Modeling crisis decision-making for children in state custody

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Abstract

We studied 1492 children in state custody over a 6-month period to investigate the relationship between children's hospital admissions and the crisis workers' clinical assessment. A 27-item standardized decision-support tool [the Childhood Severity of Psychiatric Illness (CSPI)] was used to evaluate the symptoms, risk factors, functioning, comorbidity, and system characteristics. The CSPI has been shown to have a reliability range from 0.70 to 0.80 using intraclass correlations. Logistic regression was used to calculate age-adjusted odds ratios (AOR) of hospitalization, their 95% confidence intervals, and corresponding P values. The results showed that risk factors, symptoms, functioning, comorbidities, and system characteristics were all associated with hospital admissions. Children with a recent suicide attempt, severe danger to others, or history of running away from home/treatment settings were more likely to be hospitalized (respective AOR=12.7, $P<.0001$; AOR=32.3, $P<.0001$; AOR=3.0, $P=.001$). In addition, hospitalization was inversely associated with caregiver knowledge of children (AOR=0.2, $P=.01$) and multisystem needs (AOR=0.3, $P=.04$). The decision to hospitalize children psychiatrically appears to be complex. As predicted, risk behaviors and severe symptoms were independent predictors of children's hospital admissions. Interestingly, the capacity of the caregiver and the children's involvement in multiple systems also predict children's hospital admissions.
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1. Introduction

The psychiatric hospital remains an important component of the children's mental health services system. Despite the reductions and closures of state hospital facilities [1] and efforts to reduce the length of community hospital stays [2], admissions to the hospital have not been reduced, and in fact appear to be on the rise, particularly in the public sector [3,4]. With the efforts to create intensive community treatment alternatives to residential treatment, it is possible that acute psychiatric hospitals will serve an even larger role in the future as the system of care for children evolves in local communities [5,6].

Clinical decision-making for adult psychiatric hospitalization has evolved significantly over the past several decades. Recently, medical necessity criteria have come to mirror involuntary commitment criteria instituted as a part of the Civil Rights Movement in the 1960s [7]. Thus, factors such as suicide risk, danger to others, and severe self-care impairment are reliably associated with hospital admission and outcomes among adults [8,9].

The present study focuses on modeling crisis decision-making for children in state custody. Operated within the State of Illinois Child Welfare system, the Illinois Department of Children and Family Services (DCFS), the Screening, Assessment, and Supportive Services (SASS) program is designed to provide crisis assessment and treatment services to children in the protective custody of the State of Illinois. The main goals of this study were to identify factors that predict children's psychiatric hospitalization or deflection service utilization, and to model crisis decision-making for children in state custody.

2. Methods

2.1. Setting

This study was conducted through the SASS program within the State of Illinois Child Welfare system, the Illinois

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DCFS. The SASS program, originally implemented in 1992, is responsible for providing crisis assessment and treatment services to children in the protective custody of the State of Illinois. This program is designed to serve children at various levels of psychiatric risk. The mental health services include ongoing crisis screening, monitoring of children who require acute psychiatric impatient care, deflection services for children exhibiting dangerous or destructive behaviors that might otherwise require hospitalization if not treated, and postdischarge services for children who have been admitted to a psychiatric hospital. Deflection services include crisis therapy, linkage to community treatment and other service resources, and support for foster parents to monitor and supervise children in their care. The principal aims of the program are to decrease the number of inappropriate psychiatric admissions, to monitor hospital-based care to ensure that children are not hospitalized beyond medical necessity, and ultimately, to provide mental health services at the least restrictive, yet medically appropriate, level of care.

2.2. Sample

The study sample was obtained from the SASS database. The inclusion criteria were all children with complete information regarding at least one episode of treatment served by the SASS in the 6 months between January 2001 and June 2001. The exclusion criteria were those children who had incomplete assessment data. A total of 1492 children, who were wards of the Illinois DCFS, were included in this analysis. Compared to the overall child welfare population, minority children appear somewhat underrepresented in this sample of crisis cases in that about half of the sample was Caucasian. The age range of the study sample was from 5 to 21 years. This study was not blind in that SASS workers both completed the assessment reports and contributed to the decisions regarding hospital admission or deflection.

