11.1)		
Ownership (non-profit)	8 (88.9)	1 (11.1)		
System Membership	5 (55.6)	1 (11.1)		1.00
No System Membership	3 (33.3)	0		

H0#1b. There is no *statistically significant* difference in the client characteristics, including age, race, gender, co-morbidities, insurance status, and level of service.

Distribution of Clients among Hospitals

The number of clients identified by patient key codes discharged from each hospital ranged from 28 to 172. The frequency distribution was skewed. Seven hospitals discharged < 100 clients while 2 hospitals discharged > 100 clients. The median was 48 clients per hospital and the mean was 76 clients per hospital.

Characteristics of Clients (n=682) within Hospitals (n=9) with and without Inpatient Psychiatric Units (IPU)

A total of 682 clients within 9 hospitals were included in the analysis. The characteristics of the clients within the hospitals are presented in Table 17. The continuous variable client age for hospitals with and without an IPU is displayed using means and standard deviations. Frequencies and percentages are used to present the categorical variables (race, gender, co-morbidities, insurance status, and level of service).

Independent samples t-tests was performed to compare the mean age of clients at hospitals with and without an IPU

(Table 16). The null hypothesis could not be rejected. There was no significant difference between the mean ages of clients at hospitals with and without an IPU.

Chi square tests were performed to test for independence between the categorical variables race, gender, co-morbidities, insurance status, and level of service at hospitals with and without an IPU. The null was rejected for race. Significant associations were found between the frequencies of clients by race with respect to whether or not there was an IPU ($p < .01$). The reason for the significant association can be identified by comparing the frequency distributions of race. The relative proportion of clients from hospitals with an IPU was greater for race than the proportion of the clients from the hospital without an IPU (Table 16). There were no significant associations between genders, the co-morbidities, insurance status, or level of service with respect to whether or not there was an IPU.

Table 16

Characteristics of 682 clients within 9 hospitals with and without an IPU

Characteristics	[N, (%)]		Test Statistics	
	Clients from hospitals with an IPU N=634 (93%)	Clients from hospitals without an IPU N=48 (7%)	t test	Chi square
Age, mean [SD]	39.34 [11.1]	38.94 [12.21]	0.24	
Race				15.4***
African-American	405(59.4)	18(2.6)		
White-Caucasian	206(30.2)	29(4.3)		
Other	23(3.4)	1(0.2)		
Gender				0.00
Male	384(56.3)	29(4.3)		
Female	250(36.7)	19(2.3)		
Co-morbidities ^a				
Other psychiatric	155(22.7)	13(1.9)		0.17
All Others	479(70.2)	35(5.1)		
Alcohol/substance Abuse	140(20.5)	12(1.8)		0.64
All Others	494(72.4)	36(5.3)		
Other co-morbidities	246(36.1)	12(1.8)		3.61
All Others	388(56.9)	36(5.3)		

Note.^a Multiple co-morbidities per client were recorded. *** $p < 0.001$.

Table 16 (continued)

Characteristics of 682 clients within 9 hospitals with and without an IPU

Characteristics	[N, (%)]		Test Statistics	
	Clients from hospitals with an IPU N = 634 (93%)	Clients from hospitals without an IPU N = 48 (7%)		
Insurance Status				0.20
Insurance	484 (71.0)	38(5.6)		
No Insurance	150 (22.0)	10(1.5)		
Level of Service				7.04
99281 (Highest severity)	18(2.6)	0		
99282 (High severity)	60(8.8)	3(0.4)		
99283 (Moderate severity)	142(20.8)	12(1.8)		
99284 (Low to moderate severity)	207(30.4)	23(3.4)		
99285 (Self-limited or minor)	207(30.4)	10(1.5)		

All of the clients (n = 682, 100%) were discharged from hospitals that were non-profit and supported psychiatric emergency services (PES). The majority of clients visited hospitals with an IPU (n = 634, 93.0%), in an urban location (n = 601, 88.1%). Most of the clients visited hospitals with system membership (n = 571, 83.7%) and had a residency training/medical school affiliation (n = 398, 58.4%), (Table 17).

Table 17

Distribution of system categorical characteristics for 682 clients

Variable	Frequency (Number of Clients)		Percent
Inpatient Psychiatric Unit (IPU)	Yes	634	93.0
	No	48	7.0
Psychiatric Emergency Services (PES)	Yes	682	100.0
	No	0	
Teaching Status (Residency Training/ Medical School Affiliation)	Yes	398	58.4
	No	284	41.6
Urban/Rural Location	Urban	601	88.1
	Rural	81	11.9
Ownership Type	Not- For- Profit	682	100.0
	For- Profit	0	
System Membership	Yes	571	83.7
	No	111	16.3

Aim 2

Aim 2 was to explore if the frequency of psychiatric assessment differs in EDs in hospitals with and without IPUs.

