

Psychiatric Hospital Service Utilization of Children and Adolescents in State Custody

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ABSTRACT

Objective: To examine factors related to psychiatric hospitalization decision and length of stay of wards of the Illinois Department of Child and Family Services. **Method:** A prospective design was implemented using the Childhood Severity of Psychiatric Illness (CSPI), a reliable, quantitative measure of psychiatric severity and its mediating factors. The CSPI was completed by hospital screeners upon conclusion of their crisis interviews. In addition to completing the CSPI, workers reported on demographic information, *DSM-IV* diagnoses, prescreening living arrangements, and length of hospital stay. **Results:** CSPI variables could effectively predict decision to admit versus deflect. The overall accuracy of this statistically significant prediction model was 77.9%, which was replicated on a new sample. Factors associated with decision to hospitalize are clinical in nature; ratings of suicidality, dangerousness, and impulsivity contributed the most to the model. Predicting length of stay was only moderately successful. Despite achieving significance, the model accounted for just 15.1% of length of stay variance using a multiple regression. Factors associated with length of stay were largely non-clinical in nature: living arrangement stability, region of the hospitalization, and age. **Conclusions:** These results can be used to assess how decisions regarding level and duration of care are currently being made as a point of departure for quality improvement efforts. *J. Am. Acad. Child Adolesc. Psychiatry*, 1999, 38(3):305–310. **Key Words:** psychiatric hospitalization, child welfare, decision-making, outcomes, service use.

The primary purpose of a short-term hospitalization is to stabilize children who are thought to be a danger to themselves or others and who cannot be treated at a lower level of care. Despite the importance of the psychiatric hospitalization, concerns remain regarding its use. Hospitalization, at approximately \$500 per day, is the most expensive form of care (Burns and Friedman, 1990; U.S. Congress, Office of Technology Assessment, 1986). This cost has increased rapidly (U.S. Congress, Office of Technology Assessment, 1986). As a result, hospitalizations constitute a significant proportion of all child services

expenditures (Behar, 1990; Cole and Poe, 1993). In addition, there is no conclusive evidence of the effectiveness of hospitalizations (Sondheimer et al., 1994); however, the studies that address hospital treatment effectiveness tend to emphasize the potential benefits of long-term hospitalizations rather than short-term hospitalizations (Livingston et al., 1990, Perry et al. 1992).

Given the potential benefits of and concerns over the use of psychiatric hospitalization, effective monitoring of hospital utilization is needed. Services utilization research tends to emphasize decision-making regarding either the level of care or the dose of care provided. Studies that attempt to determine factors that lead to a hospitalization address the "level of care" issue, while studies that predict length of stay address the "dose of care" issue. In both cases, we would expect that decision-making is based on the specific needs of the child and not on extraneous factors. Ideally, our decisions reflect a detailed knowledge of child psychopathology and how it interacts with diverse social environments, leading to intricate clinical pathways.

An examination of the literature reveals that predicting decision to admit has been fairly successful

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(Bickman et al., 1996; Costello et al., 1991; Hillard et al., 1988; Lyons et al., 1997a; Patrick et al., 1993; Pottick et al., 1995b). Factors associated with decision to admit range from nonclinical factors such as insurance coverage (Patrick et al., 1993) to clinical factors such as diagnosis (Bickman et al., 1996; Hillard et al., 1988; Pottick et al., 1995b). Length of stay, on the other hand, has been more difficult to predict (Allen et al., 1985; Pottick et al., 1995a, 1998). For example, Pottick and colleagues' elegant reanalysis of 1986 nationally representative data collected by the National Institute of Mental Health still accounted for only 36% of the variance in length of stay (Pottick et al., 1998). Factors related to length of stay include diagnosis, posthospital disposition, socioeconomic status, and number of previous hospitalizations (Livingston et al., 1990; Perry et al., 1992; Pottick et al., 1998). Many of the utilization studies have been conducted in environments with limited alternatives to the hospitalization. Consequently, lengths of stay are often long. Therefore, the results of many utilization studies are of limited value to clinicians who use the hospital for short stays. Also, there appears to be a scarcity of research on children in the child welfare system and their unique service utilization patterns and issues.