2.3. Measurements

Data on each case was collected from monthly SASS service reports and ratings undertaken using a standardized assessment tool, the Childhood Severity of Psychiatric Illness (CSPI) [10], which was completed by the SASS workers at the time of screening. The monthly reports include information on demographics, psychiatric diagnosis, pre-screening living arrangement, SASS service hours, and hospital length of stay.

The CSPI is a 27-item standardized decision-support tool in which the ratings are made on 4-point scales per item, with 0 indicating no evidence and 3 suggesting severe dysfunction. These items cover five dimensions: symptoms, risk factors, functioning, comorbidity, and system characteristics. Results from a series of studies show that the CSPI can serve as an accurate measure of children's mental health needs, service utilization, and outcomes [10]. The CSPI has

Table 1
Sample characteristic

Characteristics	Deflection (n = 738)	Hospitalization (n = 754)
Age (y)	13.7 (3.6)	14.3 (3.5)
Gender (% female)	47.3	52.7
Race (%)*		
Caucasian	57.1	64.0
African American	33.4	27.6
Hispanic American	6.9	6.5
Other races	2.6	1.9
New cases (%)	79.7	69.4
Case supervision hours	0.9 (1.2)	1.2 (1.3)
Hospital monitoring hours	0.9 (1.8)	2.2 (2.1)
Screening services hours*	2.2 (1.4)	3.0 (1.9)
Case agency (%)*		
Private	56.1	48.3
DCFS	43.9	51.7

Data were mean (SD), unless otherwise specified. Significance tests for categorical variables were performed with the Pearson χ^2 statistic. DCFS = Illinois Department of Children and Family Services.
* $P < .01$.

been shown to have a reliability range from .70 to .80 using intraclass correlations. In this study, the CSPI was used prospectively to assess the type and level of children's mental health services needs. All SASS agencies have participated in an annual audit of CSPI reliability to ensure the reliable use of the measure in the field [11]. During the period of the study, the statewide audit reliability was 0.71 for individual items of the CSPI.

2.4. Analyses

Records of SASS reports completed for each child in the sample were examined to determine factors predicting children's psychiatric hospitalization or deflection service utilization. The dependent variable in the study was binary response: hospital admission or deflection service. Descriptive statistical analysis was conducted to report the sample characteristics. The χ^2 statistic was used to test if there was difference on hospital admission among each level of those CSPI items. Multivariate logistic regression analysis was performed to determine age-adjusted odds ratio of CSPI item related to children's psychiatric hospitalization. The predicted probability of admission was calculated using the formula: $p(Admission) = e^y/(1 + e^y)$ [7]. The overall model prediction accuracy was estimated. Finally, the provider profile of admission/deflection choices by agency was determined.

3. Results

Table 1 presents the sample characteristics. The average age of the sample was 13.9 (SD 3.6) with a range of 5 to 21 years. The study sample was 52.7% women. Over half of

Table 2
Selected CSPI items are independently associated with the risk of hospitalization

Item of CSPI	AOR	95% CI	P value
Suicide risk	12.7	5.9–27.3	<.0001
Danger to others	32.3	12.7–72.3	<.0001
Elopement risk	3.03	1.7–5.6	.0003
Neuropsychiatric disturbance	2.5	1.4–4.3	.001
Emotional disturbance	4.4	1.3–15.4	.02
Impulsivity	3.3	1.5–7.4	.004
Caregiver knowledge of child	0.2	0.1–0.6	.01
Multisystem needs	0.3	0.1–0.9	.04

Odds ratios have been adjusted for age and all other CSPI items. CSPI = childhood severity of psychiatric illness, AOR = age-adjusted odds ratio, CI = confidence interval.

the study sample was Caucasian. The race or ethnic background was significantly related to hospitalization or deflection services. There were about 10% more new cases of deflection than of hospitalization. Average case supervision time was approximately 1 h for both deflection services and hospitalization. The hospital monitoring hours were approximately 1 h for those receiving deflection services, and 2 h for those children hospitalized. The screening services hours were longer for hospital admission than for deflection service. Hospital admissions (52%) and deflections (48%) were fairly evenly divided in the sample.

