**Objective:** To determine if mental health hospitalizations have increased among youth.

**Design:** A retrospective cross-sectional time trend study. The Washington State Comprehensive Hospital Abstract Reporting System data set was used to examine hospitalizations among youth (aged 5-19 years) from January 1, 1990, through December 31, 1999. The yearly rates of youth hospitalized for mental illness were calculated, as were the proportions of hospitalizations due to mental illness. Chi-squared tests of trend were computed to assess for significant change over time. Additional analyses examined trends in hospital days due to mental illness and repeated hospitalizations and compared mental illness with other major causes of child and adolescent hospitalization.

**Results:** The rate of school-aged children (aged 5-14 years) hospitalized for mental illness increased by 22% during the 1990s ($P = .004$). The proportion of hospitalizations due to mental illness in school-aged children increased from 7.8% in 1990 to 12.8% in 1999 ($P < .001$). Among adolescents (aged 15-19 years), no significant change occurred in the rate of mental illness hospitalizations, but the proportion of hospitalizations due to mental illness increased from 14.5% in 1990 to 21.5% in 1999 ($P < .001$). Although injuries were the leading cause of hospitalizations among youth in 1990, mental illness has since surpassed injuries as a cause for hospitalization. Mental illness accounted for one third of all hospital days for youth in 1999.

**Conclusions:** Mental illness hospitalizations account for an increasing proportion of admissions and hospital days among children and adolescents in Washington State. During the past decade, mental illness has surpassed injury as a leading cause of hospitalization for Washington youth.

**Arch Pediatr Adolesc Med. 2004;158:781-785**

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Several studies have found that overall hospitalization rates for children and adolescents have been decreasing during the past 20 years,¹² as have hospital days.³ Possible reasons for these declines include improved prevention efforts and a shift from inpatient to outpatient management of many conditions. Although injuries, appendicitis, and asthma have long been seen as major causes of hospitalization in children and adolescents,¹²⁴ mental illness has emerged as a significant contributor as well.¹³⁴

There is some evidence that psychiatric admissions increased among youth in the 1980s,³¹ but that the mean length of stay for these psychiatric admissions may have decreased.³¹ A study of hospitalizations longer than a week in California children aged 1 to 12 years observed a 57% increase in psychiatric hospitalizations between 1985 and 1994, with the largest increase seen in hospitalizations for depressive disorder. During the same period, a 24% decrease in the overall rate of such long hospitalizations among children was observed. However, such long hospitalizations accounted for only 11% to 12% of hospitalizations among children. Cross-sectional analyses of hospital discharge data during the early 1990s found that mental illness accounted for 8.1% of admissions among children aged 6 to 12 years and 14.8% of admissions among adolescents aged 10 to 19 years.⁷

Population-based studies have reported different prevalence rates of mental illness among youth, with the differences largely due to variations in definitions of mental illness, diagnostic ascertainment, and the age range of the population assessed. Regardless, most population-based studies in school-aged children and adolescents have yielded 6- or 12-month prevalence rates of approximately 20%. Studies using administrative data have yielded significantly lower

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*From the Child Health Institute (Ms Garrison and Drs Richardson, Christakis, and Connell) and Departments of Health Services (Drs Christakis and Connell) and Pediatrics (Drs Richardson, Christakis, and Connell), University of Washington, Seattle.*

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prevalence rates, possibly because as many as half of the youth with psychiatric disorders do not receive mental health services or treatment. In studies that have examined the unmet health care needs of children, the need for mental health care is a major factor.

Although overall youth hospitalization rates have been dropping due to a shift to ambulatory management, hospitalizations for mental illness may not be following the same trend. Unmet outpatient mental health needs may be affecting the rate of child and adolescent hospitalization for mental illness. Not only do managed care restrictions on access to outpatient and inpatient mental health care tend to be more restrictive than those for medical care, but shortages at national and local levels are being seen in the availability of trained child mental health professionals in the community. Given these factors, we hypothesized that the decreases observed in overall hospitalization rates may not have been mirrored in the rates of mental illness hospitalizations. The objectives of this study were to examine trends in pediatric mental illness hospitalizations during the 1990s and to determine whether such hospitalizations differed in trend from overall hospitalizations in Washington State.

