

# Adverse Events During Medical and Surgical Hospitalizations for Persons With Schizophrenia

Gail L. Daumit, MD, MHS; Peter J. Pronovost, MD, PhD; Christopher B. Anthony; Eliseo Guallar, MD, DrPH; Donald M. Steinwachs, PhD; Daniel E. Ford, MD, MPH

**Context:** Persons with schizophrenia have a high risk of premature mortality. It is not clear if greater risk for adverse events during hospitalization is a contributing factor.

**Objectives:** To estimate the prevalence of adverse events in medical and surgical hospitalizations for persons with schizophrenia compared with those for persons without schizophrenia and to examine the relation between adverse events and intensive care unit admission, in-hospital death, length of stay, and total charges for hospitalizations for persons with schizophrenia.

**Design:** Cross-sectional study.

**Setting:** We studied discharges from all Maryland acute care hospitals' medical and surgical services in 2001 and 2002.

**Patients:** There were 1746 medical and surgical hospitalizations for adults with a secondary diagnosis of schizophrenia and 732 158 for adults without schizophrenia.

**Main Outcome Measures:** For primary outcomes, we applied the Agency for Healthcare Research and Quality's Patient Safety Indicators (PSIs), which were developed to detect adverse events in administrative data. We compared PSIs for hospitalizations for patients with a secondary diagnosis of schizophrenia with those for patients without and determined the association between schizophrenia and each PSI adjusting for patient and hospital characteristics. For hospitalizations for patients with

schizophrenia, for secondary outcomes we examined the association between each PSI and intensive care unit admission, in-hospital death, length of stay, and total charges.

**Results:** Hospitalizations for patients with schizophrenia had the following higher adjusted relative odds of having PSIs compared with those for patients without schizophrenia: infections due to medical care (odds ratio [OR], 2.49 [95% confidence interval (CI), 1.28 to 4.88]); postoperative respiratory failure (OR, 2.08 [95% CI, 1.41 to 3.06]); postoperative deep venous thrombosis (OR, 1.96 [95% CI, 1.18 to 3.26]); and postoperative sepsis (OR, 2.29 [95% CI, 1.49 to 3.51]). For hospitalizations for patients with schizophrenia, having respiratory failure or sepsis resulted in at least twice the adjusted odds for intensive care unit admission and death. The median adjusted increase in length of stay was at least 10 days, and median hospital charges were elevated by at least \$20 000 for infections due to medical care, respiratory failure, deep venous thrombosis, and sepsis.

**Conclusions:** Medical and surgical hospitalizations for persons with schizophrenia had at least twice the odds of several types of adverse events than those for persons without schizophrenia. These adverse events were associated with poor clinical and economic outcomes during the hospital admission. Efforts to reduce these adverse events should become a research priority.

*Arch Gen Psychiatry.* 2006;63:267-272

**T**HE INSTITUTE OF MEDICINE report *To Err is Human: Building a Safer Health Care System*<sup>1</sup> focused national attention on the problem of medical adverse events and resultant morbidity and mortality. Adverse events are defined as injuries caused by medical management rather than underlying disease. Adverse events in the hospital may be due to errors or delays in diagnosis; errors in treatment, including medication errors; or failure to prevent injury. Between 14% and 50% of in-hospital deaths may be attributed to adverse events.<sup>2,3</sup>

Despite the recent emphasis on patient safety, estimates for harm from adverse

events for persons with schizophrenia and other severe mental illnesses are lacking.<sup>4</sup> In addition to medical errors that may occur in psychiatric inpatient units, persons with schizophrenia could be at even higher risk for patient safety concerns during somatic hospitalizations than the general population. During hospitalizations on medical and surgical floors, nurses, physicians, and other health care professionals may not be experienced in caring for the special needs of patients with schizophrenia. These health care professionals may minimize or misinterpret somatic symptoms and delay diagnosis and treatment of conditions needing attention, particularly if patients experience active psychosis, display

Author Affiliations are listed at the end of this article.

aggressive behavior, or have difficulty communicating. A recent study of nurse attitudes toward a standardized patient revealed that the group randomized to evaluate a patient taking antipsychotics was less likely to attribute the patient's symptoms to cardiac chest pain than the group randomized to a patient without psychotropic medications.<sup>5</sup> Other sources of preventable adverse events could result from improper use of restraints, excessive "as occasion requires" dosing of antipsychotics, and psychotropics' interactions with other medications. If drug errors cause oversedation, then respiratory problems, including pneumonia or sequelae from immobilization (eg, venous thromboembolism), might follow.