Null Hypothesis 2

H0#2. There is no statistically significant difference in the frequency of psychiatric assessment.

Outcome of Documented Psychiatric Diagnostic Interview Examinations (PDIE)

The documentation of a psychiatric diagnostic interview examination (PDIE) is considered separately since PDIE was the outcome of interest (a dependent variable) and not a client characteristic (Table 18). In the original sample of 3,139 clients from 43 hospitals, the null hypothesis was rejected as a statistically significant difference was found between those clients with and without a documented PDIE. The majority of the 3139 clients (n = 2647, 84.3%) did not have a documentation of a PDIE. Documentation of a PDIE existed for less than one-fifth of the clients (n = 492, 15.7%), (Table 6).

Chi square tests were performed to compare PDIE at hospitals with and without an IPU. Analysis of the final sample (n = 682 clients from 9 hospitals) found 54% of

clients had a documented PDIE, however, for the final sample size the results did not reach statistical significance, and therefore, the null could not be rejected (Table 18).

Table 18

Comparison of PDIE for 682 clients with respect to availability of IPUs at 9 hospitals

	Inpatient Psychiatric Unit (IPU)		Statistical Test <i>Chi square</i>
	No IPU	IPU	Total
<hr/>			
No PDIE			
Frequency	20	294	314
Percent	42.0%	46.4%	46.0%
<hr/>			
PDIE			0.40
Frequency	28	340	368
Percent	58.3%	53.6%	54.0%
<hr/>			
Total Count	48	634	682
Percent	100.0%	100.0%	100.0%
<hr/>			

Aim 3

Aim 3 was to determine the effects of system and client characteristics on the likelihood of psychiatric assessment.

Null Hypothesis 3

H0#3. The system and client characteristics have no effect on the likelihood of psychiatric assessment.

Generalized Linear Model

The dependent variable for the binary logistic regression model was the documentation of a psychiatric diagnostic interview examination (PDIE) for each client measured at the binary nominal level, where 1 = Yes and 0 = No. The analysis aimed to determine if the probability of a PDIE could be predicted from the system characteristics (the number of inpatient beds, the annual number of ED visits, teaching status, urban/rural location, and system membership) or from the client characteristics (age, race, gender, co-morbidities, insurance status, and level of service).

The probability of a PDIE was modeled using the client characteristics (age, African-American, other race, gender, co-morbidities, insurance status, and level of service) and the system characteristics (total inpatient beds, annual number of ED visits, teaching status, urban/rural location,

and system membership) as predictor variables since clients were clustered within the hospitals.

Logistic regression analysis was performed using only the final sample of 682 clients from the 9 hospitals in which a PDIE was documented as the original sample of 3139 clients from 43 hospitals was too skewed to PDIE = 0 to produce reliable results.

Generalized estimating equations (GEE) were used to estimate the effects of the hospital and client characteristics on the likelihood of a PDIE. The model failed to converge when any of the hospital characteristics (total inpatient beds, annual ED visits, teaching status, urban/rural location, and system membership) were included. The results in this discussion are based on the models estimated with all client characteristics included in the model concurrently. Separate models were run to estimate the effects of each client characteristic, however, the results were nearly identical to the concurrent model shown in Table 19.

The null could not be rejected based on the results of the GEE analysis on the likelihood of PDIE. None of the predictors reached the level of statistical significance (Table 19).

Table 19

GEE analysis predicting the effect of client and hospital characteristics on PDIE (N = 682)

Predictor	<i>B</i>	<i>SE B</i>	e^B
Level of Service, 99281	-1.03	0.77	0.36
Level of Service, 99282	-0.44	0.47	0.64
Level of Service, 99283	0.60	0.34	1.82
Level of Service, 99284	0.06	0.11	1.06
Insurance	-0.00	0.11	1.06
African American	0.48	0.40	1.62
Other Race	-0.04	0.31	0.96
Gender	0.06	0.07	1.06
Age	0.01	0.01	1.01
Psych Co-morbidity	0.04	0.07	1.04
Substance Co-morbidity	-0.08	0.07	0.92
Other Co-morbidity	-0.03	0.11	0.97

Note. e^B =Odds Ratio.* $p < 0.05$.

