Acute Inpatient Care for Psychiatric Disorders in the United States, 1996 Through 2007

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**Context:** Data from facility-level surveys indicate that US inpatient psychiatric admissions rose in 2004, from their trough in 1998 to 2000, mainly in acute care settings. Patient-level factors, including age, admission type, diagnoses, length of stay, and payment source, are vital to understanding hospitalization trends.

**Objective:** To evaluate trends in acute care hospitalizations for primary psychiatric diagnoses between 1996 and 2007 in relation to patient-level variables.

**Design, Setting, and Participants:** The yearly National Hospital Discharge Survey furnished demographic, clinical, and payment data on a probability sample of discharges from short-stay facilities (mean [SD], 448.33 [19.66]), along with weights for extrapolation to population estimates. Discharges with a primary psychiatric diagnosis (mean [SD], 19,535 [2,615]) were identified among children (aged 5-13 years), adolescents (aged 14-19 years), adults (aged 20-64 years), and elderly individuals (≥65 years).

**Main Outcome Measures:** Annual rates of discharges and total days of inpatient care associated with primary psychiatric diagnoses for each age group.

**Results:** Psychiatric discharges increased for children from 155.54 per 100,000 children in 1996 to 283.04 per 100,000 in 2007 (P = .003); for adolescents, from 683.60 to 969.03 per 100,000 (P = .001); and for adults, from 921.35 to 995.51 per 100,000 (P = .003) but declined for elderly individuals from 977.63 to 807.55 per 100,000 (P < .001). Total inpatient days increased for children (1845 days per 100,000 in 1996 to 4370 days in 2007; P = .02) and for adolescents (5882 days per 100,000 in 1996 to 8247 days in 2007; P < .001) but decreased for elderly patients (10,348 days per 100,000 in 1996 to 6517 days; P < .001). The proportion of inpatient days paid by private sources declined among children (36%-21%), adolescents (52%-22%), and adults (35%-23%; all P < .001).

**Conclusions:** Inpatient discharges in short-stay facilities with a primary psychiatric diagnosis rose between 1996 and 2007, most dramatically for youth, but decreased among elderly individuals. Private funding bore a declining share of costs.

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**ALTHOUGH CONTEMPORARY treatments may lessen their hardships, psychiatric disorders remain chiefly chronic conditions during which severity and impairment often fluctuate. Exacerbations that threaten safety or signal alarming changes in mental status often require inpatient care, which is provided mainly in short-stay settings within general or psychiatric hospitals.**¹ Growth of these services paralleled the receding role of long-term psychiatric hospitalization between 1970 and the mid-1990s.²,³ Since the mid-1990s, payers reduced expenditures for hospitalization in these acute care settings through more stringent criteria to authorize admission and continued stay, as well as lower reimbursement rates.⁴ Concurrently, the restrictiveness and negative stigma of psychiatric hospitalization made outpatient alternatives a desirable objective for mental health policy makers and advocates.⁵,⁷

Consistent with these fiscal and programmatic influences, admissions to inpatient psychiatric services in the United States decreased between 1990 and 2000, from 833 to 714 per 100,000 civilians (¹Table 97) State and county hospitals also continued their steady reductions in psychiatric inpatient beds devoted mainly to long-term care (from 207.4 per 100,000 in 1970, to 40.5 in 1990, to 21.5 in 2000). Private psychiatric hospitals and dedicated psychiatric units in general hospitals, which grew between 1980 and 1990 (from 21.4 to 41.3 beds per 100,000), had by 2002 shed capacity back to their earlier levels (22.7 per 100,000) (²Table 19.2).