A better understanding of the types, magnitude, and consequences of adverse events in nonpsychiatric hospitalizations is needed for persons with schizophrenia. The objectives of this study were to: (1) estimate the prevalence of adverse events in a statewide sample of medical and surgical hospitalizations for adults with schizophrenia compared with those for adults without schizophrenia and (2) examine the extent to which these adverse events were associated with clinical outcomes of intensive care unit (ICU) admission and death and economic outcomes of increased length of hospital stay and cost of care among persons with schizophrenia. We hypothesized that adverse events would be more prevalent in hospitalizations for persons with schizophrenia than in those for persons without, particularly those events potentially related to oversedation such as postoperative respiratory failure, sepsis, and venous thromboembolism.

## METHODS

### STUDY DESIGN AND POPULATION

We conducted a cross-sectional study of Maryland hospital discharges in 2001 and 2002 for adults 18 years and older with and without a secondary diagnosis of schizophrenia. Hospital discharges from a medical or surgical service were eligible.

### DATA SOURCES

Nonconfidential data were obtained from the Uniform Health Discharge Data Set maintained by the Maryland Health Services Cost Review Commission. This database contains information on all patients discharged from the 52 nonfederal acute care hospitals in the state of Maryland, encompassing basic patient demographic data including age, sex, race, and county of residence; codes from the *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* for primary discharge diagnosis, primary procedure, and up to 14 secondary diagnostic and procedure codes; length of stay (LOS); hospital charges; ICU stay; in-hospital death; admission via the emergency department; and hospital characteristics, including teaching hospital and trauma center designations.<sup>6</sup> To protect patient confidentiality, the state database does not have identifiers to link hospitalizations to unique individuals; thus, it does not provide the ability to estimate the number of repeat hospitalizations per person. The Johns Hopkins (Baltimore, Md) institutional review board deemed that this study, using secondary data, met criteria for exemption.

We selected the following medical conditions from the Charlson Index<sup>7,8</sup> and from the Agency for Healthcare Research and Quality's (AHRQ's) Clinical Classifications Software<sup>9</sup> Comor-

bidity Scale to use as severity measures: history of myocardial infarction or coronary artery disease, diabetes mellitus, chronic obstructive pulmonary disease, liver disease, human immunodeficiency virus or AIDS, renal disease, malignancy, and substance abuse.

### IDENTIFYING ADVERSE EVENTS: PATIENT SAFETY INDICATORS

We used the AHRQ Patient Safety Indicators (PSIs) to identify adverse events occurring during hospitalizations, our primary outcomes.<sup>10</sup> The University of California, Stanford, Evidence-Based Practice Center and AHRQ developed PSIs to identify medical injuries during hospitalization using *ICD-9-CM* codes and other variables in administrative data.<sup>11,13</sup> Because administrative data are collected regularly for billing purposes and are population based, they are potentially an efficient source for information on medical injuries, especially because no reliable public reporting system for patient safety exists currently. The PSIs encompass complications, adverse events, medical negligence, and iatrogenic conditions; each indicator has inclusion and exclusion criteria to identify appropriate risk pools and minimize ambiguity as to whether an event was preventable.<sup>10</sup> The multistep development process for the PSIs included a detailed evidence-based review of candidate indicators and their reliability and validity, followed by clinical and coding expert review and revision of the candidate indicators and empirical testing with hospital discharge data for those indicators rated as valuable by the expert review.<sup>10</sup> Thus, the PSIs are thought to have reasonable validity and specificity, particularly as screening tools for examining incidence and risk factors associated with medical injuries.<sup>11,12</sup> As claims-based indicators, the PSIs are not meant to be used as definitive measures of patient safety but to identify areas where quality of care may need further detailed study.<sup>11,12</sup> Misclassification of PSIs is likely random with respect to whether a patient has schizophrenia.