METHODS

DATA SOURCES

The Washington State Comprehensive Hospital Abstract Reporting System data set was used to examine all children and adolescents aged 5 to 19 years who were hospitalized in Washington State from January 1, 1990, through December 31, 1999. The data set incorporated data from all acute care facilities in the state, including short-term psychiatric hospitals, but excluded long-term care facilities and institutions. Pregnancy-related hospitalizations were excluded from this analysis; while adolescent pregnancies represent an important social problem in our society, hospitalizations for childbirth are not considered “adverse events” in the same way that hospitalization for injury or illness is. Demographic data for rate denominators were obtained from the Washington State Office of Financial Management’s intercensal estimates.

DATA ANALYSIS

We conducted a retrospective cross-sectional time trend study. Age groups were defined as school-aged children (aged 5-14 years) and adolescents (aged 15-19 years), and all analyses were stratified by age group. Hospitalizations for mental illness were classified as those for which the International Classification of Diseases, Ninth Revision (ICD-9) code for the primary discharge diagnosis was for a psychiatric disorder (codes 293-302 and 307-314), excluding alcohol- and other drug-related conditions. In sensitivity analyses, this definition was broadened first to include hospitalizations for alcohol- and other drug-related conditions and self-inflicted injuries, and second to include psychiatric disorders that were coded on discharge but not as the primary diagnosis.

Yearly rates of youth hospitalized for mental illness were calculated for each age group, as was the proportion of hospitalizations due to mental illness, using intercensal population estimates for the age groups as the denominator. We excluded from this analysis repeated hospitalizations for the same cause in an individual during a given year. We hypothesized that repeated hospitalizations might be more common for mental illness than for other causes of hospitalizations and wanted to construct a conservative estimate. Furthermore, we believed that the number of unique youth hospitalized for a given condition was more relevant to public health than the number of admissions. However, because most other analyses have examined all admissions, for comparability we performed a separate analysis in which repeated hospitalizations were included. \( \chi^2 \) Tests of trend were computed to determine whether the rates or proportions changed significantly over time. Descriptive analyses were also conducted, examining the distribution of different psychiatric diagnoses among those hospitalized for mental illness in the 2 age groups.

In an additional analysis, the proportion of hospitalizations due to mental illness was compared with the other 2 leading causes for hospitalization in these age groups, injuries and appendicitis. Changes in the proportion of hospitalizations due to any cause have implications for the distribution of resources at the hospital level. Furthermore, trends over time in hospital days due to mental illness were examined using a \( \chi^2 \) test of trend.

RESULTS

There were 307,556 hospitalizations among youth aged 5 to 19 years in Washington State during the 1990s. After excluding pregnancy-related hospitalizations, this number dropped to 215,674. Overall annual hospitalization rates in school-aged children and adolescents decreased by one third in Washington State during the 1990s.

By 1999, the rate of school-aged children hospitalized for mental illness had increased by 22% from the 1990 rate of 11.0 per 10,000 (P = .004). However, most of this increase occurred in the first half of the decade (Figure 1). In 1999, 13.4 per 10,000 school-aged children in the state of Washington were hospitalized for a mental illness (approximately 1 of every 750 children aged 5-14 years). The proportion of hospitalizations due to mental illness in school-aged children increased from 7.8% in 1990 to 12.8% in 1999 (P < .001). Among adolescents, no significant change occurred in the rate hospitalized for mental illness, but the proportion of hospitalizations due to mental illness increased from 14.5% in 1990 to 21.5% in 1999 (P < .001). In 1999, 36.2 per 10,000 adolescents were hospitalized for a mental illness (approximately 1 of every 276 Washington teens aged 15-19 years).