However, more recent data from the Substance Abuse and Mental Health Services Administration biennial Survey of...
Mental Health Organizations show that admissions surged in 2004 to 910 per 100 000.11 (Table 97) Facilities that provide mainly acute short-stay care accounted for most of this rise from 2000 rates (general hospital psychiatric services: up 47%, 349 to 515 per 100 000; private psychiatric hospitals: up 25%, 161 to 201 per 100 000), while facilities with long-term inpatient services (state and county psychiatric hospitals) showed admissions growth of only 6.45% (84 to 89 per 100 000). These findings compel a detailed examination of recent trends in psychiatric inpatient care within acute care services.

Analyses that include patient-level factors may be more informative than the aggregate psychiatric facility-level admissions data that show this growth in psychiatric hospitalizations.5,6 First, psychiatric inpatient settings typically comprise separate units for children, adolescents, adults, and, often, elderly patients. The specialized care of these groups warrants examination of hospitalization trends that stratifies accordingly by age. Second, data from designated psychiatric services exclude patients with primary psychiatric diagnoses hospitalized on nonpsychiatric units, such as those treated on a general medical services unit ("scatter beds"). Third, beneficiaries of private and public health insurance programs may differ in hospitalization trends and the availability of facilities that care for them.5,6 Fourth, more stringent admission criteria that accompanied managed care may have affected the inpatient prevalence of specific psychiatric diagnoses, which would signal changing needs in staffing, programming, and postdischarge care.

This study examined discharges from acute care inpatient services in the United States from 1996 to 2007 within 4 age groups (children, adolescents, nonelderly adults, and elderly patients) based on an annual survey sampling all general and children's hospitals (including specialty psychiatric units as well as the general medical units within them) and other specialized short-stay facilities. Analyses evaluated trends in each group's population-adjusted hospitalization rates for psychiatric and nonpsychiatric diagnoses, total days of hospital occupancy, governmental vs commercial sources of payment, emergency vs nonemergency admission, and specific primary psychiatric diagnosis.

METHODS

DATA SOURCE

The National Center for Health Statistics conducts the annual National Hospital Discharge Survey (NHDS).10 The NHDS acquires anonymized data on individual patient discharges from a probability sample of nonfederal hospitals that, since 1988, included all general and children's hospitals and other specialized inpatient facilities (including psychiatric hospitals) whose mean length of stay is less than 30 days. The pool of facilities meeting these criteria is updated every 3 years. Eligible facilities identified through this sampling frame between 1996 and 2007 averaged 483.75 (range, 477-507) and their mean participation rate was 93%. The probability sample of eligible facilities derives from a 3-stage process. The primary sampling units are geographic regions selected with regard to population and geographic coverage. Hospital sampling within primary sampling units was generally proportional to number of discharges. The number of discharges sampled within a hospital was roughly proportional to its total annual discharges. Discharges in each year’s data set averaged 286 458 (SD, 30 402; range, 242 438 [in 1996] to 328 806 [in 2006]).

Each NHDS record includes demographic, clinical (eg, diagnoses, length of stay [LOS], status at discharge), and payment source data. Each record contains a weighting value to enable extrapolation from sample data to national estimates.

PATIENT AGE GROUPINGS

Patients between the ages of 5 and 13 years were coded as children. Patients aged 14 to 19 years constituted the adolescent group. Adults were 20- to 64-year-olds, and the elderly group comprised those 65 years and older.

SELECTION AND CATEGORIZATION OF PSYCHIATRIC DIAGNOSES

The NHDS codes diagnoses using the International Classification of Diseases, Ninth Revision, Clinical Modification.11 Categorization as a psychiatric hospitalization required that the initial digits of the first diagnostic code range between 290 and 319. Several additional dementia diagnoses outside these bounds were also coded as psychiatrically related, specifically Alzheimer disease (331.0), frontotemporal dementia (331.1), Lewy body dementia (331.82), mild cognitive impairment (331.83), and senile degeneration of the brain (331.2). Medication-induced movement disorders and neuroleptic malignant syndrome were classified as psychiatric. A comorbid psychiatric diagnosis was recorded if the second diagnostic code also met these criteria.