To avoid indicators with very low numbers of events and thus unreliable statistical measures, we decided a priori to select a threshold of 15 events to include a PSI in the analysis. We evaluated all 20 PSIs and included the following PSIs with an adequate number of events for analysis: infections due to medical care; failure to rescue (death after developing particular complications of care); decubitus ulcers; postoperative respiratory failure; postoperative deep venous thrombosis or pulmonary embolism; postoperative sepsis; and postoperative hemorrhage or hematoma.

### CLINICAL AND ECONOMIC OUTCOMES OF PSIs IN SCHIZOPHRENIA

Clinical and economic variables during hospitalizations of patients with a secondary diagnosis of schizophrenia were our secondary outcomes. For each PSI, we examined clinical outcomes of an ICU admission and in-hospital mortality. We examined LOS and total charges for economic outcomes. While hospital charges do not equal hospital costs, Maryland is an all-payer state, and as such, its charges are regulated and reflect costs.<sup>14</sup> We did not use these clinical and economic outcomes for the PSI "failure to rescue" because by definition all of these cases died during hospitalization and analyses of excess LOS and charges would not be meaningful.

### ANALYSIS

We performed bivariate analyses and  $\chi^2$  tests to investigate differences in patient and hospital characteristics between medical and surgical admissions for patients with and without a sec-

ondary diagnosis of schizophrenia. To test the hypothesis that admissions for patients with schizophrenia may be more likely to be at risk for adverse events, we examined the presence or absence of each PSI for admissions for patients with and without schizophrenia and then developed logistic regression models for the presence of each PSI to control for patient and hospital characteristics. In these multivariate models, we adjusted for patient age, sex, race, urban vs rural residence, payer (commercial insurance, Medicaid, Medicare, self-pay), medical comorbid conditions (history of myocardial infarction or coronary artery disease, diabetes mellitus, chronic obstructive pulmonary disease, liver disease, human immunodeficiency virus or AIDS, renal disease, malignancy, and substance abuse), medical vs surgical primary diagnosis, admission via the emergency department, teaching hospital status, and trauma center status. Each medical comorbid condition was entered into the model as a separate variable.

To examine the association between each PSI and the odds of an ICU admission or in-hospital death for admissions for patients with schizophrenia, we constructed logistic regression models adjusting for patient and hospital characteristics. Because hospital LOS and total charges are often not normally distributed, we used median regression to calculate the increase in hospital LOS and total charges associated with the presence of each PSI for hospital admissions for patients with schizophrenia while adjusting for patient and hospital characteristics.<sup>15</sup> We used Stata SE 7.0 (Stata Corp, College Station, Tex) in all analyses.

## RESULTS

### CHARACTERISTICS OF HOSPITALIZATIONS FOR PATIENTS WITH AND WITHOUT A SECONDARY DIAGNOSIS OF SCHIZOPHRENIA

During 2001 and 2002 in Maryland, there were 1746 medical and surgical hospitalizations for patients with a secondary diagnosis of schizophrenia and 732 158 for patients without a secondary diagnosis of schizophrenia (**Table 1**.) Admissions for patients with schizophrenia showed they were older by 0.9 year and were more likely to be nonwhite, female, and live in urban counties than admissions for patients without schizophrenia. More than 80% of admissions for patients with schizophrenia had either Medicaid or Medicare as payers compared with about half in those for patients without schizophrenia. Reflecting the known burden of comorbid medical conditions in persons with schizophrenia, admissions for patients with schizophrenia had a substantially higher prevalence of chronic obstructive pulmonary disease, diabetes mellitus, AIDS, and substance abuse compared with those for patients without schizophrenia.