The current study examined factors related to decision to admit and length of stay of children who were wards in a large Midwestern state. Once admitted, children were screened for hospitalization and followed closely. Services were provided within a continuum of care. This research serves as a review of this state's efforts at delivering services that are clinically determined.

METHOD

Setting

This study was conducted through the Screening, Assessment, and Supportive Services (SASS) program within the state of Illinois child welfare system, the Illinois Department of Child and Family Services (DCFS). The SASS program was implemented in 1992 to provide crisis assessment and treatment services to children in protective custody who are referred for or at risk of hospitalization. Services include ongoing monitoring of children who require acute psychiatric inpatient care, deflection services for children who do not meet admission criteria, and posthospitalization discharge services. These services are intended to fulfill the goals of (1) decreasing the number of inappropriate psychiatric admissions for DCFS wards, (2) monitoring hospital-based care to ensure that children are not hospitalized beyond clinical necessity, and as part of a larger initiative to (3) provide mental health services at the least restrictive level of care. In keeping with goals that are based on the welfare of state wards receiving mental health services, SASS has no financial incentive to hospitalize its referrals.

Referrals are made to SASS workers when a DCFS ward is demonstrating a risk of self-harm or injury to others that might require hospitalization. Telephone referrals can be made by relevant parties such as DCFS personnel (i.e., caseworkers) or clinicians from a hospital to which a child has been presented for admission. For eligible children, prehospitalization screenings and crisis intervention services are administered within 4 hours of the referral. Screening interviews take place with the child and caregiver and are intended to assess whether the child has reached a level of risk that warrants hospitalization. The hospital physician however, is ultimately responsible for the final decision. If a child is not considered appropriate for hospitalization, a variety of deflection services can then be implemented. These include individual or family counseling, intensive outpatient treatment, partial hospitalization, placement stabilization, developmental rehabilitation services, home-based services, or case management.

The children in this study were funded through Medicaid. The DCFS contracts with all hospitals under a fee-for-service reimbursement system. A total of 41 hospitals from throughout the state are represented in our sample.

Sample

The overall sample consisted of 2,666 children and adolescents who were wards of the DCFS. Of these 2,666 cases, 46.7% were female and 53.3% were male. The average age was 13.0 years ($SD = 3.4$). The majority of children (60.4%) were African-American; an additional 32.0% were white, and the remaining 7.6% were Hispanic or Asian. Diagnostically, 41.8% had a mood disorder, 27.2% had attention deficit or disruptive disorders, 11.4% had adjustment disorders, 8.0% had impulse control disorders, and 3.4% had psychotic disorders. The remaining 8.8% had a variety of other disorders.

The sample included all children screened through SASS from January 1997 through September 1997. Children were screened to determine whether they were in need of psychiatric hospitalization. All data were collected directly from the SASS workers upon completion of the screening interview.

Measures

The primary measure used was the Childhood Severity of Psychiatric Illness (CSPI), a standardized decision support tool (Lyons, 1998; Lyons et al., 1997b,c). Focus groups with various providers along with indications from the literature were used to identify relevant dimensions. Anchored ratings on items designed to reflect these dimensions were developed and tested for reliability and clinical relevance.

Completing the CSPI involves making ratings on 4-point scales (0 = no evidence through 3 = severe dysfunction) along a series of 25 clinically relevant dimensions. The dimensions are symptoms, risk factors, functioning, comorbid factors, and placement or system characteristics. All SASS workers received a 3-hour training on the use and implementation of the CSPI. Rater reliability during these trainings ranges from 0.70 to 0.80 using the Spearman ρ . Recent reviews of SASS charts indicate that reliability remains strong after training, with an average Spearman ρ of 0.67. This suggests that the measure is used properly in the field.

In addition to completing the CSPI on all screened cases, SASS workers also completed monthly reports on all children receiving services. These reports contain information on hospital length of stay, type and intensity of services delivered, prescreening living arrangement, placement stability, demographics, and diagnosis.

TABLE 1
Comparison of Observed and Predicted Hospitalization
and Deflection Decisions

Observed	Predicted		Total
	Hospitalize	Deflect	
Hospitalized	667 (70)	285 (30)	952 (43)
Deflected	203 (16)	1,050 (84)	1,253 (57)

Note: Values represent frequency of cases, with percentage given in parentheses.