Diagnostic codes were categorized to yield diagnostic groupings. The depression group comprised major depressive disorder, dysthymic disorder, and depression not otherwise specified. The psychosis group contained schizophrenia, schizoaffective disorder, delusional disorder, and psychotic disorder not otherwise specified. The bipolar group included any bipolar disorder diagnosis and cyclothymia. The anxiety group included generalized anxiety, panic, obsessive-compulsive, phobic, separation, posttraumatic stress, acute stress, selective mutism, and social phobia disorders as well as anxiety not otherwise specified. Personality and substance use groups comprised their respective specific disorders. The dementia group represented all specified dementias and mild cognitive impairment. A conduct problems group comprised attention-deficit/hyperactivity, oppositional, and conduct disorders. The developmental group included mental retardation, pervasive developmental disorders, and learning disorders. A broad group of psychophysiological disorders encompassed eating, sleep, movement, and somatoform disorders as well as neuroleptic malignant syndrome, each of which had too few observations to warrant a distinct category. Psychiatric manifestations of other illnesses (the 316 group) made up the sequelae of general medical conditions group. All other diagnoses in the 290 to 319 range were categorized as other.

CATEGORIZATION OF PAYMENT SOURCES

Payment sources were grouped into private, government, and other. The “private” category was used when the record indicated Blue Cross/Blue Shield, private insurance, or health maintenance organization/preferred provider organization as the primary expected source of payment (whether or not a public program paid premiums). Payment source was categorized as “government” when the record indicated Medicare, Medicaid, workers’ compensation, or other government program. “Other”
was used for records indicating self-pay, no charge, and other payment.

CATEGORIZATION OF ADMISSION TYPE

Since 2001, NHDS included a “source of admission” variable. To identify patients hospitalized under more exigent circumstances, this study distinguished admissions whose source was coded as “emergency department” from other sources.

DATA ANALYSES

Point Estimates

National estimates of annual hospital discharges were the sum of records’ weighting values. Multiplying this estimate by total LOS provided the estimate of total days of hospital care. Because LOS distributions have large positive skewness, the estimate of LOS central tendency used the mean of the log-transformed number of hospitalization days. Summary LOS statistics present geometric means (the antilog of mean log [LOS]). Point estimates for primary psychiatric diagnoses combined survey data for 2 consecutive years.

Annual documentation provides age-stratified estimates of the US civilian population on July 1 of that year, provided by the US Census Bureau. These estimates permitted computation of population-adjusted discharges and days of hospital care, expressed herein as the rate per 100,000 of the respective age group.

Error Estimates

Because multistage surveys obtain data in clusters that share common characteristics, they are prone to underestimate the true population variance. Analytic procedures to account for cluster-correlated data require information on the observations’ cluster memberships and their respective sizes and sampling probabilities. Because of confidentiality concerns, however, the National Center for Health Statistics withholds this information from NHDS public use data sets. Instead, annual NHDS documentation provides parameters, based on analyses with SUDAAN (RTI International, Research Triangle Park, North Carolina) using Taylor series linearization for variance estimation, that enable calculation of approximate standard errors for several survey variables: number of persons with a specific first diagnosis and specific additional diagnoses, total days in hospital care, and total numbers of specific procedures. Documentation provides parameter sets for population strata, such as age, enabling more accurate standard error estimation for, say, the number of 44- to 64-year-olds with a first diagnosis of major depressive disorder.

Accordingly, this study calculated standard errors to present each year’s 95% confidence intervals (CIs) for population-adjusted rates of discharges and days in care with a primary psychiatric diagnosis within the 4 age groups. Error estimates that required combination of 2 SEs, such as for computation of days in care for those with a psychiatric primary diagnosis, followed NHDS formulae provided for this purpose. Because NHDS provides 1 parameter set for 15- to 44-year-olds and another for 45- to 64-year-olds, standard errors for any psychiatric diagnoses combined survey data for 2 consecutive years.

