Risk Adjustment Using CDPS

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Overview

- Part I: Background on Risk Adjustment
  - General program and policy goals of risk adjustment
  - History of risk adjustment
  - Overview of risk adjustment systems

- Part II: CDPS and Medicaid Rx
  - Overview of CDPS and Medicaid Rx
  - Version 5.0
  - Other uses of CDPS and Medicaid Rx
Part I: Background on Risk Adjustment

- General program and policy goals of risk adjustment
  - Benefits to states, clients, and health plans
- History of risk adjustment
  - Models and applications
- Overview of risk adjustment Systems
  - Data employed (inputs)
  - Methods for grouping
Health Based Risk Adjustment:

A WORKING DEFINITION

- The process by which the health status of a population is measured using health-based risk assignment
- Can be used to evaluate health plans or to modify capitation payment rates to health plans
- Can also be used to adjust outcomes (e.g. hospitalization rates) or to target interventions (e.g. disease or case management)
Why Risk Adjustment is Needed:

DISTRIBUTION OF EXPENDITURES

<table>
<thead>
<tr>
<th>% of Population</th>
<th>% of Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>30%</td>
</tr>
<tr>
<td>10%</td>
<td>72%</td>
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<tr>
<td>50%</td>
<td>95%</td>
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Goals of Risk Adjustment

- To make equitable comparisons among health plans that take the health status of their enrolled members into consideration
- To minimize the incentives for plans and providers from selectively enrolling healthier members
- To provide adequate financing for those who treat individuals with higher-than-average health needs
Reason for risk variation

- A particular health plan’s provider network may predispose it to certain risk selections (e.g., those affiliated with academic medical centers)
- Some geographic regions may include a sicker-than-average mix of enrollees
- Some provider groups may attract specific population subsets (e.g. diabetes, AIDS, children with disabilities)
Applications of Risk Adjustment

- To adjust capitation payments for expected future expenditure based on health status
- To risk profile and/or identify persons for disease or high risk case management
- To adjust observed differences in performance measures, utilization, and/or cost based upon observed differences in illness burden
Benefits of Risk Adjustment

- Allows states to foster competition based on quality and efficiency rather than on risk selection
- Supports health plans that attract clients with specific service needs
- Allows health plans to promote efficiency in care management without the accompanying expenditure risk that results from attracting a sicker population
History of Risk Adjustment

- Risk adjustment systems developed in academia in the 1990s as a method to adjust capitated payments
- First models targeted Medicare (DCGs, ACGs)
- Medicare was an early promoter but a late adaptor
  - Medicaid risk adjustment begins in 1997 (ACGs, DPS)
  - Medicare Part C risk adjustment in 2004 (mod-HCC)
  - Medicare Part D risk adjustment in 2006 (mod-HCC)
Overview of Risk Adjustment Systems

- Type of information used to risk adjust
  - (e.g. diagnoses, pharmaceuticals, ADL, etc.)
- Grouping system
- Weights may be ‘customized’ or ‘off-the-shelf’
- Prospective or concurrent weights
- Individual-level or plan-level application
- Frequency of updates and other timing issues
Criteria for Risk-Adjusted Payment Systems

- System should create incentives for plans to serve people in need of care
- System should preserve the incentives for the efficient delivery of care that capitated payment is designed to produce
- System should provide for equitable payment across plans
- Resistant to gaming
- Administrative feasibility/cost of implementation
Options for Type of Information used in Risk-Adjusted Payment

- Demographic data – age, gender, family size, category of assistance, geography
- Diagnoses
- Prescription Drugs
- Functional Status
- Self-Reported Health Status
- Prior utilization or expenditures
<table>
<thead>
<tr>
<th></th>
<th>Incentives to Serve the Sick</th>
<th>Equity Across Plans</th>
<th>Incentives for Efficiency</th>
<th>Resistance to Gaming</th>
<th>Administrative Feasibility</th>
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<tr>
<td>Demographic data</td>
<td>−</td>
<td>−</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Diagnoses</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>−</td>
<td>0</td>
</tr>
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<td>Prescription Drugs</td>
<td>++</td>
<td>+</td>
<td>0</td>
<td>0</td>
<td>++</td>
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<tr>
<td>Functional Status</td>
<td>++</td>
<td>++</td>
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<td>?</td>
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<tr>
<td>Self-Reported Health Status</td>
<td>++</td>
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</tr>
<tr>
<td>Prior Expenditures</td>
<td>+++</td>
<td>−</td>
<td>−</td>
<td>+</td>
<td>?</td>
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</tbody>
</table>
Options for Grouping Systems