Summary of Results

A statistically significant association between the frequency of psychiatric assessment (PDIE) of clients discharged from hospitals and IPU was found. The original

sample (n = 3,139 clients from 43 hospitals), however, was so skewed for clients not having a documented PDIE that the model to test the effects of system or client characteristics on the likelihood of PDIE could not be executed as originally planned. The model to test the effects of system and client characteristics on the likelihood of a PDIE being documented was not statistically significant when run on the smaller final sample of 9 of the original 43 hospitals, which reduced the client sample from n = 3139 to n = 682.

At the probability level of 0.20 the classification accuracy was 54.0%, indicating that the model classified 54.0% of the 682 clients into the correct PDIE category.

Conclusion

Significant associations existed between hospitals with and without an IPU in regard to the frequencies of psychiatric assessment of adults with schizophrenia discharged from Maryland EDs in community hospitals. The differences between the numbers of individuals with and without a documented assessment were too great to use the original sample of 3,139 clients in 43 hospitals to assess the effects of system or client characteristics on the likelihood of a documented PDIE. Using the final sample of

682 clients in 9 hospitals, the likelihood of a PDIE could not be predicted by the client characteristics.

CHAPTER V: DISCUSSION

This chapter discusses the relevant findings of this research and then its limitations. Next, strategies are suggested and discussed to strengthen future studies on this topic. Chapter V then articulates this study's implications for healthcare stakeholders and concludes with suggestions for future research.

Discussion of Relevant Findings

In response to challenges faced by people with mental disorders, both the New Freedom Commission (2004) and the Institute of Medicine (2006) have called for restructuring of the U.S. health care delivery system. Prior to restructuring, planners must understand the frequency of two aspects of psychiatric assessment in the emergency department (ED): first, psychiatric assessment documented as a psychiatric diagnostic interview examination (PDIE); and second, whether or not system and/or client characteristics have an effect on the likelihood of a PDIE. The purpose of this study was to examine the frequency of PDIE and the effect of system and/or client characteristics on the likelihood of PDIE. A discussion of the significant findings of this study will be presented.

Aim 1

Race

Consistent with the findings of previous research (Cunningham, 2006), this study of the final sample of 682 clients from 9 hospitals found ED visit rates for African Americans were higher than for Whites. African Americans made 62 percent of visits, while Whites made only 34.5 percent of visits. The total proportion of ED visits by African Americans and Whites combined (96.5%) was also consistent with previous research. Maryland Health Care Commission (2008) reported African Americans and Whites combined accounted for 94.2 percent of all ED visits.

Gender

Previous research from across the U.S. reported men have higher visit rates to the ED in general (McCaig & Newar, 2006; Young, et al., 2005). In Maryland, the reverse was reported for 2003. In Maryland generally, women were more likely to visit an ED (Maryland Health Care Commission, 2008). The results of the study of the final sample of 682 clients from 9 hospitals, however, were consistent with the U.S. results because it found more ED visits were made by men (60.6%) than by women (39.4%).

Co-morbidities

Previous research has reported patients presenting to the ED for a psychiatric evaluation had a higher prevalence of co-morbidities in general (Vergare, Binder, Cook, Galanter, & Lu, 2005; American Psychiatric Association, 2004). This research found 60.7 percent of the final sample (683 clients from 9 hospitals) had at least one documented co-morbidity. These findings are consistent with a literature review that found almost 50 percent of individuals with schizophrenia to have co-morbidity (Green, Canuso, Brenner, & Wojcik, 2003).

This research assessed if any of groups of co-morbidities were documented on a client record. These co-morbidities were assessed: co-morbid psychiatric disorder, substance/alcohol abuse, and other co-morbidities (not including comorbid psychiatric disorder and substance/alcohol abuse) on each record. Some of the co-morbidities assessed in this study were documented far less often than has been reported in previous research.

Substance abuse among adults with schizophrenia is much higher than for the general population (Green, Canuso, Brenner, & Wojcik, 2003; Regier, et al., 1990). The rate of co-morbid substance/alcohol abuse (22.4 %) in this study was lower than found in other studies reporting life-time

prevalence to be as high as 48 percent (Regier, et al., 1990). It is not surprising that more than one-fifth of the clients had a diagnosis of substance/alcohol abuse or dual-diagnosis. Todd, et al., (2004) defined dual-diagnosis as having both a mental disorder and an addictive disorder. Individuals with dual-diagnosis have significantly more ED visits than those with mental disorder alone (Curran, Sullivan, Williams, et al, 2003).