Analyses of Trends

Trends in continuous variables, such as days of hospital care, were assessed through weighted least squares regression in which the outcome was regressed onto year in a model that weighted each year’s number of observations and its variance. Survey design-related error was incorporated into tests of the coefficients by calculating the overall standard error using the NHDS-provided parameters for the outcome variable over survey years and adding it to the model-based standard error. The sum of the model- and design-based standard errors was used for significance testing.

Trends in categorical outcomes, such as likelihood of hospitalization or commercial vs government payer, were evaluated via logistic regression. Design-related error was accounted for by parametric resampling. Logistic analyses were replicated with new data for each year randomly and independently drawn from a distribution that had the year’s point estimate of discharges as its mean and the standard error of that point estimate as its standard deviation. This procedure was replicated 12,000 times (ie, 1000 replicates per each level of the independent variable to obtain a large number of permutations in discharge rates over survey years). The effect of year is presented as the mean logistic coefficient, exponentiated to express annualized change as an odds ratio (OR). Each replicate furnished a 99% CI. Estimates presented of the overall CI’s lower and upper limits were derived from the distributions of these individual lower/upper CI bounds. The number of replicate analyses that yielded P values larger than .01 was divided by the number of replicates to indicate the proportion that produced nonsignificant coefficients. This proportion is reported as $P_{rep}$ to distinguish it from P values for test statistics vis-à-vis their theoretical distributions (eg, F, t).

Because NHDS data represent discharges rather than unique individuals, sensitivity analyses examined the potential impact that multiple discharges of the same individual within a survey year would have on trends in estimates of psychiatric hospitalizations per 100,000 persons.

RESULTS

POPULATION-ADJUSTED RATES OF DISCHARGES WITH A PRIMARY PSYCHIATRIC DIAGNOSIS

The Table presents age-stratified raw, weighted, and population-adjusted data on NHDS observations with a primary psychiatric diagnosis. Annual psychiatric discharges increased appreciably for children from 155.54 per 100,000 children in 1996 to 283.04 in 2007 (OR$_{year}$, 1.0427; 99% CI, 1.0415-1.0440; $P_{rep} = .003$). Exclusion of the outlier 2007 with its wide standard error (Table) negligibly affected the linear trend estimate (OR$_{year}$, 1.0408; 99% CI, 1.0389-1.0426; $P_{rep} < .001$). Among adolescents, psychiatrically related discharges increased from 683.60 to 969.03 per 100,000 (OR$_{year}$, 1.0316; 99% CI, 1.0311-1.0321; $P_{rep} < .001$). The rate among adults younger than 65 years rose from 921.35 to 993.51 per 100,000 but the overall linear trend was relatively small (OR$_{year}$, 1.0113; 99% CI, 1.0113-1.0117; $P_{rep} = .003$). Countering this trend, psychiatric discharges of elderly indi-
### Table. Annual Rates of Hospital Discharges With Primary Diagnosis of Psychiatric Disorder

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<td>No. with psychiatric Dx</td>
<td>596</td>
<td>607</td>
<td>802</td>
<td>895</td>
<td>557</td>
<td>689</td>
<td>732</td>
<td>719</td>
<td>760</td>
<td>763</td>
<td>798</td>
<td>665</td>
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<td>78,204</td>
<td>74,215</td>
<td>65,054</td>
<td>84,353</td>
<td>105,331</td>
<td>86,683</td>
<td>82,867</td>
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<td>No. with psychiatric Dx</td>
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<td>(95% CI)</td>
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<td>No. with psychiatric Dx</td>
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<td>2625</td>
<td>2699</td>
<td>2430</td>
<td>2544</td>
<td>2770</td>
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<td>319,808</td>
<td>313,154</td>
<td>334,737</td>
<td>349,443</td>
<td>319,543</td>
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<td>319,147</td>
<td>313,968</td>
<td>305,965</td>
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<td>% Psychiatric of total</td>
<td>2.82</td>
<td>2.86</td>
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<td>(95% CI)</td>
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<td>937.85</td>
<td>914.61</td>
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<td>998.15</td>
<td>928.75</td>
<td>886.84</td>
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<td>867.48</td>
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<td>870.55</td>
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**Abbreviations:** CI, confidence interval; Dx, diagnosis.