Age-adjusted odds ratios (AOR) of selected CSPI items are independently associated with hospitalization (Table 2). We started with models including only items of symptoms, risk factors, functioning, or system factors. Items reflecting impulsivity, suicide risk, and danger to others, had statistically significant AOR in all levels, and graded increases from level one to level three, while for elopement risk and crime/delinquency symptoms, AOR of hospitalization were statistically significant only at level three. For the symptom of emotional disturbance, AOR of hospitalization was statistically significant among levels two and three. For neuropsychiatric disturbance, the age-adjusted odds ratios of hospitalization were statistically significant at level on and level two. Both peer and school dysfunction had graded, statistically significant AOR from level one to three. Caregiver knowledge of child and placement safety had statistically significant AOR at level one, while multisystem needs had statistically significant AOR at level two. In the full model, including all statistically significant items, data demonstrated that danger to others had the highest odds to be hospitalized compared to other risk factors, while neuropsychiatric disturbance had the lowest odds to be hospitalized. Suicide risk ranked number two in predicting children's psychiatric hospitalization. Both multisystem needs and caregiver knowledge of child were statistically significant, but inversely associated with psychiatric hospitalization.

Using the logistic model it is possible to convert CSPI profiles into a probability of admission statistic. Examples

Table 3
The predicted probability of hospital admission for selected CSPI items

CSPI item	Scale				
Suicide risk	1	0	0	1	3
Danger to others	1	3	0	1	3
Elopement risk	1	0	0	1	3
Neuropsychiatric disturbance	1	0	3	1	3
Emotional disturbance	1	0	0	1	3
Impulsivity	1	0	0	1	3
Caregiver knowledge of child	1	0	0	3	3
Multisystem needs	1	0	0	3	3
P (admission)[a]	.18	.51	.29	.52	.99

CSPI = childhood severity of psychiatric illness.

[a] Predicted probability of hospital admission was calculated using the formula: $P(Admission) = e^y/(1 + e^y)$(ref). $Y[Pr(Yi = 1)/Pr(Yi = 0)]$ was calculated according to item scales (0–3) by logistic regression models ($Y = \beta_0 + \beta_1 X_{i1} + \ldots \beta_p X_{ip}$).

of this predicted probability of admission for statistically significant CSPI items is displayed in Table 3. When all these items are rated at level one (mild dysfunction), the predicted probability of hospital admission was 0.18. If Danger to Others or Neuropsychiatric Disturbance were rated at level three (severe dysfunction) and all other items were normal (level 0), the predicted probability of hospital admission was 0.51 or 0.29, respectively. In some circumstances, both caregiver knowledge of child and multisystem needs were rated at level three (the present caregiver has a significant problem in understanding the child's current condition and the agencies have competing goals for the child/children), and all other items were rated normal (level 0), with predicted probability of hospital admission at 0.52. Naturally, the predicted probability of hospital admission was 0.99, if all items were rated at level three (severe dysfunction). Using the equation provided in the methods section, probability of admission can be calculated for any observed CSPI profile.

Table 4 reports the overall accuracy of the prediction model. The results showed that 79% of all deflection cases were correctly predicted and 75% of all hospitalization cases were correctly predicted. The model was appropriate in predicting both deflection and hospitalization, while the model was slightly more accurate in predicting deflection. To test validity of the predicting model, we compared high-risk deflection (predicted to be hospitalized but not actually hospitalized) to low-risk deflection (predicted not to be hospitalized and not hospitalized) with amount of deflection

Table 4
Accuracy of overall model on hospital admission

Predicted observed	Deflection	Hospitalization
Deflection	497 (79%)	129 (21%)
	Predicted deflection	High-risk deflection
Hospitalization	152 (25%)	458 (75%)
	Low-risk admission	Predicted hospitalization

Table 5
Provider profile of admission or deflection decision-making by agency

Agency[a]	n	P (admission) for hospital	n	P (admission) for deflection
A	37	.71	49	.81
B	39	.22	43	.95
C	129	.43	111	.93
D	23	.27	19	.95
E	89	.39	27	.86
F	118	.37	40	.91
G	22	.62	27	.93
H	65	.36	105	.93
I	24	.34	17	.94
J	19	.38	28	.74
K	15	.38	7	.94

[a] Agency names were replaced with letters of A–K.

services received. High-risk deflection cases received significantly more deflective services [$t(df=414)=2.04$, $P=.04$].