When repeated hospitalizations are included in the analysis and all hospital admissions are examined, the rise in mental illness hospitalizations among school-aged children is more noticeable. Although there was a 22% increase in the yearly number of school-aged children hospitalized for mental illness during the 1990s, there was a 34% increase in the number of mental illness hospitalizations among this age group, rising from 12.0 to 16.1 admissions per 10,000 children aged 5 to 14 years. The proportion of mental illness admissions that were repeated hospitalizations also increased during the decade in this age group, from 8.3% in 1990 to 16.4% in 1999. Among adolescents, the proportion of repeated hospitalizations remained stable, accounting for approximately 16% of mental illness admissions each year. However, there were no significant changes over time in the
yearly rate of mental illness admissions among adolescents, with a rate of 44.7 admissions per 10000 adolescents in 1999.

Depressive disorders were the most common primary psychiatric diagnosis in hospitalized youth, accounting for 32% of mental illness hospitalizations among school-aged children and 56% among adolescents. In school-aged children, oppositional defiant disorder accounted for 38% of mental illness hospitalizations, and attention-deficit/hyperactivity disorder and conduct disorder accounted for an additional 16%. Among adolescents, bipolar disorder accounted for 15% of mental illness hospitalizations and schizophrenia for an additional 8%.

Although injuries were the leading cause of hospitalizations in Washington State among school-aged children and adolescents in 1990, the drop in injury hospitalizations across ages and the increase in mental illness hospitalizations among school-aged children have resulted in mental illness surpassing injuries and appendicitis as a cause for hospitalization in adolescents since 1996 and in school-aged children since 1997 (Figure 1).

During the 1990s, the length of stay among school-aged children admitted for mental illness decreased significantly, from a mean of 30.5 days in 1990 to 12.7 days in 1999 (P = .001) (Figure 2). During this time, mental illness consistently accounted for approximately 35% of hospital days among school-aged children. The mean length of stay among adolescents admitted for mental illness decreased as well, although less dramatically, from 13.2 days in 1990 to 9.1 days in 1999 (P = .001). However, the proportion of adolescent hospital days accounted for by mental illness increased significantly during this time, from 30% to 38% (P = .001). During 1999, there were approximately 18000 mental illness–related hospital days among school-aged children in Washington State and about 16800 among adolescents.

The definition for mental illness hospitalization in the primary analysis was a conservative one: it did not include youth admitted for suicide attempts whose primary diagnosis was not a mental illness or those who had a psychiatric diagnosis coded as secondary to another problem, such as alcohol or other drug abuse. When drug and alcohol disorders and self-inflicted injuries were included in the category of mental illness, the rate of youth hospitalized for mental illness increased by 6% in school-aged children and 26% in adolescents (Table). Self-inflicted injuries accounted for 5% of hospitalizations among adolescents during 1998 to 1999. Alternatively, if hospitalizations for which mental illness was coded in other than the primary diagnosis category were included, the rate increased by 28% in school-aged children and 33% in adolescents.

**COMMENT**

Even though overall hospitalization rates decreased markedly during the 1990s, the rates of hospitalization for mental illness remained stable among adolescents and increased significantly among school-aged children. Although injuries are often considered the leading cause of hospitalization among youth,29 hospitalizations for men-

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**Figure 1.** Rates of youth hospitalized by age group and primary diagnosis in school-aged children aged 5 to 14 years (A) and in adolescents aged 15 to 19 years (B).

**Figure 2.** Mean length of stay by age and primary diagnosis in school-aged children aged 5 to 14 years (A) and in adolescents aged 15 to 19 years (B).
mental illness surpassed those for injuries during the 1990s. While the mean length of stay for mental illness hospitalizations decreased during this period, mental illness accounted for one third of all hospital days by Washington youth aged 5 to 19 years during 1999.

There are multiple potential causes for the decline in the overall hospitalization rates among Washington youth. Increased prevention efforts may have played a role, as may have the shift from inpatient to outpatient management of many conditions prompted by managed care. Although it seems likely that health systems factors that lead to a decrease in overall hospitalization rates would also lead to a decrease in hospitalizations for mental illness, this does not seem to be the case in Washington State. It is possible that the prevalence or severity of mental illness among Washington youth has increased, thereby affecting hospitalization rates. Alternatively, increased recognition of mental illness or changes in treatment patterns and resources may be responsible for these findings.