Statistical Analyses

Logistic regression was used to predict hospitalization decision (hospitalize or deflect), using variables from the CSPI. Of the original 2,666 children, 461 (17%) were deleted from the analyses because of missing data. CSPI variables were selected for their clinical relevance, low frequency of missing data, and likely impact on the equation based on a priori examination.

Lengths of hospital stay with corresponding clinical and demographic information could be collected on 430 children, with 69 (16%) cases eliminated because of missing data. An unweighted least-squares regression was used to predict length of stay. Predictor variables were entered on the basis of hypotheses and box plots of the data. None of the CSPI or demographic variables had a linear relationship with length of stay. Therefore, we dummy-coded the variables to maximize predictability. It is not surprising that the distribution of length of stay values was positively skewed to a point that compromised the assumptions of a least-squares multiple regression. We therefore truncated the sample to end at a length of stay of 50 days. This eliminated an additional 27 (6%) cases and resulted in a distribution that was adequately normal with 334 values.

RESULTS

Predicting Hospitalization Decision

The results of the logistic regression to predict hospitalization decision are shown in Tables 1 and 2. The logistic regression generated a statistically significant model of hospitalization decision (model $\chi^2 = 871.9$, $df = 5$, $p <$

TABLE 2

Logistic Regression Predicting Psychiatric Hospitalization Versus Deflection ($n = 2,205$): Coefficients and Tests of Significance

Variable	Logistic Coefficient	Wald Test of Significance
Suicide Risk	0.77	182.3*
Danger to Others	0.72	115.5*
Impulsivity	0.76	95.9*
Emotional Disturbance	0.57	44.2*
Behavioral Disruption (Conduct Disturbance + Oppositional Behavior)	-0.16	12.9*

Note: Standardized coefficients used. Model $\chi^2 = 871.9$, $p < .001$.
* $p < .001$.

.001), suggesting that the predictors classify better than the base rate. The overall accuracy of the model was 77.9%, which is 21.1% higher than the percentage of deflections (Table 1). Deflections were predicted with higher accuracy than hospitalizations, at 83.8% and 70.0%, respectively. The positive predictive value (the odds of a child's being admitted after a hospitalization was predicted) was 68.8%. The negative predictive value (the odds of a child's being deflected after a deflection was predicted) was 78.7%.

The finding that 83.8% of actual deflections were predicted deflections indicates that 16.2% of actual deflections were predicted to be hospitalized. These non-hospitalized, high-risk cases can be considered "high-risk deflections." Likewise, the 30% of hospitalized cases that were predicted deflections can be considered "low-risk hospitalizations."

The 5 variables that constitute the model are presented in Table 2. Each partial logistic coefficient represents the change in the log-odds of hospitalization versus deflection associated with a change in a given predictor, holding other predictors constant. Because hospitalizations were coded with a 1 and deflections were coded with a 0, positive coefficients represent greater likelihood of a predicted hospitalization and vice versa. CSPI ratings of suicidality, dangerousness, and impulsivity contributed the most to the prediction equation. The Emotional Disturbance CSPI variable, which measures severity of *DSM-IV* mood disorders, played a moderate role in the equation. The Conduct Disturbance and Oppositional Behavior CSPI variables were combined into a Behavioral Disruption variable because of their high Pearson correlation of .70. This new variable negatively predicted decision to admit, therefore predicting decision to deflect.

The equation derived from these analyses, using the standardized β weights in Table 2, was replicated on an entirely new sample of 778 screenings. The overall accuracy of this validation sample was 78.1%, very similar to the 77.9% accuracy of the model sample. Deflections in the validation sample were predicted with 81.6% accuracy, and hospitalizations were predicted with 73.6% accuracy. These values are again very similar to the accuracies derived from the model sample.

Predicting Length of Stay

The average length of stay for this sample was 15.0 days (SD = 11.0 days). Table 3 presents the variables that

TABLE 3Multiple Regression Predicting Psychiatric Hospital Length of Stay ($n = 334$): β Weights and Tests of Significance

Variables	β	t
Return home postdischarge: yes	-.15	-3.0*
Age category: 5-10 and 10-15	.17	3.3*
Region: Northern (includes Chicago)	.31	6.0*
Prescreen living arrangement: group home	.06	1.2
Prescreen living arrangement: foster care	.01	0.1
Danger to Others: mild	.02	0.3
Danger to Others: moderate	.06	1.1
Danger to Others: severe	-.04	-0.9
Suicide Risk: severe	.07	1.5
Emotional Disturbance: moderate or severe	.07	-1.3
Conduct Disturbance: severe	-.10	-1.9
Impulsivity: moderate or severe	-.06	-1.1
Oppositional Behavior: absent	-.01	-0.1

Note: All variables listed were assigned a dummy code of 1.0. The reference categories were assigned a dummy code of -1.0. Standardized coefficients were used. Model $F_{3,331} = 20.8, p < .001$.