Admissions for patients with a secondary diagnosis of schizophrenia were more likely to be at a teaching hospital and a trauma center than those for patients without schizophrenia, and three quarters of hospitalizations for patients with schizophrenia were admitted through the emergency department. Hospitalizations for persons with schizophrenia were more likely to have an ICU stay, more likely to have in-hospital mortality, and had a longer LOS and higher median charges than hospitalizations for persons without schizophrenia.

We examined primary diagnoses in hospitalizations with and without a PSI and for patients with and without schizo-

**Table 1. Patient and Hospital Characteristics of Medical and Surgical Hospitalizations for Patients With and Without a Secondary Diagnosis of Schizophrenia\***

	Patients With Secondary Diagnosis of Schizophrenia (n = 1746)	Patients Without Secondary Diagnosis of Schizophrenia (n = 732 158)
Patient characteristic		
Mean age, y	55.4	54.3
Race		
White	50.9	66.2
Nonwhite	49.1	33.9
Sex		
Male	47.5	37.8
Female	52.5	62.2
Urban residence	75.6	64.8
Payer type		
Commercial insurance	4.8	42.3
Medicaid	29.8	12.9
Medicare	54.5	39.1
Self-pay/none	3.1	3.7
Comorbid illness		
Previous myocardial infarction	3.7	4.8
Chronic obstructive pulmonary disease	23.4	13.8
Diabetes mellitus	21.9	16.8
Renal disease	2.0	1.6
Any malignancy	3.5	4.4
Liver disease	2.0	1.3
AIDS	2.2	0.6
Substance abuse	26.8	13.3
Hospital and hospitalization characteristics		
Hospital characteristic		
Teaching hospital	48.2	44.8
Trauma center	37.3	30.1
Hospitalization characteristic		
Admitted via emergency department	75.6	24.4
Surgical diagnosis	26.1	46.2
ICU stay	16.3	9.5
Death in hospital	5.2	3.0
Median length of stay, d (interquartile range)	5 (3-10)	3 (2-6)
Median total charge, \$ (interquartile range)	13 317 (7691-24 874)	8498 (4887-15 736)

Abbreviation: ICU, intensive care unit.

\*Values are expressed as percentage of patients unless otherwise indicated.

phrenia for any systematic differences. The only appreciable difference we found across groups was for primary pulmonary diagnoses, which were more common in hospitalizations for patients with schizophrenia and in hospitalizations with PSIs. We found the following prevalence of primary pulmonary diagnoses for these types of hospitalizations: schizophrenia with a PSI, 18%; schizophrenia and no PSI, 15%; no schizophrenia with a PSI, 10%; and no schizophrenia and no PSI, 5%. Other primary diagnoses with a high prevalence were cardiovascular disease (15%-20% across all groups), injury (10%-14%), and gastrointestinal disease (9%-10%) (data not shown).

**Table 2. Adverse Events During Medical and Surgical Hospitalizations in Maryland for Persons With and Without Schizophrenia\***

	Prevalence per 1000 Admissions (95% CI)		Adjusted Relative Odds (95% CI)†
	Patients With Schizophrenia (n = 1726)	Patients Without Schizophrenia (n = 732 158)	
<b>Patient Safety Indicators</b>			
Infections due to medical care	12.6 (7.0 to 18.3)	4.6 (4.4 to 4.8)	2.49 (1.28 to 4.88)
Failure to rescue	141.3 (109.6 to 173.0)	150.0 (147.7 to 152.4)	1.04 (0.80 to 1.36)
Decubitus ulcer	43.4 (29.3 to 57.5)	50.2 (49.2 to 51.3)	0.96 (0.68 to 1.35)
<b>Postoperative adverse events</b>			
Respiratory failure	108.8 (73.0 to 144.7)	45.4 (44.2 to 46.6)	2.08 (1.41 to 3.06)
Deep venous thrombosis or pulmonary embolism	34.7 (17.9 to 51.5)	13.0 (12.6 to 13.3)	1.96 (1.18 to 3.26)
Sepsis	115.0 (73.1 to 157.0)	40.9 (39.5 to 42.2)	2.29 (1.49 to 3.51)
Hemorrhage or hematoma	47.4 (28.0 to 66.8)	36.6 (36.0 to 37.3)	1.14 (0.74 to 1.75)

Abbreviation: CI, confidence interval.

