Using Big Data to Inform Child Welfare and Behavioral Health Policy and Practice

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Presentation Agenda

• Introduce concepts and vocabulary
• Place our field in the larger arena of BIG Data
• Existing projects that have built community problem solving capacity
• Answer questions about children in PRTFs
• Discussion: Vision of the future and how can we get there?
Some Terms:

- **Administrative Data** is information (usually electronic) collected by agencies in the course of their work (e.g. arrest records, CPS reports, state Emergency Room records, Medicaid claims).

- **Secondary Data Analysis** is often described as “use of data by people other than those who collected it”. This includes academic analysis of administrative data. Many people think first about analysis of published data from preexisting studies.
What is BIG DATA and BIG DATA ANALYTICS?
Do we have any actionable analytics from our big data in the cloud?

Yes, the data shows that my productivity plunges whenever you learn new jargon.

Maybe in-memory computing will accelerate your applications.

Plunge, plunge, plunge.
Question #5  Which statement below fits your definition of Big Data best?

- All of the external and internal web-based data available for business intelligence: 52.4%
- I’m not really sure what “Big Data” refers to: 10.4%
- The mass amounts of internal information that is stored and managed by an enterprise: 17.4%
- All of the web-based data and content businesses use for their own operations: 8.8%
- None of the above: 3.5%
- I don’t know: 7.5%

Percentage of Respondents
Question #13  Why did your company decide to move forward with a Big Data initiative or project?

- Opportunity to capitalize on a current market trend to unearth business insights, create revenue opportunities or streamline operations: 130 (30.4%)
- Benefits line up with my company’s business needs: 136 (31.8%)
- Advised to integrate Big Data by an executive, analyst, consultant, etc.: 36 (8.4%)
- We already had tools, processes and people in place: 88 (20.6%)
- We have not yet decided: 130 (35%)
- Other: 29 (6.8%)
DATA
SORTED
ARRANGED
PRESENTED VISUALLY
“Everyone benefits when farmers are able to produce more with fewer resources,” Monsanto CEO Hugh Grant said in a statement.

Monsanto Buys Big Data Climate Firm for $930M, Reports 4Q Loss

By Matt Egan / Published October 02, 2013 / FOXBusiness

“the ability to turn data into actionable insight and farm management recommendations is vitally important”
David Friedberg, CEO of The Climate Corp.
What is different about our context?

• In human services our product doesn’t involve automation of machines

• We have interactions between human beings and humans interfacing with systems (of people)

• Human service workers (social workers) are the “technology” between policy and people
Thinking of Administrative Data as “Big Data”

• Unstructured data
• Complexity
  – Requires major efforts clean data and link across systems
• Four V’s
  – Volume: Scale/size of data
  – Velocity: Stream speed of data
  – Variety: Different forms of data
  – Veracity: Uncertainty of data

Benefits of Big Data in Child Welfare/Behavioral Health

1) They are universal, not sampled
2) Answer more interesting and complicated questions
3) Increase your confidence in an identified trend by looking across different systems or geographic areas
4) Explore relatively rare events in greater detail
5) Improve situational awareness
What type of work is going on in NC already?

We are not starting from scratch...
KDD Information System Architecture

NC DSS & 100 County DSSs

Data Acquisition

Raw Tables

Data Infrastructure

CW, FW, FS

Other

Descriptive Modeling

Data Cubes:
Outcome Measures

Ongoing Analysis

Link & Incorporate

Other Administrative Data
(ESC, Vital Records & Others)

Research

Policy Briefs
Articles
Conference Presentations

Quarterly Reports
Presentations
Ad Hoc Reports

Website:
Reports & Graphs

Presentation & Visualization

Easy To Use

Easy To Maintain

Timely Usable Information

Information Delivery

Management Assistance Website
ssw.unc.edu/ma

Management Assistance
for Child Welfare, Work First, and Food & Nutrition Services in North Carolina

This is a new release (V3.1). Click here for release notes.
The server transition is complete. You can now set bookmarks to pages you used frequently. Thank You.

Select a region: (Please click on the map OR choose from the list)

Map of Counties:
Child Welfare Experience

• Unique number of children investigated for abuse & neglect since 1998: 1,023,032
  – Demographic, maltreatment types reported and found, referral source, repeat maltreatment

• Unique number of children entering foster care since 1998: 82,903
  – Demographic, initial and current placement, placement stability, length of stay, reentry
Data and Practice

Initial Placement Types by State Fiscal Year

- Own Home
- Relative
- Foster Home
- Group Home
- Therapeutic Home
- Emergency Shelter
- Other
- Missing Data
Data and Practice cont.

Initial Placement Types by Age - 2013

- Own Home
- Relative
- Foster Home
- Group Home
- Emergency Shelter
- Therapeutic Home
- Other

0 to 5 | 6 to 12 | 13 to 17
Group Homes and Therapeutic Placements

- Current placements: 8,991 children in care (end of Sept 2013)
  - Group homes: 10% (888 children)
    - About 37% of these children are in “treatment” group homes
  - Therapeutic foster homes: 11.4% (1,026 children)

- What we don’t know from child welfare data: Psychiatric diagnoses, medications, clinical services, total costs
Using Data to Better Understand the Experience of Children in Psychiatric Residential Treatment Facilities (PRTFs)
What we Know about PRTFs in NC

• From 2009 to 2011, total spending increased from $50 million to $67 million to $97 million

• Total cost over three years for 2,157 youth was $390 million
  – PRTFs accounted for about two-thirds of the total cost for this group in 2011