* $p < .01$.

were submitted to a multiple regression and the results of this analysis. As demonstrated in Table 3, a significant equation emerged ($F_{3,331} = 20.8, p < .001$). The combination of state region, age category, and postdischarge living displacement variables predicted 15.1% of the variance in length of stay. Of these 3, the regional variable contributed the most to the equation. Variables that predicted whether children would be hospitalized (suicidality, dangerousness, impulsivity, emotional and behavioral problems) did not predict how long they would stay once hospitalized. The child's prescreening living arrangement (residential placement versus all others and foster placement versus all others) also failed to predict duration of hospital stay.

DISCUSSION

The purpose of this study was to determine whether "level of care" and "dose of care" decisions regarding the psychiatric hospitalization of state wards could be effectively modeled. In a rational, integrated mental health service delivery system, children receive services based on relevant clinical factors. Also, they should receive only those services required to address their individual needs. Otherwise, misallocated services inappropriately tax a limited pool of resources and can be ineffective.

The results of this study demonstrate that standardized assessments such as the CSPI can be used prospectively by trained clinicians to predict hospital admission

decisions ("level of care"). A logistic regression technique was successful in predicting decision to admit or deflect with a total accuracy of nearly 80%. The model was cross-validated on a new sample of 778 screens without any loss in accuracy. Furthermore, the model is guided by intuitive clinical factors. Suicidality, dangerousness, and impulsivity played the largest role in predicting admission. Because these are the variables that SASS clinicians are taught to use when making admission decisions, our findings demonstrate the system is largely functioning as it purports to. Emotional problems such as depression and anxiety also contributed to predicting hospitalization. Behavioral problems demonstrated an inverse relationship with decision to admit; higher combined scores on conduct and oppositionality variables decreased the probability of entering the hospital and increased the probability of a deflection. In the absence of a safety risk, conduct problems and oppositionality, while often burdensome to caregivers in all settings, arguably do not necessitate a stay in the hospital. Despite this, it appears that some children are being referred for hospitalization for behavioral problems. We can use this information to determine why behavioral problems are not being managed as effectively as possible and how we can better support the providers who are dealing with them.

Deflections were found to be more predictable than hospitalizations in our sample, probably because screeners tend to err on the side of caution when it comes to admitting, leading to a more heterogeneous sample of hospitalized cases. This also suggests that there may be additional nonclinical factors that affect the decision to admit.

Predicting length of stay, as a means of addressing the "dose of care" issue, was less successful. While significant, a regression model predicted just 15% of the variance. Furthermore, the variables from our study that did predict variance were not directly clinical: age, postdischarge placement stability, and region of screening. Nevertheless, these variables illuminate current system factors that affect service decisions, which can be used to inform service delivery improvement. For instance, the finding that return to prescreening living arrangement affects length of stay should highlight placement stabilization as an important issue in quality improvement efforts.

Variables that were successful in predicting decision to admit, such as suicidality, dangerousness, and impulsivity, contributed little to determining how long chil-

dren would stay once admitted to the hospital. Providers can use this finding, however, to inform thinking about the important clinical variables that should, in fact, bear on length of stay. For instance, one factor that may bear on length of stay is response to treatment once in the hospital. Also, factors external to the patient likely affect length of stay. For example, Lyons et al. (1991) found in an adult population that practice pattern variation (i.e., the attending psychiatrist) was a powerful predictor of length of stay (Lyons et al., 1991).

What makes the task of creating clinically based guidelines for duration of hospital stay decisions difficult is that lengths of stay have shrunk dramatically in recent years because of pressures from funding sources. This trend has shifted the way people have used the hospital and conceptualize an appropriate length of stay. Clearly, the length of stay issue is a challenging one that will require coordination and contemplation among the various payers and providers of this service.