Level of service

This research found the majority of clients discharged directly from the ED in both the original sample (n = 3139 clients from 43 hospitals) and the final sample (n = 682 clients from 9 hospitals) had a level of service documented at moderate to highest severity [99283, 99284, and 99285], (n = 2642, 84.2%) and (n = 601, 88.1%) respectively. What is surprising, however, is that less than one-fifth (15.7%) of the clients had a documented PDIE in the original sample (n = 3139 clients from 43 hospitals). Even when the analysis was limited to the final sample (n = 682 clients from 9 hospitals), only those 9 hospitals with at least one psychiatric diagnostic interview examination (PDIE) documented; only 54 percent of clients had a documented PDIE.

Aim 2

An examination of whether the frequency of psychiatric assessment differed for EDs in hospitals with and without an inpatient psychiatric unit (IPU) was conducted. For the original sample (3,139 clients from 43 hospitals), the frequency of PDIE varied significantly with regard to whether or not the ED was in a hospital with or without an IPU. The frequency of a PDIE at hospitals with an IPU was 21.3 percent compared to only 4.0 percent at hospitals without an IPU.

Rarely were the goals of psychiatric assessment for adults with mental disorders, as recommended by the *APA Practice Guideline for Treatment of Patients with Schizophrenia* and the New Freedom Commission (APA, 2004; New Freedom Commission, 2004), met. Only 15.7 percent of adults in the original sample of 3,139 clients in 43 hospitals had a documented PDIE. This outcome is lower than the 44 percent of 298 clients who upon chart review were found to have had a mental status examination in the ED prior to admission to an inpatient psychiatric unit (IPU) (Tintinalli, et al., 1994). In general, these findings are consistent with information that the frequency of assessments defined as diagnostic and/or screening services

may be on the decline in the ED (McCaig & Burt, 2001; McCaig & Burt, 2003; Nawar, Niska, & Xu, 2007).

When analyses were conducted on only the final sample of 682 clients from the 9 hospitals with at least one documented PDIE, 54 percent of adults had a documented PDIE, however, these results did not reach statistical significance.

Aim 3

The effects of the client and system characteristics on the likelihood of a PDIE could not be predicted.

Limitations

This study had some limitations, most of which were related to the inherent problems associated with the use of secondary data. The results of this study cannot be generalized to other EDs. Due to payer restrictions, it did not take into account the assessment of those adults with schizophrenia who were seen in the ED and admitted to an inpatient bed prior to discharge. The data did not include any information on the client disposition from the ED, therefore, it is possible that clients discharged from the ED may have been transferred to another hospital for psychiatric services rather than discharged directly back

to wherever they were living immediately prior to the ED visit.

The results are also limited by the potential for inaccuracy of coding. Inaccuracy of coding may be the result of variability in individual hospital practices for thorough and accurate recording (Edelberg, 2004; Iezzoni, 1997), the level of experience of the coder, and the subjectivity of the code descriptors. Additionally, even though CPT 90801 has been found to be the most frequently used code to document a psychiatric assessment (Goldberg, 2004) and is reimbursable at 80 percent rather than the 50 percent used for other psychiatric codes (Schmidt, Yowell, & Jaffe, p. 10), the possibility does exist for an evaluation and management (E & M) code to have been documented for a psychiatric assessment in lieu of CPT 90801.

This study was also limited by the small number of client records (15.7%) in the original sample of 3,139 clients from 43 hospitals, documented with a PDIE. To determine if there were similarities or differences, a comparison of the system and client characteristics for three sample sizes is presented as Appendix C. The three sample sizes include the original sample of 3,139 clients

from 43 hospitals, the sample of 2,031 clients from the 34 hospitals with no PDIE documented, and the final sample of 682 clients from 9 hospitals that had at least one documented PDIE. Chi square analysis of the system and client characteristics for both the 34 hospital and 9 hospital samples found only race, insurance and level of service to be statistically significant.

The low median and mean of clients per hospital translates into only 4 to 6 clients requiring a PDIE, being discharged from each hospital, each month. With such a low median and mean of clients per hospital discharged with a principal diagnosis of schizophrenia a volume/outcome association is possible. Volume/outcome associations can result in a shortage of experienced practitioners to conduct and document a PDIE (Shahian & Normand, 2003). When all clients discharged with a principal diagnosis of any mental disorder are considered, a total of 68,557 clients were discharged from Maryland community hospital EDs during 2004. Discharging over 60 thousand clients with mental disorders over the course of a year translates into a mean of 3 to 4 clients requiring a PDIE being discharged from each hospital, each day. That volume should be more than sufficient to have experienced professionals conducting and

documenting a PDIE. The other issue, however, is if hospitals are not educating practitioners to conduct a PDIE and document using the CPT 90801 a volume/outcome association would still be of concern.

