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Using Claims-Based Risk Indicators to Predict Health Outcomes for Children with Mental Illness

David Mancuso, PhD • Dan Nordlund, PhD • Barbara E.M. Felver, MES, MPA

In collaboration with the Division of Behavioral Health and Recovery, Alice Huber, PhD, Chief, Evaluation and Quality Assurance

IDENTIFYING RISK FACTORS in health service claims and encounter data that predict when children are at elevated risk of future adverse health outcomes could provide useful tools to support proactive health interventions. This paper examines the feasibility of building behavioral health risk indicators for children that could be operationalized from integrated medical and behavioral health service data. We analyze data for 747,813 children and young adults under the age of 21 enrolled in Medicaid coverage in June of 2011 in Washington State, to assess the degree to which risk indicators experienced in the prior 12 months were predictive of inpatient and emergency department (ED) service utilization over the following 6 months. Several risk indicators are found to be strongly predictive of future utilization of hospital inpatient and ED services.

Key Findings

We considered a set of risk indicators, including: 1) a prior outpatient ED visit with mental illness diagnosis, 2) a prior psychiatric or medical inpatient admission with a mental illness diagnosis, 3) a suicide or self-injury attempt, 4) a drug or alcohol overdose, 5) substance abuse, 6) psychotropic medication polypharmacy, and 7) receipt of antipsychotic medication while under the age of six. Each risk indicator was associated with increased hospital admission and ED utilization rates, for all causes, in the 6-month follow-up period compared to children without these risks.

- **With regard to inpatient hospital admission risk**, persons who had a mental-health-related inpatient admission in the prior 12 months had **15 times the rate of all-cause inpatient admissions** in the 6-month follow-up period, compared to persons with none of the selected risk factors. Individuals with a prior history of mental-health-related ED visits, suicide or self-injury attempts, drug overdose, substance use disorder, or psychotropic medication polypharmacy had from **four to eight times the inpatient admission rate** of individuals without the selected baseline risk factors.
- **With regard to ED utilization**, persons with a past history of a mental-health-related outpatient ED visit had about **7 times the rate of subsequent ED use**, compared to persons without the selected risk factors. Individuals with a prior history of mental-health-related inpatient admissions, suicide or self-injury attempts, drug overdose, or a substance use disorder had about four **to five times the rate of outpatient ED utilization** of individuals with none of the selected risk factors.

These findings point to the potential value in using these risk indicators to help treating providers, health plans and behavioral health plans proactively target services towards children and young adults under the age of 21 with behavioral health needs.

Risk indicators and outcomes for children and young adults

Defining the Medicaid population. We analyzed information for 747,813 children and young adults under the age of 21 enrolled in Medicaid health coverage in Washington State in the month of June 2011. Medicaid coverage was defined to include the following medical coverage groups:

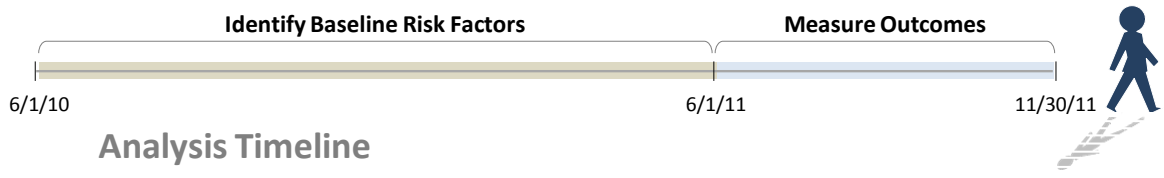
- Disability-related coverage (e.g., SSI-related coverage).
- Pregnancy-related coverage.
- TANF-related family medical coverage.
- Foster care and adoption-related coverage.
- Medicaid medical coverage for children in households with income above the TANF-related coverage thresholds.
- And Medical Care Services and ADATSA coverage groups that became Medicaid coverage categories under a waiver implemented in January 2011.

Defining baseline risk indicators. For this population, we developed a set of behavioral health risk indicators derived from integrated medical, mental health, and substance abuse service claims and encounters from the 12-month baseline period ending May 31st 2011. Detailed measure definitions are provided in the technical notes on page 4. The risk indicators reflect the occurrence of the following events in the 12-month baseline period:

- An **outpatient ED visit with mental illness diagnosis**.
- A **psychiatric or medical inpatient admission with a mental illness diagnosis**.
- A health service event with a **suicide or self-injury** diagnosis.
- A health service event with a **drug or alcohol overdose** diagnosis.
- A health service event with a **substance use disorder** diagnosis.
- **Psychotropic medication polypharmacy** defined as receiving 4 or more medications in at least one month across the following drug therapy classes: antipsychotic, antimania, antidepressant, antianxiety, ADHD, or sedative.
- **Receipt of antipsychotic medication by a child under the age of 6**.