- Diagnostically based systems
  - Chronic Illness and Disability Payment System (CDPS)
  - Hierarchical Co-Existing Condition System (HCCs)
  - Adjusted Clinical Groups (ACGs)
  - CRGs, CD-Risc, ETGs, others

- Prescription Drug-based systems
  - MedicaidRx (UCSD)
  - RxGroups (DxCG)

- Interest in using functional status to adjust LTC payments
Options for Payment Weights

- **Customized weights**
  - Can be specific to utilization/expenditure patterns in the population being risk adjusted
  - Can be specific to the benefit package
  - Requires a large sample size to estimate weights reliably

- **Weights ‘off-the-shelf’**
  - Readily available
  - Can be applied to smaller populations
  - Less sensitive to small sample errors
Budget Neutrality

- Most Medicaid programs want to assure budget neutrality
- If, as in Medicare, some are in a capitated plan and some are in FFS, budget neutrality is a policy and political option
- Given data and political concerns, budget neutrality is generally a good idea, even when FFS is an option
Status of Health-Based Payment

- Medicaid programs active, particularly in states with substantial numbers of SSI beneficiaries in managed care

- Medicare began HBP in January 2000 using inpatient diagnoses
  - Began phasing in the use of ambulatory diagnoses in 2004
  - Part D payments are risk-adjusted using diagnostic data

- State and Federal health care exchanges will risk adjust payments to participating health plans

- Diagnostic data primarily used to measure health-status
  - Interest in Rx models where diagnostic data are not available (e.g. California and Florida)
  - Frailty adjustment used for PACE and a few demonstration plan
## Medicaid Health-Based Payment Activities

<table>
<thead>
<tr>
<th>State</th>
<th>Population Covered</th>
<th>Date Implemented</th>
<th>Classification System</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Implemented</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Maryland</td>
<td>SSI + TANF</td>
<td>1997</td>
<td>ACGs</td>
</tr>
<tr>
<td>Colorado</td>
<td>SSI + TANF</td>
<td>1997</td>
<td>DPS</td>
</tr>
<tr>
<td>Oregon</td>
<td>SSI + TANF</td>
<td>1998</td>
<td>DPS</td>
</tr>
<tr>
<td>Utah</td>
<td>SSI</td>
<td>1998</td>
<td>Marker Diagnosis</td>
</tr>
<tr>
<td>Michigan</td>
<td>SSI</td>
<td>2000</td>
<td>CDPS</td>
</tr>
<tr>
<td>Minnesota</td>
<td>TANF</td>
<td>2000</td>
<td>ACGs</td>
</tr>
<tr>
<td>Delaware¹</td>
<td>SSI + TANF</td>
<td>2000</td>
<td>CDPS</td>
</tr>
<tr>
<td>Tennessee</td>
<td>SSI + TANF</td>
<td>2000</td>
<td>CDPS</td>
</tr>
<tr>
<td>New Jersey</td>
<td>SSI</td>
<td>2000</td>
<td>CDPS</td>
</tr>
<tr>
<td>Utah¹</td>
<td>SSI</td>
<td>2000</td>
<td>CDPS</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>SSI + TANF</td>
<td>2003</td>
<td>CDPS</td>
</tr>
<tr>
<td>Washington</td>
<td>TANF</td>
<td>2003</td>
<td>CDPS</td>
</tr>
<tr>
<td>Virginia</td>
<td>SSI + TANF</td>
<td>2003</td>
<td>CDPS</td>
</tr>
<tr>
<td>Ohio</td>
<td>SSI + TANF</td>
<td>2006</td>
<td>CDPS</td>
</tr>
<tr>
<td>Oregon Mental Health</td>
<td>SSI + TANF</td>
<td>2006</td>
<td>CDPS-MH</td>
</tr>
<tr>
<td>Florida</td>
<td>SSI + TANF</td>
<td>2006</td>
<td>MedicaidRx</td>
</tr>
</tbody>
</table>