Strategies to Strengthen Future Studies

Future studies on this topic could be strengthened in three ways: (a) replicating this research using the largest available sample of Agency for Healthcare Research and Quality (AHRQ)/Healthcare Cost and Utilization Project (HCUP)/State Emergency Department Database (SEDD), (b) using longitudinal analysis to answer the question of whether or not PDIE is on the decline in the ED, (c) and/or employing a mixed methods approach to understand why the frequency of PDIE documentation was found to be so low. Additional HCUP/SEDD data have recently become available to expand future research on this topic. Supplementing an expanded quantitative analysis with chart reviews and qualitative interviews would allow researchers to pursue these three suggestions.

At the time of this writing, AHRQ/HCUP/SEDD with the data elements necessary to replicate this research is available for Hawaii, Maryland, Maine, and Vermont, all for

calendar year 2007. Using these data could enable replication of this study with an even larger sample.

Moreover, between 1992 and 2005 the frequency of general diagnostic and/or screening in the ED declined from 89.0 percent to 71.9 percent. Longitudinal analysis would answer the question of whether or not PDIE is, in fact, on the decline in the ED. Now that additional years of data have been released by AHRQ, longitudinal analysis would be possible.

Finally, a mixed-methods approach to understanding why the frequency of PDIE was found to be so low could include chart reviews and qualitative interviews with ED providers. Since examination of CPT data alone cannot answer the question of the frequency with which psychiatric assessments are documented with an evaluation and management (E & M) code rather than using the PDIE CPT 90801, chart reviews could determine when a psychiatric assessment was completed but not documented as a PDIE. When chart reviews confirm that a psychiatric assessment was not documented with either an E & M or PDIE code, qualitative interviews with providers could then inform an understanding of how a treatment plan was formulated without the benefit of a psychiatric assessment.

Perhaps the lack of documentation of PDIE is an issue of unfamiliar nomenclature. When these data were collected the CPT code 90801 for PDIE had been in use for approximately 6 years. Even so, some practitioners may not have been familiar with the CPT code of 90801 or with the term, PDIE. These practitioners may in fact have conducted examinations that included all of the components of a PDIE but were not familiar with the PDIE code so they may have used an E & M code.

When the final sample of 682 clients in 9 hospitals is considered a volume/outcome issue may be a concern as a mean of 76 clients per hospital translates into only 6.3 clients per month on average were discharged from each of the 9 hospitals. It is important to note, however, that these numbers account only for discharges with a principal diagnosis of schizophrenia. Discharges for all mental disorders other than schizophrenia numbered over 60 thousand for Maryland community hospital EDs in 2004, or an average of 5,000 discharges per month. Including all mental disorders in future studies would reduce the potential for volume/outcome issues.

Three additional questions suggested for future research on this topic include: (a) Do practitioners know

what constitutes of PDIE? (b) Which factors contribute to an African-American having a PDIE documented? and (c) When a PDIE is documented is the E & M visit code, upcoded or downcoded?

Implications for Healthcare Stakeholders

This new information informs nursing and medical educators of the need to teach the importance of assessment of adults with schizophrenia who use the ED. In the future, the likely completion of PDIEs for those with schizophrenia may decrease, as their number of ED visits increases and the number of hospitals opening free-standing ED's increases. Such understanding is necessary to inform alternative organizational structures of care or policy changes.

That information has value for nurses, physicians, adults with mental disorders and their families, payers, policy makers, mental health advocates, healthcare administrators, and health services researchers. Examination of system and client characteristics of ED visits by adults discharged directly from the ED with a principal diagnosis of schizophrenia builds on more generic and global reports of ED use by adults with mental disorders.

Assessment services in the ED serve four purposes: to identify risk of harm for the patient or others; to establish a provisional diagnosis or to confirm pre-existing diagnoses; and to formulate a treatment plan (American Psychiatric Association, 2004). When the risk of harm to patients or others is not assessed, the ED can become a dangerous setting for all involved. Violence in the ED is on the rise and is being attributed to overcrowding and increased numbers of persons with mental disorders visiting the ED as a result of both the economic downturn and curtailment of mental health services (Smyth, 2010).

While a PDIE is time-consuming and may be unfamiliar to ED providers whose focus is on emergent physical care (Kunen, Niederhauser, Smith, Morris, & Marx 2005; Tintinalli, Peacock, & Wright, 1994), a thorough assessment is nevertheless necessary to establish a provisional diagnosis, to confirm pre-existing diagnoses and to formulate a treatment plan. The information that emerges from performing PDIEs could create safer conditions in the ED, a matter of potential concern to hospital administrators and ED professionals.