\*Infections due to medical care, n = 612 041; failure to rescue, n = 90 594; decubitus ulcer, n = 72 100; postoperative respiratory failure, n = 115 665; postoperative deep venous thrombosis, n = 344 553; and postoperative sepsis, n = 84 946.

†Adjusted for age, sex, race, urban vs rural residence, payer, medical comorbid conditions, medical vs surgical hospital admission, hospital admission through emergency department, urban vs rural hospital, teaching hospital, and trauma center.

**Table 3. Clinical and Economic Outcomes Associated With Adverse Events During Medical and Surgical Hospitalizations for Persons With Schizophrenia**

	ICU Admission		Death		Length of Stay	Total Charges
	%	Adjusted OR (95% CI)*	%	Adjusted OR (95% CI)*	Median Increase, d (95% CI)	Median Increase, \$ (95% CI)
<b>Patient Safety Indicators</b>						
Infections due to medical care	26	0.94 (0.17 to 5.21)	11	2.07 (0.20 to 21.7)	17.7 (15.3 to 20.2)	56 005 (46 282 to 65 729)
Decubitus ulcer	20	0.48 (0.13 to 1.78)	11	1.47 (0.32 to 6.81)	4.0 (4.0 to 4.0)	5104 (−2308 to 17 800)
<b>Postoperative adverse events</b>						
Respiratory failure	63	9.92 (3.85 to 25.51)	34	8.85 (2.98 to 26.24)	14.0 (10.2 to 17.8)	40 998 (34 197 to 47 798)
Deep venous thrombosis or pulmonary embolism	19	0.98 (0.23 to 4.16)	19	2.09 (0.45 to 9.62)	10.1 (6.7 to 13.5)	20 305 (13 496 to 27 114)
Sepsis	38	2.96 (0.95 to 9.20)	19	7.14 (1.57 to 32.51)	23.8 (20.8 to 26.9)	53 485 (46 746 to 60 225)
Hemorrhage or hematoma	14	0.49 (0.12 to 1.89)	9	4.61 (0.79 to 26.92)	0.6 (−1.9 to 3.1)	160 (−5294 to 5614)

Abbreviations: CI, confidence interval; ICU, intensive care unit; OR, odds ratio.

\*Adjusted for age, sex, race, urban vs rural residence, payer, medical comorbid conditions, medical vs surgical hospital admission, hospital admission through emergency department, urban vs rural hospital, teaching hospital, and trauma center.

### ADVERSE EVENTS DURING HOSPITALIZATIONS FOR PATIENTS WITH AND WITHOUT SCHIZOPHRENIA

Several PSIs had at least twice the prevalence in hospitalizations for patients with a secondary diagnosis of schizophrenia compared with those for patients without schizophrenia: infections due to medical care, postoperative respiratory failure, postoperative deep venous thrombosis, and postoperative sepsis (**Table 2**). After adjusting for patient and hospital characteristics, the adjusted relative odds of these adverse events remained between 2 and 2.5 times higher for hospitalizations for patients with schizophrenia compared with those for patients without schizophrenia. Patient safety indicators of failure to rescue, decubitus ulcer, and postoperative hemorrhage were not elevated in hospitalizations for patients with a secondary diagnosis of schizophrenia compared with those for patients without schizophrenia.