Sensitivity analyses indicated that the rise in hospitalizations per 100,000 for children and adolescents is unlikely to result from the same patients being hospitalized more frequently (supplementary Figure 2, http://mysbfiles.stonybrook.edu/~jblader/AGPSupplement/InptSupplement.html). In contrast to rising rates for psychiatrically related hospitalizations, medical discharges showed no reliable change among children (OR<sub>Year</sub> = 0.9985; 99% CI, 0.9974–1.00; P<sub>year</sub> = .35), adolescents (OR<sub>Year</sub> = 0.9837; 99% CI, 0.9829–0.9846; P<sub>year</sub> = .11), adults (OR<sub>Year</sub> = 1.0035; 99% CI, 1.0030–1.0039; P<sub>year</sub> = .15), or elderly individuals (OR<sub>Year</sub> = 0.9969; 99% CI, 0.9957–0.9980; P<sub>year</sub> = .11).

**Sensitivity Analysis for Hypothetical Rehospitalization Rates**

Sensitivity analyses indicated that the rise in hospitalizations per 100,000 for children and adolescents is unlikely to result from the same patients being hospitalized more frequently (supplementary Figure 2, http://mysbfiles.stonybrook.edu/~jblader/AGPSupplement/InptSupplement.html). For children, the linear trend becomes flat only if the readmission rate in 1996 were at least 55% and increased by 6% or more annually or started at 60% and increased by 5% annually. Under the more plausible assumption of a 30% starting readmission rate, the linear trend remained robust over the full range of hypothetically annual increases. The trend for adolescents likewise dropped to statistical nonsignificance only under the unrealistic scenario of a 45% starting readmission rate that rose by 6% each year. The linear trend for adults, however, was less robust against rising rehospitalization rates. A 35% starting rehospitalization rate that increased by at least 2% annually would offset the linear trend of a growing number of individuals discharged from psychiatric inpatient care. It is plausible, then, that growth in inpatient discharges for adults results not from more persons being hospitalized but by the same patients admitted more frequently per year.

**Psychiatrically Related LOS, Total Occupancy, and Payment Sources**

Data at the bottom of the Figure 1 parts include trends in each age group's geometric mean LOS. The graphs depict total days of hospitalization for primary psychiatric diagnoses and the portion of days reimbursed by private, government, and other sources.

**Length of Stay**

Mean log(LOS) was consistently shorter for children and adolescents with privately reimbursed stays (children: β<sub>year</sub> = −0.4037; t<sub>1</sub> = −49.94; P < .001; adolescents: β<sub>year</sub> = −0.1368; t<sub>1</sub> = −38.87; P < .001). Over time, mean log (LOS) decreased more rapidly for adolescents with pri-
vate payers relative to government programs (β_{Year × Payer} = −0.007; t_0 = −21.228; P < .001). By contrast, the decline in log(LOS) for adult patients was more pronounced for government-reimbursed than privately reimbursed care (β_{Year × Payer} = −0.0071; t_0 = 57392; P < .001). Mean log(LOS) declined markedly among elderly patients (β_{Year} = −0.0232; t_11 = −49.44; P < .001).

**Total Days of Hospital Care and Payment Source**

If shorter LOSs coincide with an increased number of hospital discharges, then total patient days, an important index of overall inpatient use, might remain stable. However, for children, population-adjusted days of hospital care for psychiatric diagnoses increased from 1996 (1845 days per 100,000) to 2007 (4370 per 100,000; β_{Year} = 120.64; t_11 = 2.58; P = .02) (Figure 1A). A sharp increase occurred between 1996 and 1998 (2778 days per 100,000), then oscillated around a mean of 2578 days per 100,000 (range, 2425–3008 days) through 2006. Children’s occupancy rose precipitously in 2007, and omitting that year attenuated their shorter LOSs.