ED professionals must step up to the challenge of assessing persons with mental disorders whether or not the ED is in a hospital with an IPU. When psychiatric emergency services (PES) are available, they should be fully utilized to manage the client with mental disorders. When no PES is available, the community hospital ED must be prepared to treat the client with mental disorders with the same level of health care service delivery as is afforded the client with somatic complaints.

At this time, the ED is the only source of care for many individuals, including persons with mental disorders. Nurses and physicians would benefit from education on the importance of PDIE for adults with schizophrenia prior to releasing those individuals from the ED without an inpatient admission. In particular, those adults with a level of service documented as 99284 and/or 99285 would benefit because these codes represent presentations of high severity and /or pose an immediate significant threat to life or physiologic function. Information gleaned from a PDIE would inform the treatment plan. Some advantages of a well-informed treatment plan include the potential for these results: (a) a reduction of the increased morbidity associated with schizophrenia; (b) a reduction in multiple

return visits to the ED associated with schizophrenia; and
(c) a safer environment for clients and providers due to
the provider having a thorough understanding of the
situation at hand.

One-hundred percent of the clients in this study were
discharged directly from the ED without an inpatient
admission. Of them, 65.5 percent had a documented level of
service of high (99284) or highest (99285) severity. That
is not the quality, client-centered care the New Freedom
Commission seeks. This research strongly supports the need
for restructuring, beginning with a mandate for PDIE of
every client discharged directly from the ED with a level
of service of moderate severity (99283) or higher.

Adults with mental disorders and their families are
also stakeholders who can benefit from the implications of
this study. This group could be educated about the
importance of a PDIE, and that education may prompt the
client or their family member to ask that a PDIE be
completed prior to discharge directly from the ED. The
resulting information could help families advocate for the
client when the individual is unable to advocate for
themselves. Just as the Joint Commission's "Speak Up"
program educates and encourages patients to be informed and

ask questions about their care, so also might education about PDIE prompt persons with mental disorders and/or their families to request one. Education about PDIE could also be incorporated into family education programs already in existence through the National Alliance for Mental Illness (NAMI) and their local chapters.

Payers would also benefit from PDIE being conducted more often in the ED because it can inform the treatment plan. A better informed treatment plan has the potential to reduce the additional expense of treatment for adults with schizophrenia if that plan results in less morbidity, less mortality and fewer ED visits.

Policy makers and mental health advocates might consider promoting legislative action to mandate a PDIE prior to discharge, again to reduce the potential for increased morbidity and mortality. Additionally, a reduction in mortality and morbidity would likely translate into a reduction in ED visits for adults with schizophrenia. Conducting a PDIE is within the scope of practice of a psychiatric nurse practitioner (NP). Promotion of legislation to mandate that a psychiatric NP be available to conduct PDIEs could relieve some of the pressure on the ED practitioner and also provide the client

with a provider accustomed to dealing with psychiatric emergencies.

Health care administrators could benefit by supporting a PDIE: (a) to reduce costs associated with increased ED visits for adults with schizophrenia, and (b) to improve ED safety for all when providers have a better understanding of all clients.

Ideally, this research will prompt all stakeholders to inquire whether or not their local ED conducts a PDIE for clients with mental disorders to ascertain whether they can safely be discharged directly from the ED without an inpatient admission.

Unfortunately, the results of this study show that care for adults with mental disorders in the ED is of unknown quality. Delivery of assessment services is critical for persons with mental disorders, necessary not only for the safety of all involved, but also to support the formulation of a treatment plan.

The low frequency of documented PDIE identified by this study may be due to a lack of resources, documentation of a PDIE using a code other than 90801, to the stigma associated with serious mental disorders, and/or to a lack

of education that results in discharging clients from an ED without a thorough assessment. Whatever the cause, steps must be taken to ensure that all persons discharged directly from an ED without an inpatient admission receive an appropriate assessment prior to discharge. Only then will EDs move forward to improve the delivery of care to adults with mental disorders in ways that reflect the goals of the IOM and New Freedom Commission.

Suggestions for Future Research

This study is the first to report the frequency of psychiatric assessment documented as a PDIE for adults discharged from an ED without an inpatient admission. It has identified the importance of race, insurance and level of service as possible predictors of the documentation of PDIE for adults with mental disorders.

What was surprising, however, is that more than 80 (84.2 from the original sample of 3,139 clients from 43 hospitals and 88.1 from the final sample of 682 clients from 9 hospitals) percent of clients in this study had a level of service documented as moderate to highest severity (99283, 99384, or 99285), yet less than one-fifth (15.7% of the original sample) to just over one-half (54.0% of the final sample) of the clients had a documented PDIE. Of

greatest importance to the restructuring of health care delivery to persons with mental disorders is documentation that a PDIE is being performed on so few (15.7%) clients. This practice begs the question of how EDs provide quality care for clients with mental disorders discharged directly from the ED without a PDIE. Direct consideration of this discrepancy would strengthen further study of this topic.