¹ No longer contracting with MCOs on a risk basis.
Key Ingredients for Successful HGP

equitable data

equitable data

equitable data

equitable data
Persistence of Diagnosis from Year 1 to 2

Figures are the percent of Medicaid recipients with disabilities with the specified diagnosis in year 1 who have the diagnosis appear on at least one claim in year 2.
Results In HPB (Micro)

- In CO, for PWDs, a University and Children’s Hospital has a case-mix of 1.35
- In OR, a plan that uses Oregon Health Sciences University has a case-mix of 1.13
- In MD, implementation errors created major problems; state has corrected them; working on moving forward
- In NJ, state calculated case-mix scores for plans every month, and in initial implementation, MMIS vendor did not perform calculations correctly, requiring retroactive adjustments; problem has been fixed
Results of HBP (Macro)

- HBP appears to get more money to plans that serve sicker people
- Equitable data is key technical challenge
- Not much evidence yet that plans or providers respond by developing systems of care to attract sicker people (but HBP isn’t used enough yet to expect this), and there are some reports of positive developments
Summary

- HBP is necessary to encourage plans to compete for the chronically ill
- HBP is not sufficient to encourage this competition
  - Additional efforts are needed (e.g. provision of information on quality, access, satisfaction, and outcomes, particularly for the chronically ill; monitoring of quality assurance and quality improvement activities, enrollment and disenrollment, and marketing)
- Equitable data is a key technical challenge in implementing HBP
- Medicaid programs likely to continue implementation efforts, but scope and pace will depend on whether HBP achieves policy and political goals, and on the extent to which persons with disability are in managed care
- ‘Side’ benefits of HBP:
  - Greatly increased attention to the accuracy of encounter data, allowing these data to be used for rate setting and program management
  - Facilitating and catalyzing plan efforts at profiling and disease management
Part II: CDPS and Medicaid Rx

- History of CDPS and Medicaid RX
- Overview of the models
  - Major categories, Stage 1 groups
  - Hierarchies, comorbidities
- Applying the weights
History of CDPS

- In 1996, out of concern that current risk adjustment systems could be better tailored for Medicaid programs, Rick Kronick and colleagues developed a diagnostic based risk adjustment model, the Disability Payment System (DPS) using Medicaid claims data on disabled beneficiaries from Colorado, Michigan, Missouri, New York, and Ohio.

- In 2000, this model was updated using additional data for both disabled and TANF beneficiaries from California, Georgia, and Tennessee. The new model was named the Chronic Illness and Disability Payment System (CDPS).
History of MRX

- In 2001, responding to interest from Medicaid programs, Todd Gilmer and colleagues developed a pharmacy based risk adjustment model for Medicaid beneficiaries, Medicaid Rx (MRX), using CDPS data. This model was based on the Chronic Disease Score (CDS) by Von Korff and colleagues and the RxRisk model by Fishman and colleagues.
In 2008, the CDPS and MRX models were updated using Medicaid data from 44 states in 2001 & 2002. An additional model was developed that employs both diagnostic and pharmacy data. This model is called CDPS + Rx.

The data were supplied by CMS from the Medicaid Analytic eXtract (MAX) data system. The MAX data are a set of person-level data files containing information on Medicaid eligibility, service utilization, and payments.
What are CDPS and MRX?

- Mappings of diagnoses and/or pharmaceuticals to a set (or vector) of disease categories
- CDPS maps 16,461 ICD9 codes to 58 CDPS categories within 20 major categories corresponding to major body systems (e.g. cardiovascular) or type of disease (e.g. diabetes)
- MRX maps 56,236 NDC codes to 45 Medicaid Rx categories
Stage 1 Groups

- Building blocks of CDPS
- Groups of ICD9 codes, typically at the 3-digit level
- Occasionally, codes are grouped at the 4 or 5 digit level:
  - 296.4-7 is a stage 1 group for bipolar disorder that has been separated from the remainder of the 3 digit code, 296X, for affective psychosis.
CDPS Major Categories