This study has limitations that affect the validity of our results. As is often the case with this type of study, collecting data from workers in the field leads to challenges in obtaining complete and accurate information. Typical problems such as missing data and the varied environments in which the CSPI is completed compromise our findings. Indeed, one reason that the length of stay sample was smaller than the hospitalization decision sample involves the difficulty in tracking length of stay over months and across agencies as children are transferred from one SASS provider to another. Also, this study takes place in one state with a unique service environment and demographics, suggesting that our results have limited generalizability.

Despite its limitations, this study has merit for several reasons. First, all subjects were state wards, a group whose hospital utilization patterns have never been examined with such large samples and a quantitative methodology. Second, the samples and methodology used to predict hospitalization decision were very similar to those used to predict hospital length of stay. Therefore, the findings in the literature which have suggested that predicting decision to admit is more effective than predicting length of stay are now corroborated after essentially controlling for sample differences and methodology. Finally, the utilization patterns under study here were for short-term hospitalizations, in contrast to many of the studies in the literature, which have focused on long-term hospitalizations. Short-term hospitalizations, used to manage

acute risk in an integrated continuum of care, are rapidly replacing long-term hospitalizations. Indeed, future research should focus on the service utilization patterns of children using short-term hospitalizations and the feasibility of using our methodology to implement more rational and predictable decision-making systems.

Clinical Implications

There are several potential applications of a reliable prediction model for admission decision. For instance, the model is currently being used as a standard with which to evaluate individual decisions. We assign cases in which there are discrepancies between observed decisions and predicted decisions into 1 of 2 categories. High-risk deflections are cases predicted to be hospitalized that are actually deflected. Low-risk hospitalizations are cases predicted to be deflections that are actually hospitalized. These discrepant cases are then used as a means for quality improvement. Lists of mispredicted cases are sent to the agencies that screened them for the purpose of decision review. When consistent nonclinical factors are affecting decisions, they have been compiled and used to change the system to instill greater clinical influence.

Using these findings to review the effort of Illinois to develop a rational service delivery system leads to the conclusions that (1) predicting decision to admit or deflect is both effective and clinically rational and (2) predicting length of hospital stay is challenging. Of the variables we measured, those that affect duration of hospitalization do so only slightly and are systemic or demographic in nature (i.e., nonclinical). A continuous quality improvement model would suggest that this type of review should be conducted with regularity to determine whether efforts to alter the ways providers make decisions change in suggested ways.

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Asthma in Non-Inner City Head Start Children. Kelly A. McGill, PharmD, Christine A. Sorkness, PharmD, Carole Ferguson-Page, MSN, James E. Gern, MD, Thomas C. Havighurst, MS, Barbara Knipfer, BS, Robert E. Lemanske, Jr., MD, William W. Busse, MD

Objective: Asthma is a significant cause of morbidity and mortality in children. The objective of this study was to determine whether the federal program Head Start in Dane County, Wisconsin, could be used as a mechanism to identify preschool-aged children with asthma. *Design:* Five-year, cross-sectional survey of parents with children enrolled in Head Start. *Methods:* Investigator-administered asthma screening questionnaire to parents of enrolling Head Start children in Dane County, Wisconsin. *Measurements:* Asthma prevalence and asthma-related health care use, including emergency department visits, hospitalizations, and medication usage, were measured using an asthma screening questionnaire developed by investigators. *Results:* Information was gathered on 2215 children. The prevalence of physician-diagnosed asthma in the screened children was 15.8%. Parental reports of physician-diagnosed asthma were validated in a subset of 133 children, with a 98.5% confirmation rate. Independent risk factors for asthma included male gender (relative risk, 1.4) and African-American ethnicity (relative risk, 1.4). Asthma-related morbidity was substantial with 26.7% of identified children hospitalized for asthma and 54.5% with an emergency department visit during their lifetime. The majority of children (46.4%) were treated with intermittent, quick relief medications (β -agonists) alone, whereas only 6.1% were on daily, long-term controller medications. *Conclusions:* Asthma screening through a Head Start program provides an effective means of targeting preschool-aged children from socioeconomic groups at high risk for asthma. Identification of children early in the disease course and those at high risk for asthma provides an ideal opportunity for the implementation of preventive and therapeutic interventions. *Pediatrics* 1998;102:77-83