A better understanding of how often completed psychiatric assessment is documented using an E& M code, rather than procedure code 90801 for a PDIE, would also be valuable. If PDIEs are being completed but not documented specifically with the 90801 code, then the quality of health care service delivery for persons with mental disorders using the ED may be better than is apparent from these research results. ED professionals could benefit, even before restructuring is planned, from knowledge about that kind of documentation.

Appendix A

Psychotic disorders excluded from the sample and their respective ICD-9-CM codes

ICD-9-CM Code	Psychotic Disorders Excluded from Sample
291.3	Alcohol-Induced Psychotic Disorder, With Hallucinations
291.5	Alcohol-Induced Psychotic Disorder, With Delusions
292.11	Amphetamine-Induced Psychotic Disorder, With Delusions
292.11	Cannabis-Induced Psychotic Disorder, With Delusions
292.11	Cocaine-Induced Psychotic Disorder, With Delusions
292.11	Hallucinogen-Induced Psychotic Disorder, With Delusions
292.11	Inhalant-Induced Psychotic Disorder, With Delusions
292.11	Opioid-Induced Psychotic Disorder, With Delusions
292.11	Other (or Unknown) Substance-Induced Psychotic Disorder, With Delusions
292.11	Phencyclidine-Induced Psychotic Disorder, With Delusions
292.11	Sedative-, Hypnotic-, or Anxiolytic-Induced Psychotic Disorder, With Delusions

Appendix A (continued)

ICD-9-CM Code	Psychotic Disorders Excluded from Sample
292.12	Amphetamine-Induced Psychotic Disorder, With Hallucinations
292.12	Cannabis-Induced Psychotic Disorder, With Hallucinations
292.12	Cocaine-Induced Psychotic Disorder, With Hallucinations
292.12	Hallucinogen-Induced Psychotic Disorder, With Hallucinations
292.12	Inhalant-Induced Psychotic Disorder, With Hallucinations
292.12	Opioid-Induced Psychotic Disorder, With Hallucinations
292.12	Other (or Unknown) Substance-Induced Psychotic Disorder, With Hallucinations
292.12	Phencyclidine-Induced Psychotic Disorder, With Hallucinations
292.12	Sedative-, Hypnotic-, or Anxiolytic-Induced Psychotic Disorder, With Hallucinations
293.81	Psychotic Disorder Due to ... [Indicate the General Medical Condition], With Delusions
293.82	Psychotic Disorder Due to ... [Indicate the General Medical Condition], With Hallucinations
296.04	Bipolar 1 Disorder, Single Manic Episode, Severe With Psychotic Features

Appendix A (continued)

ICD-9-CM Code	Psychotic Disorders Excluded from Sample
296.24	Major Depressive Disorder, Single Episode, Severe With Psychotic Features
296.34	Major Depressive Disorder, Recurrent, Severe With Psychotic Features
296.44	Bipolar I Disorder, Most Recent Episode Manic, Severe With Psychotic Features
296.54	Bipolar I Disorder, Most Recent Episode Depressed, Severe with Psychotic Features
296.64	Bipolar I Disorder, Most Recent Episode Mixed, Severe With Psychotic Features
297.1	Delusional Disorder
297.3	Shared Psychotic Disorder
298.8	Brief Psychotic Disorder
298.9	Psychotic Disorder NOS

Note. ICD-9-CM = International Statistical Classification of Diseases and Related Health Problems, ninth revision, clinical modification; NOS = Not Otherwise Specified (APA, 2000).

Appendix B

*Current Procedural Terminology (CPT) Codes and Descriptors
for Level of Service and Procedures*

Level of Service

99281 Emergency department visit for the evaluation and management of a patient, which requires these 3 key components: a problem focused history; a problem focused examination; and straightforward medical decision making. Counseling and/or coordination of care with other providers or agencies are provided consistent with the nature of the problem(s) and the patient's and/or family's needs. Usually, the presenting problem(s) are self limited or minor.

99282 Emergency department visit for the evaluation and management of a patient, which requires these 3 key components: an expanded problem focused history; an expanded problem focused examination; and medical decision making of low complexity.

Appendix B (continued)

Counseling and/or coordination of care with other providers or agencies are provided consistent with the nature of the problem(s) and the patient's and/or family's needs. Usually, the presenting problem(s) are of low to moderate severity.