- Stage 1 groups are combined into CDPS major categories:
- Cardiovascular, Psychiatric, Skeletal, Central Nervous System, Pulmonary, Gastrointestinal, Diabetes, Skin, Renal, Substance Abuse, Cancer, Developmental Disability, Genital, Metabolic, Pregnancy, Eye, Cerebrovascular, AIDS/Infectious disease, Hematological
Hierarchies

- CDPS categories are hierarchical within major categories
- For example, in the major category cardiovascular:
  - CARVH includes 3 stage 1 groups and 7 diagnoses
  - CARM includes 13 stage 1 groups and 53 diagnoses
  - CARL includes 26 stage 1 groups and 314 diagnoses
  - CAREL includes 2 stage 1 groups and 35 diagnoses
Hierarchies and Comorbidities

- Weights are additive across major categories
- Within major categories, only the most severe (i.e. expensive) diagnosis counts
- This allows an accounting of comorbidities, but reduces the incentive for upcoding of diagnoses
- For example, if a beneficiary has both diabetes and depression, both count towards the risk score
- However, if a beneficiary has hypertension and heart disease, only heart disease counts
CDPS and MRX weights

- Linear regression is used to regress expenditures on the vector of CDPS or MRX categories.
- The weights are the resulting regression coefficients, or marginal expenditure effects of each category.
- For example, when expenditure = Y (mean=1.0):
  - \[ Y = \text{Intercept} + b_1 \text{CDPS}_1 + b_2 \text{CDPS}_2 + \ldots + b_{58} \text{CDPS}_{58} \]
  - \[ Y = \text{Intercept} + b_1 \text{MRX}_1 + b_2 \text{MRX}_2 + \ldots + b_{58} \text{MRX}_{58} \]
  - CDPS\(_i\) and MRX\(_i\) are indicator variables (0, 1s) and \(b_i\) are (estimated) coefficients.
Sample Weights

<table>
<thead>
<tr>
<th>Category</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular, very high</td>
<td>2.037</td>
</tr>
<tr>
<td>Cardiovascular, medium</td>
<td>0.805</td>
</tr>
<tr>
<td>Cardiovascular, low</td>
<td>0.368</td>
</tr>
<tr>
<td>Cardiovascular, extra low</td>
<td>0.130</td>
</tr>
<tr>
<td>Psychiatric, high</td>
<td>0.955</td>
</tr>
<tr>
<td>Psychiatric, medium</td>
<td>0.626</td>
</tr>
<tr>
<td>Psychiatric, medium low</td>
<td>0.325</td>
</tr>
<tr>
<td>Psychiatric, low</td>
<td>0.206</td>
</tr>
</tbody>
</table>
Individual Risk Scores

- Multiply the CDPS or MRX category vector by the weight vector (and sum the factors)
- Include the intercept and age and gender factors
- A 50 year old female with type 2 diabetes and hypertension has a risk factor of .798
  - $0.225 + 0.121 + 0.322 + 0.130$
- If the same female also had bipolar disorder, her risk factor would be 1.424
  - $0.225 + 0.121 + 0.626 + 0.322 + 0.130$
Calculating Payments for Health Plans

- Average the risk scores of all plan enrollees with eligibility in the ‘observation’ period
- Calculate weighted average of all plans; normalize to 1.0 to assure budget neutrality
  - If FFS is included as a ‘plan’ – HBP is not budget neutral in those states
- Pay each plan its normalized risk score multiplied by the base rate (e.g. $800 PMPM for disabled)
CDPS + Rx

- Combined diagnosis and pharmacy based risk adjustment
- Includes all 58 CDPS categories plus 15 MRX categories that identify large numbers of beneficiaries who are filling prescriptions for medications used to treat chronic disease but who are not identified using diagnostic data
- Examples: cardiovascular, mental illness, diabetes, hemophilia, hepatitis, HIV, cancer, multiple sclerosis, seizure disorders, tuberculosis
Multiple Weight Options

- Disabled, TANF Adults, TANF Children
- Prospective and Concurrent
- Comprehensive acute care benefit package
  - Inpatient hospital, physician, outpatient hospital, clinic, psychiatric, other practitioners, pharmacy, home health, lab & xray, transportation, rehabilitation physical/other therapy, hospice, private duty nursing, and DME
- Mental health carve-out
- Pharmacy carve-out
- Combined mental health and pharmacy health carve-out