Specifically, insufficient outpatient resources may contribute to increased hospitalizations via inadequate or delayed outpatient treatment, or because hospitalization may be the only way a youth can access needed mental health treatment in a timely manner. That the mean length of stay for mental illness hospitalizations decreased among school-aged children, while the prevalence of repeated hospitalizations for mental illness was increasing among this age group, raises the possibility that decreased length of stay (whether due to insurance issues or limited bed capacity) is leading to less effective treatment.

The observation that mental illness hospitalization rates increased significantly among school-aged children but not adolescents raises some interesting questions. This, combined with the different distribution of mental illness discharge diagnoses between the age groups, suggests that the increase seen may not be uniform across diagnoses. Of note is the fact that the raw number of admissions for disruptive behavior disorders as a group (attention-deficit/hyperactivity disorder, oppositional defiant disorder, and conduct disorder) among school-aged children more than doubled between 1990 and 1999.

There were several limitations of this analysis. The use of state-rather than national-level data means that the findings may not be generalizable to other regions of the United States. However, recent analyses have shown that mental health care use in Seattle and Washington State as a whole does not differ significantly from the national average. Although the data set is limited to hospitalizations that occurred within Washington State, some of the patients may have been residents in other states, and some Washington residents may have traveled to other states for hospitalization. While it seems likely that these effects would have canceled each other out, there may have been a small degree of mismatch between the populations used for the numerator and denominator.

Second, the use of administrative data has inherent limitations. We were unable to examine important issues such as severity and prior outpatient use among youth with mental illness. Although we have interpreted the primary discharge diagnosis as the cause of hospitalization, financial and administrative factors may have affected the discharge coding. Still, it remains likely that our use of the primary discharge diagnosis was a specific if not sensitive indicator. In addition, the data used in this analysis did not include sources of inpatient mental health care outside of acute-care hospitals, such as institutional care, substance abuse centers, and private behavioral health centers. Therefore, our findings likely underestimate the true burden of disease.

Despite these limitations, there are several implications of this research. Just as more effective outpatient management of ambulatory-sensitive conditions such as asthma has been successful in reducing hospitalizations, it is possible that a proportion of mental illness hospitalizations may be preventable as well. Improved access to outpatient mental health services may therefore be critical. There are also financial implications of these results. Recent cost-of-care studies suggest that children with mental illness have health care costs 2.5 times those of other children and that 33% of mental health care costs are related to inpatient care, $3.9 billion in 1998. Such costs highlight the growing need for mental health parity in insurance coverage, especially for children and adolescents. Given the high cost and burden of mental illness, attention should be directed toward effective strategies for the prevention of mental illness and the provision of mental health care in outpatient rather than inpatient settings.

Future research should examine whether similar trends have occurred at the national level. In addition, more research needs to be conducted regarding the effectiveness of inpatient treatment for childhood mental illness and the degree to which such hospitalizations could be prevented via successful outpatient interventions. Al-
What This Study Adds

This analysis adds a much-needed update regarding the rate of hospitalization for mental illness among youth. While prior studies have explored earlier years, this analysis examined the full span of the 1990s, the same time frame in which managed care came into full force in the United States and rises in psychotropic medication use among youth were observed. Although previous studies have used the rate of hospital admissions as the outcome measure, this analysis investigated that and the prevalence (the proportion of children experiencing a psychiatric hospitalization in a year). We observed that mental illness hospitalizations had increased or remained stable, while overall hospitalizations were dropping. This highlights the need for increased efforts and research regarding the prevention of psychiatric hospitalizations via outpatient sources and the use of effective interventions once youth are in the inpatient setting.

though the availability of data limited this analysis to inpatient care, such treatment does not occur in isolation: future research should focus on the transition to outpatient care.

Accepted for publication October 13, 2003.

This study was supported in part by funding from the Annie E. Casey Foundation, Baltimore, Md, and the Nesholm Family Foundation, Seattle. Dr Chabria is a Robert Wood Johnson Generalist Faculty Physician Scholar.

We thank Richard Brandon, PhD, for his insight and support during the early stages of the project, and Cindy Larson, MA, for her technical assistance.

Correspondence: Michelle M. Garrison, MPH, Child Health Institute, University of Washington, Campus Box 358853, Seattle, WA 98195-4920 (garrison@u.washington.edu).

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