99283

Emergency department visit for the evaluation and management of a patient, which requires these 3 key components: an expanded problem focused history; an expanded problem focused examination; and medical decision making of moderate complexity. Counseling and/or coordination of care with other providers or agencies are provided consistent with the nature of the problem(s) and the patient's and/or family's needs. Usually, the presenting problem(s) are of moderate severity.

99284

Emergency department visit for the evaluation and management of a patient, which requires these 3 key components: a detailed history; a

Appendix B (continued)

detailed examination; and medical decision making of moderate complexity. Counseling and/or coordination of care with other providers or agencies are provided consistent with the nature of the problem(s) and the patient's and/or family's needs. Usually, the presenting problem(s) are of high severity, and require urgent evaluation by the physician but do not pose an immediate significant threat to life or physiologic function.

99285

Emergency department visit for the evaluation and management of a patient, which requires these 3 key components within the constraints imposed by the urgency of the patient's clinical condition and/or mental status: a comprehensive history; a comprehensive examination; and medical decision making of high complexity. Counseling and/or coordination of care with other providers or agencies are provided consistent with the nature of the problem(s) and the patient's and/or family's

Appendix B (continued)

needs. Usually, the presenting problem(s) are of high severity, and pose an immediate significant threat to life or physiologic function.

Procedures

90801 Psychiatric Diagnostic Interview Examination (PDIE) Code 90801 is used for an initial diagnostic interview examination. It includes identification of a chief complaint, history of present illness, review of systems, family and psychosocial history, and a complete mental status examination, as well as the ordering and medical interpretation of laboratory or other diagnostic studies.

Appendix C

Table 20. System Characteristics by Hospital Sample Size

Characteristics		Frequency (%), N = 43 (Original Sample)	Frequency (%), N = 34 No PDIE* hospitals	Frequency (%), N = 9 PDIE* hospitals (Final Sample)
Inpatient Unit (IPU)	Yes	27 (62.8)	19 (55.8)	8 (88.9)
	No	16 (37.2)	15 (44.2)	1 (11.1)
Psychiatric Emergency Services (PES)	Yes	35 (81.4)	26 (76.5)	9 (100)
	No	8 (18.6)	8 (23.5)	0
Total inpatient beds, mean [SD]		252 [166]	254 [166]	245 [178]
Annual ED visits, mean, [SD]		48977 [20912]	49038 [21737]	48747 [18623]
Teaching Status	Yes	17 (39.5)	14 (41.2)	3 (33.3)
	No	26 (60.5)	20 (58.8)	6 (66.6)
Urban Location	Urban	38 (88.4)	31 (91.2)	7 (77.8)
	Rural	5 (11.6)	3 (8.8)	2 (22.2)
Ownership Type, non-profit	For- profit	42 (97.7)	33 (97.0)	9 (100)
	Not for- Profit	1 (2.3)	1 (3.0)	0
System Membership	Yes	25 (58.1)	19 (55.8)	6 (66.6)
	No	18 (41.9)	15 (44.2)	3 (33.3)

* Psychiatric Diagnostic Interview Examination (PDIE)

Appendix D

Table 21. Clients Characteristics by Sample Size

Characteristics	Frequency (%), N = 3139 clients (Original Sample)	Frequency (%), N = 2031 clients No PDIE* hospitals	Frequency (%), N = 682 clients PDIE* hospitals (Final Sample)	Stat Test Chi square
Age, mean[SD]	39.65 [11.46]	39.22 [11.41]	39.31 [11.17]	
Race				109.58***
African- American	1755 (55.9)	792 (32.8)	423 (62.0)	
White- Caucasian	1235 (39.3)	1133 (47.0)	235 (34.5)	
Other Race	149 (4.7)	106 (4.4)	24 (3.5)	
Gender				
Male	2016 (64.2)	1291 (63.6)	413 (60.6)	
Female	1123 (35.8)	740 (36.4)	269 (39.4)	

* Psychiatric Diagnostic Interview Examination (PDIE)

Appendix D (continued)

Table 21. Clients Characteristics by Sample Size

Characteristics	Frequency (%), N = 3139 clients (Original Sample)	Frequency (%), N = 2031 clients No PDIE* hospitals	Frequency (%), N = 682 clients PDIE* hospitals (Final Sample)	Stat Test Chi square
Level of Service				32.58***
99281	1039 (33.3)	706 (34.7)	217 (31.6)	
99282	851 (27.1)	484 (23.8)	230 (33.7)	
99283	752 (24.0)	490 (24.1)	154 (22.6)	
99284	354 (11.3)	248 (12.2)	63 (9.2)	
99285	143 (4.6)	104 (5.1)	18 (2.6)	

* Psychiatric Diagnostic Interview Examination (PDIE)

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