The population-adjusted linear trend for adolescents was significant (β_{Year} = 196.52; t_11 = 4.57; P = .001), reflecting an increase from 5882 days per 100,000 in 1996 to 8247 days per 100,000 in 2007 (Figure 1B). Among adults, inpatient days with primary psychiatric diagnoses did not show significant linear change over the survey years (β_{Year} = −4.03; t_11 = −0.13; P = .90) (Figure 1C). Elderly patients showed a steep decline in population-adjusted hospital days with primary psychiatric diagnoses between 1996 and 2007, from 10,348 to 6517 per 100,000 persons (β_{Year} = −364.55; t_11 = −10.45; P < .001) (Figure 1D).

Figure 1A-C suggests that, among nonelderly patients, private funding sources accounted for a progressively smaller portion of population-adjusted hospital days with primary psychiatric diagnoses. The interaction between year and payer was significant for adolescents (β_{Year × Payer} = −254.12; t_11 = −3.96; P < .001) and adults (β_{Year × Payer} = −87.27; t_11 = −3.17; P = .01), but not for children (β_{Year × Payer} = −61.97; t_11 = −1.68; P = .12).

Regardless of LOS, the likelihood of private payment for a hospitalization declined for children (OR_{Year} = 0.943; 99% CI, 0.941–0.944; P_{rep} < .001), adolescents (OR_{Year} = 0.909; 99% CI, 0.9079–0.9094; P_{rep} < .001), and nonelderly adults (OR_{Year} = 0.957; 99% CI, 0.9568–0.9574; P_{rep} < .001). The reduction in hospital days reimbursed by private payers is therefore unlikely to result entirely from their shorter LOSs.
Payment Sources for Nonpsychiatric vs Psychiatric Hospital Discharges

Logistic regression examined whether the likelihood that a hospitalization had a private payer was related to survey year and type of primary diagnosis (medical vs psychiatric). Significant main effects of time for nonelderly age groups indicated an overall linear trend toward lower likelihoods, about 4% per year, of commercial reimbursement for nonpsychiatric inpatient care. Private reimbursement for psychiatric discharges declined more steeply among adolescents (OR_year × Diagnosis, 0.9723; 99% CI, 0.9722-0.9731; P < .001) and slightly for children (OR_year × Diagnosis, 0.9964; 99% CI, 0.9957-0.9971; P = .01), but not among adults (OR_year × Diagnosis, 1.001; 99% CI, 0.9999-1.0003; P = .21). These trends are presented graphically in supplementary Figure 3 (http://mysbfiles.stonybrook.edu/~jblader/APGSupplement/inptSupplement.html).

TRENDS IN ADMISSION SOURCE

Figure 2 shows the proportion of discharges between 2001 and 2007 with a primary psychiatric diagnosis for which the source of admission was an emergency department. In logistic regression analyses, the likelihood of emergency admission increased significantly over time among children (OR_year, 1.1525; 99% CI, 1.1427-1.1624; P < .001), adolescents (OR_year, 1.1193; 99% CI, 1.1151-1.1234; P = .007), adults (OR_year, 1.0940; 99% CI, 1.0917-1.0964; P = .003), and elderly individuals (OR_year, 1.1108; 99% CI, 1.1070-1.1146; P = .006).