### IMPACT OF ADVERSE EVENTS IN HOSPITALIZATIONS FOR PATIENTS WITH SCHIZOPHRENIA

**Table 3** presents the clinical and economic outcomes associated with the presence of PSIs in hospitalizations for patients with schizophrenia adjusted for patient and hospital characteristics. All PSIs except for hemorrhage or hematoma were associated with a substantial increased odds of ICU admission, death, and a significant increase in median LOS or total hospital charges. The adjusted odds for admission to the ICU and the adjusted odds for death were increased substantially for respiratory failure and sepsis. The median LOS for infections due to medical care increased by 17.7 days with median charges increased by more than \$50 000. Length of stay and total charges were increased as well for postoperative adverse events of respiratory failure, deep venous thrombosis, and sepsis.

We examined medical and surgical hospitalizations in the state of Maryland and found hospitalizations for persons with schizophrenia had at least twice the odds of several types of indicators of medical injury than those for persons without schizophrenia. These adverse events, measured by AHRQ's PSIs, were associated with increases in LOS, charges, ICU admission, and in-hospital death for persons with schizophrenia. Because, to our knowledge, studies to date have not examined patient safety during nonpsychiatric hospitalizations for persons with schizophrenia, these results shed light on what may be a previously unrecognized or underrecognized contributor to excess morbidity and mortality in this population.

Alternative explanations for the increase in PSIs in hospitalizations for patients with schizophrenia other than medical injury are important to consider. Undiagnosed medical comorbid disease in hospitalizations for patients with schizophrenia could be prevalent and contribute to illness severity and worse outcomes independent of medical errors.<sup>16</sup> In addition, patients with schizophrenia may have higher clinical severity for a given disease (eg, uncontrolled diabetes mellitus) that could lead to poorer hospital outcomes yet is not adequately captured in administrative data. Furthermore, while we cannot quantify the effect of tobacco smoking on rates of PSIs using administrative data, the high rates of smoking in schizophrenia may contribute to the PSIs through effects on respiratory function, infection, or hypercoagulability. Another factor that may increase hypercoagulability and deep venous thrombosis aside from smoking and immobility in schizophrenia is antipsychotic medication, which may have effects on platelet aggregation.<sup>17,18</sup>

Despite the inability to completely account for comorbidity using administrative data, we did find that incorporating medical comorbid conditions into the regression models did not appreciably change the odds ratios for PSIs. Indeed, the adjusted odds ratios were very similar to the crude odds (not shown but can be inferred by the ratios of the prevalence of PSIs in Table 2). This supports the assertion that the quality of care given to patients while hospitalized, and not principally the severity of medical conditions, was a true contributor to the increase in the odds of PSIs between those with and without schizophrenia.

If the high prevalence for particular PSIs in hospitalizations for patients with schizophrenia does truly reflect an increase in risk for medical injury, underlying causes could include sequelae from medication errors, from oversedation, or from delayed diagnosis of clinical symptoms during care on medical and surgical floors. Sedation could occur if health care professionals on medical or surgical floors inexperienced in treating schizophrenia use excessive "as occasion requires" doses of psychotropics to control agitation. Psychotropics in combination with perioperative medications, such as anesthetics and analgesics, also could lead to sedation and predispose patients to atelectasis, aspiration, and other respiratory problems leading to respiratory failure. Similarly, sedation could increase the risk for short-term im-

mobility and subsequent deep venous thrombosis. The elevated rate of infections due to medical care and postoperative sepsis could be due in part to delayed recognition of signs or symptoms of infection among patients with schizophrenia. While infections due to medical care and postoperative sepsis, respiratory failure, and deep venous thrombosis were elevated in schizophrenia, the PSI measuring death after developing certain complications of care, "failure to rescue," was not more prevalent. This finding suggests that it is in the prevention or timely detection of medical complications where patients with schizophrenia may be at higher risk than those without schizophrenia, not in the treatment of complications once diagnosed.

Not only are several of the PSIs markedly increased in hospitalizations for patients with schizophrenia, but when present these indicators for medical injuries were associated with higher resource use and poorer clinical outcomes, including death. Although we cannot establish a causal relationship between these PSIs and the secondary outcomes, the strength of the associations and the consistency of the findings across several PSIs support their adverse effects on patients with schizophrenia. As primary payers for the vast majority of hospitalizations in schizophrenia, Medicare and Medicaid programs bear most of these costs.