Provider profile of admission or deflection choices by agency is presented in Table 5. All agencies included in the table were private providers. The decision making of hospital admission or deflection services varied widely among providers. In general, the private agency was more likely to use deflection services than to hospitalize a case.

3.1. Case studies

3.1.1. Case 1

A.H. is a 9-year-old boy who was placed in a group home after living in seven foster homes. Taken from his mother's custody when he was 6 years old due to repeated allegations of physical abuse and neglect, he has not seen or spoken to her since. Physically abused in one of his early foster homes, A.H. was placed in the group home after his most recent foster parents claimed that they could not handle him, following an incident in which he set fire to a living room chair.

A.H. is in a 3rd grade special education classroom for children with emotional and behavioral problems, the fourth school he has attended from his foster homes in different locations. He has always received low grades in school. His IQ recently was estimated to be in the borderline range. A.H. has no close friends and frequently gets into fights with peers at school. He has been suspended twice over the past semester.

A.H. has a history of attention deficit-hyperactivity disorder, oppositional and aggressive behavior, and conduct problems, such as stealing and setting fires (none of which has physically harmed anyone). He has seen multiple therapists toward whom he also displays oppositional behavior. He is prescribed stimulant and antipsychotic medications, the latter to control his aggressive outbursts. A.H. has been hospitalized three times, most recently for threatening to stab his teacher.

A.H. has had a difficult time adjusting to the group home. He has been very oppositional and has gotten into multiple physical fights. During dinner, A.H. and another boy got into a fight when the staff person was out of the room. The staff person returned to the room to find A.H. strangling the boy, refusing to let go, and needing to be physically removed and restrained. A.H. was unable to calm down in the seclusion room, threatening to kill this boy as he slept. SASS was contacted and arrived 30 min later. A.H. continued to display homicidal ideation at the initial assessment. The SASS disposition was to hospitalize A.H., consistent to the predicted disposition.

3.1.2. Case 2

S.T. is a 15-year-old female who lives in a foster home in Cook County. She was placed in state custody at age 7 due to physical abuse by her mother and alleged sexual abuse by her stepfather. S.T. has not seen or spoken to her mother in 5 years. She has lived in her present foster home for the past 3 years and generally has had a good relationship with her foster parents, who own their own home and both work. Also in the home are her foster parents' two children (ages 7 and 9), and S.T.'s biological brother (age 11), with all of whom she gets along well.

S.T. has a history of psychiatric difficulties, namely posttraumatic stress disorder and major depression. S.T. was hospitalized in a psychiatric facility once at age of 7 after being removed from her biological family's home and threatening to kill herself. She has not been hospitalized since then and has not experienced a depressive episode since she has lived with her present foster parents. S.T. does not presently receive any mental health services.

S.T. is in a regular education 9th grade classroom and receives pull-out academic services. S.T. has a few friends, but spends most of her time with her 18-year-old boyfriend, Anthony, who she has dated for about 2 months. S.T. recently has been skipping classes to spend time with Anthony, who is not in school, and S.T.'s grades have declined over the past couple of months. S.T. and her foster parents have been arguing more and more over her relationship with Anthony, of which her foster parents do not approve. They have forbidden S.T. from seeing Anthony and do not allow her to speak with him on the telephone. S.T. has become increasingly oppositional with her foster parents.

Recently, S.T.'s foster mother returned home from work early to find her and Anthony together in S.T.'s bedroom. A screaming argument between S.T. and her foster mother ensued and Anthony left the house. S.T. started throwing things on the floor, breaking a lamp, and threatening to run away. S.T.'s foster mother called her husband and the SASS hotline. When a SASS worker arrived, S.T. presented as very distressed, continuing to threaten to run away, but denying any suicidal or homicidal ideation. S.T. was not hospitalized, consistent with the predicted disposition, and was linked to a placement stabilization program for youth in foster care. Crisis counseling was provided to S.T. and the

foster mother around issues of dating, sexuality, and respecting house rules.