TRENDS IN DISCHARGE DIAGNOSES

Primary diagnoses of bipolar disorder increased over survey years, most markedly for children (OR_year, 1.156; 99% CI, 1.154-1.1597; P < .001) and adolescents (OR_year, 1.1149; 99% CI, 1.1133-1.1165; P < .001) but also among adult inpatients (OR_year, 1.0621; 99% CI, 1.0614-1.0627; P < .001). The distributions of primary and comorbid diagnoses appear in eTable 1. Correspondingly, anxiety diagnoses decreased among children (OR_year, 0.899; 99% CI, 0.8969-0.9026; P < .001), adolescents (OR_year, 0.9229; 99% CI, 0.9211-0.9246; P < .001), and adults (OR_year, 0.9522; 99% CI, 0.9514-0.9530; P < .001). Among elderly patients, there were moderate linear increases in dementia (OR_year, 1.0502; 99% CI, 1.0492-1.0513; P < .001). Depression diagnoses became less common among elderly inpatients (OR_year, 0.9477; 99% CI, 0.9467-0.9487; P < .001).

Substance use disorders remained stable as the chief comorbidity of psychiatric disorders among adults. Combining survey years, 30.27% of all adults with a primary psychiatric disorder had a comorbid substance use disorder.

COMMENT

The rise in annual rates of psychiatric hospitalizations for youth, particularly adolescents, and, to a lesser degree, among nonelderly adults is striking. Children and adolescents also demonstrated a large increase in days of hospital occupancy. Among adults, increased hospitalization rates seemed offset by shorter LOSs to make total days of acute inpatient care stable. Sensitivity analyses that tested the potential impact of a range of readmission-rate scenarios on these trends suggest that the annual incidence of psychiatric hospitalizations for youth has risen. In contrast, if a modest increase in readmission rates occurred among adults, higher psychiatric hospitalization rates over time might reflect the same individuals admitted more often rather than more patients in acute hospital settings. Nevertheless, other data show that per-person psychiatric admissions for nonelderly, disabled Medicare enrollees decreased during this period.

Several developments inimical to inpatient psychiatric care occurred during the period examined, suggesting that rising hospitalization rates for youth more likely correspond to clinical need rather than overuse of an abundant, easily accessible, and lucrative service offering that characterized high inpatient use in the 1980s. First, the population-adjusted number of psychiatric care beds in short-term facilities decreased, along with declining reimbursement rates and total expenditures. Long-term psychiatric inpatient services and facilities operated by the US Department of Veterans Affairs, which NHDS does not sample, drastically shed psychiatric inpatient capacity, which might also contribute to demand on acute care hospital services.

Substantial increases over this period in emergency department visits for psychiatric disturbances, along with this study’s finding of rising emergency-related hospitalizations, are consistent with this view. Growth in the number of freestanding psychiatric hospital beds since 2004 may have limited impact in alleviating an inpatient shortage because Medicaid does not reimburse inpatient services in such facilities for beneficiaries older than 21 years.

Second, managed care, through stringent criteria for authorizing admission and continued stay, appears to have diminished the proportion of child and adolescent hospi-
tal days paid by private sources. However, the overall impact on stanching clinical demand seems negligible. It is unclear if beneficiaries of publicly financed inpatient care may have become disproportionately more vulnerable to psychiatric emergencies. Alternatively, public funding sources may have filled the vacuum of declining commercial funding of psychiatric inpatient care, notably for youth. Potential cost-shifting mechanisms might include expansion of publicly supported Children’s Health Insurance Programs in many states and Medicaid eligibility for privately insured patients with extended psychiatric hospital stays whose benefits are expended.

Third, reducing hospitalization for behavioral crises has been a policy goal for some time and an impetus for enhanced outpatient services in many localities. Whether these approaches are regional successes, their cumulative impact through 2007 had not yielded a sustained national decline in psychiatric acute care inpatient occupancy. Efforts to develop more effective treatments might also have nourished hope that exacerbations leading to hospitalization would decline. Indeed, as inpatient expenditures fell, the largest growth in mental health care spending was for prescription drugs. The present findings suggest that treatment developments have not accompanied a decrease in psychiatric emergencies that eventuate in inpatient care.

