Improving Service Delivery Through Administrative Data Integration and Analytics

David Mancuso, PhD • October 2, 2015
Analytics in the Social and Health Service Environment

- Program costs are often driven by a small proportion of clients with multiple risk factors and service needs, often exacerbated by extreme poverty, mental illness, substance use disorders, cognitive limitations or functional impairments.

- High-cost clients often have significant social support needs such as the need for economic assistance, housing or employment support, or interventions to reduce the risk of criminal justice involvement.

- Persons dually eligible for Medicare and Medicaid comprise a disproportionate share of high-risk, high-cost Medicaid beneficiaries.

- Increased emphasis on quality/outcome measurement and performance-based payment structures.

- States need analytic capability that goes beyond traditional data warehousing and business intelligence applications.
RDA’s Integrated Client Databases

WASHINGTON STATE DEPARTMENT OF SOCIAL AND HEALTH SERVICES

Integrated Client Databases

DSHS | Research and Data Analysis
Creating Analytically Meaningful Measurement Concepts

Demographics
- Gender
- Age
- Race/Ethnicity
- Language

Services
- DD
- TANF
- SNAP
- Child Welfare
- Medical
- Juvenile Rehab
- Long Term Care
- Behavioral Health
- Employment
- Hours
- Earnings
- Unemployment

School
- Grades
- Progress
- Stability
- Test Scores
- Attendance
- Special Needs

Health
- Diagnoses
- Primary Care
- Disability
- Medications
- Mental Illness
- Hospitalization
- Substance Use
- Chronic Conditions
- Pain

Crime
- Misdemeanors
- Incarcerations
- Arrests
- Convictions
- Felonies

Housing
- Homeless
- Stable

Family
- Births
- Siblings
- Relationships
- Deaths

Geography
- Locale
- Urban/Rural
- County
- Legislative District
- Community Risk Factors

Creating Analytically Meaningful Measurement Concepts
How do we use integrated administrative data?

- **Program evaluation**
  - Randomized trial simulation using matching methods
  - More comprehensive integrated client-level data reduces impact of selection bias by making more client characteristics observable

- **Predictive modeling and clinical decision support**
  - PRISM
  - Housing stability risk models

- **Performance measurement**
  - Access to services
  - Quality of care
  - Outcomes
PART 1

Program Evaluation
Randomized Trial Simulations Using Matching Approaches

**Employment Rate**
- Intervention Window
- Matched Control Group: 69%
- Unmatched Control Group: 46%
- Intervention Group: 40%

**Average Annual Earnings**
- Includes $0 earnings
- Intervention Group: $12,144
- Matched Control Group: $5,880
- Unmatched Control Group: $4,725

INDEX
- ACADEMIC YEARS
- EMPLOYMENT HISTORY
- BASELINE MEASURES
- FOLLOW-UP MEASURES

AY 2010 OR 2011
Randomized Trial Simulations Using Matching Approaches

**Care Coordination Program for Washington State Medicaid Enrollees Reduced Inpatient Hospital Costs**

- Statistically significant reduction in hospital costs
- Promising reduction in overall Medicaid medical costs

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<table>
<thead>
<tr>
<th>Cost Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OVERALL Savings</strong></td>
</tr>
<tr>
<td><strong>$23</strong> Nursing Home</td>
</tr>
<tr>
<td><strong>$18</strong> All Long-Term Care Costs</td>
</tr>
<tr>
<td><strong>$248</strong> Inpatient Hospital Admission</td>
</tr>
<tr>
<td><strong>$318</strong> Total Medical</td>
</tr>
</tbody>
</table>

**Estimated per member per month impact**

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**Abstract**

Managing clinically complex populations presents a major challenge for state agencies trying to control health care costs and improve quality of care for Medicaid beneficiaries. In Washington state, a care-coordination intervention, the Chronic Care Management program, was implemented for clinically complex Medicaid beneficiaries who met criteria defined by a refined modeling algorithm. We used propensity score matching to evaluate the program’s impact on health care spending and utilization and mortality. We found large and significant reductions in inpatient hospital costs ($318 per member per month) among patients who used the program. The estimated reduction in overall medical costs of $248 per member per month exceeded the cost of the intervention but did not reach statistical significance. These results suggest that well-designed targeted care-coordination services could reduce health care spending for Medicaid beneficiaries with complex care needs.