The findings that hospitalizations for patients with schizophrenia were about half as likely to include primary surgery diagnoses as those for patients without schizophrenia, whereas several postsurgical PSIs were increased markedly in hospitalizations for patients with schizophrenia, raise questions of what patient and health care professional characteristics may influence decisions for surgery in this population. In addition to physical health status, these factors might include patient mental status, communication, informed consent, health care professional attitudes, or any possible underlying stigmatization or bias toward patients with mental illness, and deserve further study.<sup>5,19</sup>

To our knowledge, this study is one of the first to examine adverse events during nonpsychiatric hospitalizations for persons with schizophrenia. Using administrative data from an entire state allowed a population-based analysis of a large number of hospitalizations and a comparison of adverse event rates with the general population. The main limitations of this study stem also from use of administrative data. As described earlier, because of the limited clinical detail in administrative data and because diagnoses may not be recorded, risk adjustment for clinical severity is imperfect. The PSIs, although developed by clinical and coding experts and tested for reliability and validity, depend on the accuracy and completeness of ICD-9-CM coding, which is subject to error.<sup>12</sup> Administrative data are known to be high in specificity but low in sensitivity for capturing medical injuries; thus, injury rates are often underreported.<sup>20-23</sup> While we acknowledge these limitations, we believe coding for medical injuries should not be systematically different for persons with schizophrenia compared with the general population. As such, misclassification of PSIs would bias our study toward the null hypothesis or no effect of schizophrenia. Physicians may miss a diagnosis of schizophrenia and not report it; if this oc-

curred, our estimates of PSIs for hospitalizations for patients with schizophrenia compared with those for patients without schizophrenia likely would be conservative.

We believe that these findings should generalize to hospitalized populations in other states because the rates of PSIs in the hospitalizations for patients without schizophrenia appear comparable with published national data on PSIs.<sup>13</sup> However, quality of care likely varies somewhat across states and regions.<sup>24</sup>

In summary, our findings document a marked increase in indicators for medical injuries during medical and surgical hospitalizations for persons with schizophrenia compared with those for persons without schizophrenia. These events are associated with poor economic and clinical outcomes during hospitalization, including death. Although not definitive measures of patient safety, the PSIs highlight areas of concern in quality of care for patients with schizophrenia that merit more detailed investigation. The contributions of patient factors such as aggressiveness, communication, and family support; health care professional factors such as training, experience, and attitudes; and hospital factors such as availability of consultation-liaison services and psychiatric beds to medical injuries are not known. A better understanding of these factors will be instrumental to target interventions to improve inpatient safety and ultimately reduce morbidity and mortality for persons with schizophrenia.

**Submitted for Publication:** March 9, 2005; final revision received July 29, 2005; accepted September 29, 2005.

**Author Affiliations:** Division of General Internal Medicine (Drs Daumit, Guallar, and Ford and Mr Anthony), Departments of Medicine (Drs Daumit, Guallar, and Ford and Mr Anthony), Surgery (Dr Pronovost), Anesthesia and Critical Care Medicine (Dr Pronovost), and Psychiatry and Behavioral Sciences (Drs Steinwachs and Ford), School of Medicine, Welch Center for Prevention, Epidemiology, and Clinical Research (Drs Daumit, Guallar, and Ford and Mr Anthony) and Department of Health Policy and Management (Drs Daumit, Pronovost, Steinwachs, and Ford), School of Medicine and Bloomberg School of Public Health, Department of Epidemiology, Bloomberg School of Public Health (Drs Daumit, Guallar and Ford), Johns Hopkins University, Baltimore, Md.

**Correspondence:** Gail L. Daumit, MD, MHS, Johns Hopkins Medical Institutions, 2024 E Monument St, Suite 2-500, Baltimore, MD 21205 (gdaumit@jhmi.edu).

**Funding/Support:** This study was supported by grant K08MH01787 from the National Institute of Mental Health, Bethesda, Md.

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