Declining psychiatric hospitalization for elderly patients had been suggested earlier but carried the proviso that the analyses excluded managed-care Medicare enrollees. This study supports the interpretation that there was a true decrease in hospital occupancy for elderly individuals regardless of their specific health plan, which was not evident for younger Medicare enrollees. It is uncertain, however, if reduced involvement with inpatient services results from better mental health care in outpatient or nursing home settings. Recent data suggest a decrease in elderly individuals’ access to outpatient mental health services. Psychotropic medication treatment became more prevalent among nursing home residents, but the quality of this care is unclear. It is important to clarify whether reduced psychiatric hospitalization among elderly individuals signifies fulfillment of their treatment needs outside of hospitals or reflects an overall constriction of geriatric mental health services.

Declining revenues for psychiatric inpatient services were expected to accompany changes in Medicare reimbursement, authorized in 1999 and fully implemented by 2005, and indeed they coincide with declining Medicare admissions and a reduction in general hospital psychiatric beds. These changes provide potential economic, nonclinical explanations for reduced psychiatric hospital care of elderly individuals.

Analyses of admission types and diagnostic trends suggest the impairments and behavioral disturbances of hospitalized patients may have grown more acute. Admissions through emergency departments grew. Primary diagnoses of anxiety disorders became less likely over survey years. At the same time, bipolar disorder diagnoses increased for all age groups. Other studies have suggested that rising clinical diagnoses of bipolar disorder might result from reframing of primary conduct disturbances among youth and primary substance use among adolescents and adults to emphasize underlying impulse control and affective disturbances. The net effect, though, is that a growing proportion of fundamentally disinhibitory psychopathology may tax the diminishing resources of inpatient settings. While psychotic disorder diagnoses among adults showed only a modest linear increase, patients with these conditions continued to have LOSs that remained the highest among diagnostic groups, which further adds to overall acuity on current inpatient settings. The sustained prominence of comorbid substance use disorders may compel rethinking of the traditional segmentation of services and training between mental health and substance abuse sectors, especially with the heightened risk for treatment nonadherence that substance abuse incurs.

As a multipurpose data set, NHDS imposes some limitations with particular significance for mental health. (1) Clinical diagnoses recorded for administrative purposes are often inaccurate or incomplete relative to “gold-standard” diagnostic methods. Moreover, diagnoses do not characterize the specific disturbance leading to admission (e.g., suicidality, agitation, aggression, change in mental status), yet reducing inpatient care ultimately relies on the avoidance or mitigation of these problems. (2) Data on expected payment source are not synonymous with actual expenditures by those sources, because payers may have denied claims for all or a portion of a treatment episode. (3) Facilities whose average LOS exceeds 30 days are excluded from NHDS, although some of these settings may also provide short-stay acute care services. Such facilities often house inpatient facilities for court-mandated evaluations or civil commitment of acutely dangerous individuals, and these admissions have become more numerous. The specific care setting for psychiatrically diagnosed patients (psychiatric hospital, dedicated psychiatric unit, general medical service) cannot be determined, yet there are marked regional differences in how these resources are used. (5) Admission via an emergency service is an imperfect proxy for acuity, since emergency departments may be a conduit to hospitalize subacute patients for administrative reasons or expedited access to preliminary medical assessment. (6) Despite efforts to account statistically for sampling effects, all sample survey data have inherent limitations as proxies for the entire population. (7) This study cannot provide a definitive estimate of rehospitalization rates. However, inpatient trends identified in this article, along with the overall reduction in acute care beds in the past 10 years, indicate the importance of a comprehensive study of serial hospitalizations in the current service environment.

In conclusion, a substantial increase in acute care psychiatric hospitalization rates and inpatient occupancy for children and adolescents, a moderate increase in the hospitalization rate of adults, and a steep decline for elderly individuals represent significant developments in mental health treatment in the United States with potentially strong ramifications for quality of care and service financing. Investigation of the clinical and organizational determinants of these trends, and their impact on patient outcomes, are vital to understanding their implications.
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REFERENCES