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[Link to article](http://content.healthaffairs.org/search?submit=yes&fulltext=care+coordination+program+for+washington+state+medicaid+enrollees+reduced+inpatient+hospital+costs&x=0&y=0)
PART 2

Predictive Modeling and Clinical Decision Support
Odds of Experiencing a New Homeless Spell
Predicting Homelessness among TANF Parents

<table>
<thead>
<tr>
<th>DECREASED RISK</th>
<th>INCREASED RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrested, prior month</td>
<td>2.19</td>
</tr>
<tr>
<td>Homeless in prior month</td>
<td>2.05</td>
</tr>
<tr>
<td>Inpatient alcohol/drug treatment, 4-6 months prior</td>
<td>1.81</td>
</tr>
<tr>
<td>Child Protective Services involvement, index month</td>
<td>1.55</td>
</tr>
<tr>
<td>Domestic violence, prior 24 months</td>
<td>1.32</td>
</tr>
<tr>
<td>Non-compliance TANF sanction, index month</td>
<td>1.23</td>
</tr>
<tr>
<td>Mental health treatment need, prior 24 months</td>
<td>1.21</td>
</tr>
<tr>
<td>Pregnant/expecting household</td>
<td>1.17</td>
</tr>
<tr>
<td>Resides in a rural county</td>
<td>1.15</td>
</tr>
<tr>
<td>Youngest child age 6-11</td>
<td>0.89</td>
</tr>
<tr>
<td>Chronic illness risk in top 20 percent of TANF adults</td>
<td>0.89</td>
</tr>
<tr>
<td>4+ children in the household</td>
<td>0.81</td>
</tr>
<tr>
<td>Earnings in top quartile, index month</td>
<td>0.68</td>
</tr>
<tr>
<td>Public Housing Authority assistance, prior 24 months</td>
<td>0.53</td>
</tr>
<tr>
<td>On TANF, prior month</td>
<td>0.44</td>
</tr>
</tbody>
</table>

NOTES: 1. This chart shows a subset of factors in the model; all are statistically significant at p≤0.05. 2. The lower bound of an odds ratio is 0 but there is no upper bound, so an odds ratio of 10 and an odds ratio of 0.1 represent effects that are identical in size (in the opposite direction).

SOURCE: DSHS Research and Data Analysis Division, Predicting Homeless among Low-Income Parents on TANF, Ford Shah, Liu, Mancuso, Felver, August 2015.
Odds of Experiencing Homelessness after Aging Out of Foster Care

Study Timeline

Baseline risk measures
Prior 24 months

Experience in the school system
Prior 3 academic years

Child welfare history
Since first entering the child welfare system

Q. Homeless in following 12 months?
Starting the month after the index month

INDEX MONTH
Last month of foster care placement
SFY 2011 or 2012

Odds Ratio

DECREASED RISK

Youth is a parent
Homeless or receiving housing assistance, prior 12 months
Youth is African American
4+ congregate care placements (relative to <4)
4+ school moves in prior 3 years (relative to <2)
4+ convictions, prior 24 months
Juvenile Rehabilitation service, prior 24 months
2+ foster care placements
Indication of mental health treatment need, prior 24 months
Any homelessness in school data, prior 3 years
Injury, prior 24 months
2-3 school moves, prior 3 years (relative to <2)
History of behavior issues in child welfare records

INCREASED RISK

Relative foster care placement (1+)
GPA, high (relative to low)

Risk factors

Protective factors
PRISM: Rapid-Cycle Predictive Modeling and Data Integration in a Clinical Decision Support Web Application

- **Data sources**
  - Medical, mental health and LTSS services from multiple IT systems
  - Medicare Parts A/B/D data integration for dual eligibles
  - LTSS functional assessments
  - Housing status (including some local jail stay data) from the State’s eligibility data system

- **Data refreshed on a weekly basis for the entire Medicaid population**

- **Dynamic alignment of patients to health plans and care coordination organizations, with global patient look-up capability for providers**

- **1,000 currently authorized users**

- **700,000 page views in past 12 months**
Selected PRISM Screens

**Risk Factors**  Key medical and behavioral health risk factors
**IP Risk Model**  Prospective hospital admission risk model
**Adherence**  Medication adherence dashboard
**Eligibility**  Detailed eligibility and demographic data
**Claims**  All medical claims and encounters
**Office**  Office visits
  - **Rx**  Prescriptions filled
  - **IP**  Inpatient admissions
  - **ER**  Outpatient emergency room visits
  - **LTC**  Long term care services
  - **SNF**  Skilled nursing facility services
  - **Lab**  Laboratory
**Providers**  Provider list with links to contact information
**SUD**  Substance use disorder treatment
**MH**  Mental health services
Selected PRISM Uses