4. Discussion

Results of the present study suggest that notions of medical necessity for children can be complicated. Consistent with early research, the key risk management considerations, suicide risk and danger to others were important predictors of hospital admission. Risk of runaway also was related to the admission decision. Severe levels of symptomatology, particularly impulsivity, psychosis, and emotional disorders increased the odds that a child would be admitted. However, beyond the symptoms and risk behaviors of the child, system factors also were important to inform the decision to admit. In particular, the caregivers' perceived knowledge of the child informed the decision. Children who were involved in multiple systems were more likely to be admitted. These system factors were independently related to the admission decision compared to the clinical characteristics of the child.

The grading of the impact of the individual CSPI over each item's four levels offers some insight into the level of severity of each item associated with increased probability of admission. Danger to self, danger to others, and impulsivity had increasing likelihood of admission evenly across levels. Thus with increasing severity, there was an increasing likelihood of admission. For Elopement and Crime/ Delinquency the increase in likelihood of admission came only in the presence of a rating of 3 for these items. Any Neuropsychiatric Disturbance was associated with an increased risk (i.e., a rating of 1 or above) but there was no increase with increasing severity of the symptoms of psychosis. Any Caregiver Knowledge or Safety needs (i.e., a rating of 1 or above) was associated with an increased likelihood of admission but this likelihood did not increase with greater severity within item. Only the presence of conflicting problems across multiple systems (i.e., a rating of 2 or 3) was associated with an increased risk of admission.

The calculation of a probability of admission statistic for children in state custody offers a number of opportunities. As demonstrated elsewhere, this statistic can be used in quality improvement work to identify inappropriate admissions [8]. If children's data parallels findings with adults, children admitted with probabilities of <.50 will have worse hospital outcomes than those who have high probabilities of admission. This statistic also can be used in other applications to assess the severity of any sample of children served in an intensive community program [12] relative to psychiatric hospital admissions.

This study demonstrated that a standardized assessment tool, the CSPI, could be used to predict children's mental health needs and hospitalization while assessing the system factors. The overall logistic regression model showed that CSPI was successful in modeling crisis decision-making with a total accuracy of close to 80%. It showed that item rating levels were helpful in making decision for mental health service utilization. For example, age-adjusted odds ratio for the risk factor danger to others was 1.6, 5.9, and 48.2, respectively at level one, level two, and level three. As evidence for the validity of this prediction model, the children who were deflected but had CSPI profiles consistent with a decision to admit required significantly more deflection services than did the lower need children. Thus, high-risk deflections require a more intensive effort to successfully prevent hospitalization.

Because SASS clinicians were trained to use CSPI scale in support of their decision for hospitalization or deflection, the findings of current study also suggested that the SASS system is largely functioning as it was designed. Deflections were found to be more predictable than hospitalizations in this study sample, probably because screeners tend to err on the side of caution in their use of hospitalization, therefore, leading to a more heterogeneous group of hospitalized cases.

This study has several limitations. First, as is often the case with this type of study, collecting data from workers in the field leads to challenges in accuracy and objectivity. However, all agencies were subject to annual audits in which the field reliability of their uses of the CSPI was reviewed [11]. Second, this study takes place in one state with a unique service environment and demographics, which limits the generalizability of study results. All study subjects were state wards, a group whose hospital utilization is not the same as for those participants of other studies.

Present findings have multiple clinical implications. First, the study provides clear evidence that decision-making regarding the use of hospitalization of children is more complex than that of adults and includes factors beyond of the child. Thus, use of medical necessity criteria with children must allow for latitude in considering system factors. Second, psychiatric hospital decision-making, even in a large, complex system, appears to be quite rationale. From the results of this study it is possible to build greater rationality in the system by providing feedback to decision-makers on their individual performance relative to their peers across the state.

5. Conclusions

The current study suggests that modeling decision-making regarding hospital admission or deflection is complex but clinically rational. Further research is needed to better understand the factors influencing children's psychiatric hospitalization in various settings. Linking hospital decision-making to hospital outcomes is an important next step. Despite predictions in the 1980s that psychiatric hospitals were archaic and soon to be replaced by intensive community service options, the evidence suggests that hospitals

continue to play an important role in the children's mental health service system. Understanding this role and maximizing the utility of psychiatric hospitalization to effectively meet the needs of children, families, and communities continues to be an important priority.

Acknowledgments

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