Measuring subsequent service utilization outcomes. We developed a set of outcome measures reflecting inpatient hospital admissions and ED visits in the 6-month period from June 1, 2011 to November 30, 2011. Utilization is presented in terms of the count of events per 1,000 coverage months. Measures are based on integrated fee-for-serve and managed care encounters across medical and mental health service delivery systems. In particular, the inpatient utilization measure reported here combines medical and psychiatric inpatient admissions.

The intent of the analysis is to simulate the information that could be available through claims and encounter data to identify children and young adults who are more likely to experience adverse health outcomes (as indicated by hospitalizations or ED visits) in the near future. The goal is to determine if there is potential to use risk indicators to help treating providers, health plans, or behavioral health plans (Regional Support Networks in Washington State) more proactively target services towards high-risk children and young adults with behavioral health needs.



Analysis Timeline

Baseline risk indicators predict risk of adverse health outcomes

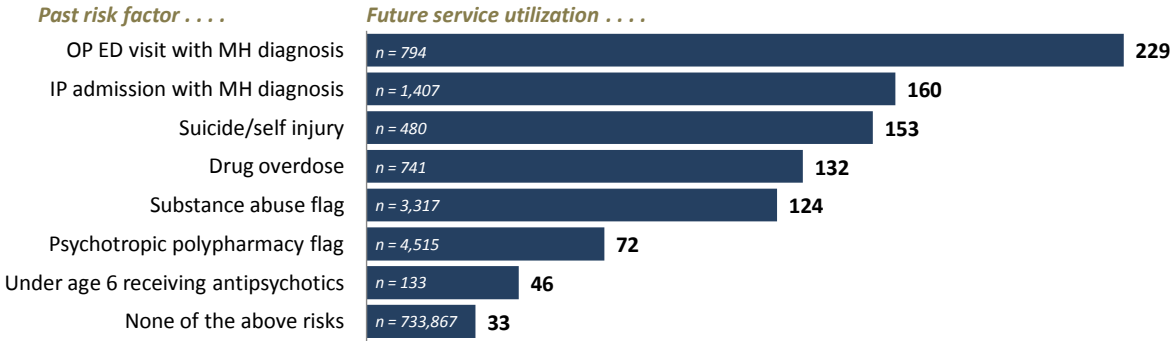
The charts below illustrate the relationship between the selected risk factors and utilization rates in the subsequent 6-month follow-up period. Among the key findings:

- The 794 Medicaid enrollees under the age of 21 as of June 2011 who had at least one outpatient ED visit in the 12-month baseline period had 229 outpatient ED visits per 1,000 coverage months in the follow-up period. This compares to only 33 outpatient ED visits per 1,000 coverage months for Medicaid enrollees who did not have any of the selected baseline risk factors. In other words, individuals with a past history of a mental-health-related outpatient ED visit had about 7 times the rate of subsequent ED use, relative to individuals without baseline risk factors.
- Persons with a prior history of mental-health-related inpatient admissions, suicide or self-injury attempts, drug overdose, or a substance use disorder had about four to five times the outpatient ED utilization of persons with none of the selected baseline risk factors.
- Inpatient utilization patterns tell a similar story. For example, the 1,407 Medicaid enrollees under the age of 21 who had at least one mental-health-related inpatient admission in the prior 12 months had 15 times the rate of all-cause inpatient admissions in the 6-month follow-up period, compared to persons with none of the selected risk factors (46 admissions per 1,000 coverage months, compared to 3 admissions per 1,000 coverage months).
- Persons with a prior history of mental-health-related ED visits, suicide or self-injury attempts, drug overdose, substance use disorder, or psychotropic medication polypharmacy had from four to eight times the inpatient admission rate of persons without the selected baseline risk factors.