- **Triaging high-risk populations through predictive modeling** to more efficiently allocate scarce care management resources

- **Informing care planning and care coordination for clinically and socially complex persons** through integrated and intuitive display of risk factors, service utilization and treating providers

- **A source of regularly updated client and provider contact information** to support outreach, engagement and coordination efforts

- **Identification of child health risk indicators** including mental health crises, substance abuse, excessive ED use, and nutrition problems

- **Medical evidence gathering for determining eligibility for disability programs**
PART 3

Performance Measurement
Diabetes Short-Term Complications Admission Rate

Persons 18-64 • PQI-01 • Admissions per 100,000 Member Months

Avoidable SSI client hospital admissions are driven by behavioral health risk

<table>
<thead>
<tr>
<th>Year</th>
<th>With Mental Health Need</th>
<th>With Substance Use Disorder (SUD)</th>
<th>With Co-Occurring Mental Health and SUD</th>
<th>Without Behavioral Health Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>62.7</td>
<td>111.2</td>
<td>120.7</td>
<td>19.7</td>
</tr>
<tr>
<td>2012</td>
<td>67.7</td>
<td>113.9</td>
<td>122.6</td>
<td>11.1</td>
</tr>
<tr>
<td>2013</td>
<td>65.2</td>
<td>122.7</td>
<td>136.0</td>
<td>15.7</td>
</tr>
</tbody>
</table>

SOURCE: DSHS Research and Data Analysis Division, Managed Medical Care for Persons with Disabilities and Behavioral Health Needs: Preliminary Findings from Washington State, JANUARY 2015.
Outpatient Emergency Department Visits
AGES 18-64 • Visits per 1,000 Member Months

ED utilization among SSI clients is driven by behavioral health risk

- With Mental Health Need
- With Substance Use Disorder (SUD)
- With Co-Occurring Mental Health and SUD
- Without Behavioral Health Disorder

<table>
<thead>
<tr>
<th>Year</th>
<th>With Mental Health Need</th>
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</thead>
<tbody>
<tr>
<td>2011</td>
<td>169.9</td>
<td>278.5</td>
<td>296.5</td>
<td>45.6</td>
</tr>
<tr>
<td>2012</td>
<td>153.4</td>
<td>253.6</td>
<td>270.9</td>
<td>41.9</td>
</tr>
<tr>
<td>2013</td>
<td>149.6</td>
<td>241.3</td>
<td>258.1</td>
<td>44.1</td>
</tr>
</tbody>
</table>

SOURCE: DSHS Research and Data Analysis Division, Managed Medical Care for Persons with Disabilities and Behavioral Health Needs: Preliminary Findings from Washington State, JANUARY 2015.
Percent Arrested
Disabled Medicaid Adults Ages 18 – 64 (Excludes Duals)

Individuals with substance abuse issues are much more likely to be arrested

<table>
<thead>
<tr>
<th>With Mental Health Need</th>
<th>With Substance Use Disorder (SUD)</th>
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</thead>
<tbody>
<tr>
<td>2011 12.1% 2012 11.8% 2013 11.9%</td>
<td>2011 23.9% 2012 22.7% 2013 23.0%</td>
<td>2011 24.1% 2012 22.8% 2013 23.1%</td>
<td>2011 5.3% 2012 5.9% 2013 6.2%</td>
</tr>
</tbody>
</table>

SOURCE: DSHS Research and Data Analysis Division, Managed Medical Care for Persons with Disabilities and Behavioral Health Needs: Preliminary Findings from Washington State, JANUARY 2015.
PART 4

Strategies and Challenges
Building Integrated Data Analytical Capability

- **Build support among agency data owners**
  - Connect analytic investments to agency business needs
  - Ensure agency subject matter experts inform analytic strategies
  - Invest in agency staff expertise

- **Prioritize high-opportunity analytical areas**

- **Leverage opportunities for federal and foundation grant support to maintain and extend capabilities**

- **Have reasonable expectations about:**
  - Scale of potential cost savings
  - Implementation timelines
  - Resources required to maintain analytical environment in production
  - Impact on state agency subject matter expert resources
Challenges

- Building and maintaining trust among data owners
- Establishing effective governance structures
- Maintaining an analytical data infrastructure in a constantly evolving policy, program and IT system environment
- Recruiting and retaining state agency staff with analytical expertise
- Finding contractors with program/policy subject matter expertise and familiarity with state agency data systems
- Data are plentiful – analytical skills informed by policy and program expertise are scarce
Questions?

https://www.dshs.wa.gov/sesa/rda/research-reports