

PATHWAYS TO RESIDENTIAL TREATMENT FOR CHILDREN AND YOUTH

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What is Known on This Topic?

Psychiatric residential treatment facilities (PRTF) are non-hospital facilities that provide psychiatric care to children and youth under 21 in Medicaid. Previous research has identified clinical diagnoses, services, and medication use as predictors of entry into PRTF.

What Did This Project Do?

This project utilized machine learning to identify services and prescription medications children and youth received prior to admission to PRTF and identify services received following discharge from PRTF.

What Could Medicaid Do with These Findings?

Prior to entrance into PRTF, children and youth with identified mental health conditions receive care in the community. Following discharge, utilization of services decreases, with a large proportion of youth not receiving care within 90 days of discharge. Those that do not receive post-discharge care are more likely to be re-admitted. A longer length-of-stay is also associated with reduced readmission.

Introduction

Psychiatric residential treatment facilities (PRTF) are defined as non-hospital facilities that provide inpatient services to Medicaid beneficiaries under 21.¹ PRTF is the most expensive and restrictive intervention available to serve children and youth, as the settings require specialized interventions, room and board, and 24-hour supervision.² As a result, it is generally reserved for those with needs that cannot be managed by home- or community-based services. Recently, the introduction of the 2019 Family First Prevention Services Act legislation provided new guidelines for the use of residential treatment settings,

aiming to minimize unnecessary placements in PRTF.³

Previous research indicated that clinical factors, such as psychiatric diagnoses, previous trauma, out of home care, prior hospitalizations, receipt of two or more psychiatric medications, age, and where someone lived were predictors of entry into PRTF.^{4,5}

The goal of this study was to use machine learning to identify a set of services and medications received by children prior to admission to PRTF and to identify services children and youth receive following their exit from PRTF.

Project Methods & Results

Data from the Kentucky Medicaid Management Information System (MMIS) was used to examine information on Medicaid recipients aged 6 to 21 between January 1, 2010, and December 31, 2017. Age was defined either as the age when first entering PRTF or as the maximum age during the study window for children and youth who did not receive PRTF. This created a population of 519,011 unique Medicaid beneficiaries available for analysis.

Billing provider type codes were utilized to identify children and youth admitted and re-admitted to PRTF. Medications and services reimbursed at least once by the Medicaid program were additionally identified from the data. Other variables of interest included age, gender, race, and ethnicity.

An ensemble machine learning approach was utilized to generate a prediction model, which consisted of combining several different models to make final predictions. The performance of these models was evaluated to ensure consistency between various samplings of the model. The risk of readmission was also assessed using a similar methodology.

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Overall, the included children and youth were 51.7% female, 72.2% White, and age 12.6 on average. A population of 1,864 (or less than 0.5%) children and youth were admitted to PRTF during the study period. Prior to PRTF admission, only 3.6% did not have any claims for behavioral health services, while over 50% of these children and youth had a claim for a psychiatric service. More than 50% had a claim for antipsychotic medication, approximately 35% had a claim for attention deficit hyperactivity disorder (ADHD) medication, and approximately 30% had a claim for antidepressant medication. Additionally, 16.3% had previously been admitted to the emergency department.

The study demonstrated that older children and youth were more likely to be admitted to PRTF than younger children. Across all age groups, psychotherapy and crisis intervention services were significantly associated with an increased risk of PRTF admission, as were claims for psychiatric hospitalizations. Claims for antipsychotic medications and ADHD medications were also associated with an increased risk of admission to PRTF. Among children and youth ages 6 to 15, antiepileptic drugs were significant predictors of PRTF entry. For children and youth ages 13 to 15, claims for drug screens were also significant predictors of entry to PRTF. For the oldest children and youth in the study (those 16 to 20 years old), claims for antidepressant medications were significantly predictive of PRTF entry.

Of these children, 639 (or 34.3% of admitted children and youth) were re-admitted to PRTF during the study period and only three had claims for behavioral and mental health services. Following an initial PRTF stay, claims for antipsychotic medications, ADHD medications, and antidepressant medications were all associated with an increased risk of readmission. Longer lengths of stay in the initial PRTF admission were shown to be protective against readmission to PRTF.

Conclusion

PRTF admission is a relatively rare event among children and youth in the Medicaid data, with less than 0.5% of children and youth enrolled in Medicaid experiencing the event. The predictive model utilized in the study indicated that involvement with psychotherapy, crisis care, and previous psychiatric hospitalization were associated with an increased risk of admission to PRTF. The data indicated that a possible pathway to PRTF was through psychiatric hospitalizations, and that most children entering

PRTF had previously interacted with mental health services. Further, the machine learning approach utilized in this study was strongly predictive of youth who would eventually enter PRTF, accurately predicting 90% of children that would enter PRTF. The ensemble approach yielded higher accuracy than any single method. This provides evidence that the choice to use several combined machine learning methodologies for this analysis provided the superior predictive model for this analysis.

Following discharge from PRTF, there was a general lack of receipt of follow-up care for the discharged children and youth in the three months following their PRTF admission. This is indicative of a notable gap in the continuity of care for a high-need population. This may also assist in explaining why a longer length-of-stay is associated with decreased readmission: greater progress prior to discharge is being made with children who remain in care for longer. It is possible that non-Medicaid funded services served these individuals, indicating that community resources and support were equipped with programs to help them.

Regardless of the rare nature of this event in the studied Medicaid population, this sub-population of children has significant healthcare needs. The novel strategy used in this study can be replicated by researchers for other rare health services to identify gaps in care. This study indicated potential pathways children and youth admitted to PRTF follow prior to admission, as well as gaps in the follow-up care provided to this population.

References

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