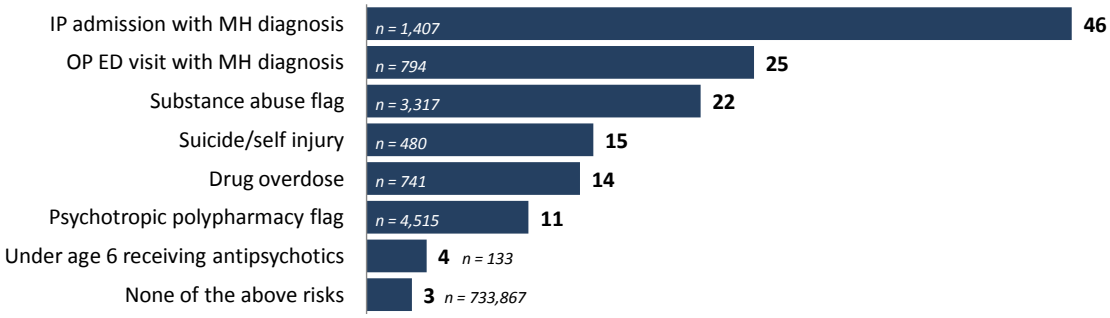
Behavioral Health Risk Indicators and Relationship to Health Service Utilization in 6-Month Follow-up Period

Medicaid population under age 21, enrolled as of June 2011
Utilization per 1,000 member months in June 2011 to November 2011 follow-up period, by risk factors present in June 2010 to May 2011 time period

Emergency Department Visits



Inpatient Admissions (All Cause)



Discussion

There are several potential advantages to using claims and encounter data to screen populations for targeted engagement in health service interventions. These advantages include the low marginal cost of data collection for the entire Medicaid-enrolled population, including enrollees who may be difficult to otherwise engage in a risk assessment process due to a variety of potential barriers. Although the analyses reported here do not fully simulate the impact of lags in claims and encounter data processing on the timing of data availability, these analyses indicate the potential for claims and encounter data to identify risk indicators that predict near-term adverse health outcomes for children and young adults with behavioral health needs. These findings point to the potential value in using these risk indicators to help treating providers, health plans, and behavioral health plans proactively target services towards children and young adults under the age of 21 with behavioral health needs.

TECHNICAL NOTES

RISK INDICATOR DEFINITIONS

The definition of an inpatient admission or outpatient ED visit as "mental health related" is based on the presence of any of the following diagnoses in any of the diagnosis fields on the claim or encounter:

Diagnosis Category	ICD-9-CM Code Values
Psychotic disorders	'295' to '295.99', '297' -'297.99', '298'-'298.99', '293.81'-'293.82'
Mania and bipolar disorders	'301.13', '296'-'296.19', '296.4'-'296.99'
Depression	'293.83', '296.2'-'296.29', '296.3'-'296.39', '300.4'-'300.49', '300.5'-'300.59', '311'-'311.99'
Anxiety	'300.0'-'300.09', '300.2'-'300.39', '308'-'308.99', '309.22'-'309.23', '309.81'-'309.89', '309.9'
Adjustment disorders	'309.24'-'309.8', '309'-'309.20'
Childhood psychiatric disorders including ADHD and impulse control disorders	'313.81', '312'-'312.99', '314.1'-'314.99'

The suicide or self-injury risk indicator is based on the presence of any claim or encounter with any diagnosis field taking an ICD-9-CM value in the range from E950 to E959. The potential suicide or self-injury risk indicator is based on the presence of any claim or encounter with any diagnosis field taking a value in the range from E980 to E989.

The drug overdose risk indicator is based on the presence of any claim or encounter with any diagnosis field taking a value in the following set: 909.0, 965.00, 965.01, 965.02, 965.09, 965.1, 965.7, 965.8, 965.9, 967.6, , 967.8, 967.9, 969.0, 969.1, 969.2, 969.3, 969.4, 969.5, 969.6, 969.7, 969.8, 969.9, 970.0, 970.1, 970.8, 970.9, E850.0, E850.1, E850.2, E850.3, E850.4, E851, E852.5, E852.8, E852.9, E853.0, E853.1, E853.2, E853.8, E853.9, E854.0, E854.1, E854.2, E854.3, E854.8, E980.0, E980.1, E980.2, E980.

The substance abuse risk indicator is based on the presence of any claim or encounter with an alcohol or drug use disorder diagnosis, including substance abuse (305.XX – excluding tobacco use disorder), substance dependence (303.XX, 304.XX), or substance-induced psychosis (291.XX, 292.XX).

The drug therapy class information used to identify children under age 6 who were prescribed an antipsychotic medication was based on the Medispan Therapeutic Classification System. The psychotropic medication polypharmacy risk indicator is based on the occurrence of at least one month in the June 2010 to May 2011 time period where the person filled 4 or more medications across the following therapy classes: antipsychotics, antimania medications, antidepressants, antianxiety medications, ADHD medications, and sedatives. Medications were classified based on the Medispan Therapeutic Classification System.

RDA CONTACT

David Mancuso, PhD • 360.902.7557 • david.mancuso@dshs.wa.gov

Copies of this paper may be obtained at www.dshs.wa.gov/rda/ or by calling DSHS' Research and Data Analysis Division at 360.902.0701.

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