• Ethical and legal concerns

Figure 2. Total Costs for Services for 2,157 Youth in PRTF Placement During FY2009-2011
Figure 3. Average Costs per Youth Receiving PRTF Care per Year (FY2009-2011)
What we Know about PRTFs Nationally

• 2005 “Community Alternatives to Psychiatric Residential Treatment Facilities” Medicaid demonstration grant
  – Awarded to nine states to serve children with serious emotional disturbance in their homes and communities
  – Evaluation report in 2012 found that:
    • children in the waiver program maintained and often improved their functional status
    • costs were an average of 25% (max 32%) of what it would have cost to serve them in PRTF, saving an average of around $40,000 per child
Current NC PRTF Analysis

Three main questions for this presentation:

1. How long do kids stay in PRTFs (first “spell”)?

2. Do they return to PRTFs for another spell, if so, how quickly?

3. Do we see differences for foster children?
NC PRTF Audience Pre-Test

1. Who do you think have longer first stays in PRTFs?
   – Boys of girls?
   – Kids prescribed psychotropic medication or not?
2. What % of children are readmitted to a PRTF within one year?
3. Who is more likely to have a second PRTF admission after one year?
   – Boys or girls?
   – Those who discharge to a Level II/III/IV facility or not?
4. Is the proportion of foster children in PRTFs changing?
Current NC PRTF Analysis

• PRTFs are non-hospitals that provide inpatient services to Medicaid eligible under 21 years old
  – must be accredited
  – must adhere to the code of federal regulations (CFR), which sets seclusion, oversight and restraint requirements (incl. 24 hr supervision) as well as requires oversight by a physician

• The data extracted from the Medicaid claims pertain to state and privately owned PRTFs that are psychiatric facilities

• Some sources refer to them as RTCs or RTFs, while others try to make a distinction between these labels.

CMS & NC DHHS web sites; Brown et al., 2010
Population/Sample (March 2006-Dec 2011)

Persons in non-Cardinal counties ($n = 8,141,049$)

- Persons with Medicaid claims ($n = ?$)
- CW ($n = 451,685$) or TANF ($n = 437,484$)
- PRTF Clients ($n = ?$)

Population or Sample
$n = 2,230$
Data

• Sample of 85 counties
• Spell data (spell = one stay in a PRTF)
  – Spell characteristics
  – Duration, discharge and readmission
  – Level II/III/IV facility before/after spell
• Cost data
• Prescription drug data during/before/after spell
## Client Characteristics

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<tr>
<th></th>
<th>N</th>
<th>% PRTF</th>
<th>% NC Kids</th>
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<tbody>
<tr>
<td>Asian</td>
<td>7</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Black</td>
<td>816</td>
<td>37</td>
<td>24</td>
</tr>
<tr>
<td>Indian</td>
<td>19</td>
<td>1</td>
<td>1</td>
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<tr>
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<td>0.5</td>
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<td>Unknown</td>
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<td>4</td>
<td>-</td>
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<tr>
<td>White</td>
<td>1259</td>
<td>56</td>
<td>55</td>
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<tr>
<td>Gender (Male)</td>
<td>1235</td>
<td>55</td>
<td>51</td>
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<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Min/Max</th>
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<tbody>
<tr>
<td>Age at Spell Start</td>
<td>13.5</td>
<td>2.54</td>
<td>14/19</td>
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</table>
Time to Discharge: First Spells
Time to Discharge: First Spells by Gender
Time to Discharge: First Spells by Psychotropic Drug Prescribed
Time to Discharge: Level II/III/IV Provider Before First Spell

Survival Distribution Function

Days Since Admittance to PRTF

Has a claim for level II/III/IV within 10 days before first PRTF spell  

0 1
Readmit: Days Since Discharge from First PRTF Spell

1 year = 25% readmitted
2 years = 33% readmitted
Readmit: Days Since Discharge from First PRTF Spell by Gender

Girls at 1 year = 29% readmitted
Boys at 1 year = 23% readmitted
Days Since Discharge from First PRTF Spell by Psychotropic Drug Prescribed

No Psychotropic Meds, after 3 years = 32% readmitted
Yes Psychotropic Meds, after 3 years = 38% readmitted
Opposite effect in first 1.5 years
Days Since Discharge from First PRTF Spell by Level II/III/IV After First Spell

After 1 year:
Not discharged to Level II/III/IV Facility = 32% readmitted
Yes discharge to Level II/III/IV Facility = 15% readmitted
### Findings: Drugs Prescribed

Number of first spells each drug prescribed

<table>
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<tr>
<th>Drug Description</th>
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<tr>
<td>First generation antipsychotics</td>
<td>228</td>
<td>0.10</td>
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<tr>
<td>Methylphenidate derivative psychostimulants</td>
<td>455</td>
<td>0.20</td>
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<tr>
<td>Guanfacine ER</td>
<td>247</td>
<td>0.11</td>
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<tr>
<td>Atomoxetine (Strattera)</td>
<td>163</td>
<td>0.07</td>
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<td>Amphetamines etc.</td>
<td>487</td>
<td>0.22</td>
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<tr>
<td>Lithium</td>
<td>311</td>
<td>0.14</td>
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<tr>
<td>Clonidine, Guanfacine IR</td>
<td>351</td>
<td>0.16</td>
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<tr>
<td>Benzodiazepine etc.</td>
<td>151</td>
<td>0.07</td>
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<td>Second gen antipsychotics</td>
<td>1,652</td>
<td>0.74</td>
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<td>Anti-epileptics</td>
<td>1,031</td>
<td>0.46</td>
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<td>SSRI Antidepressant</td>
<td>875</td>
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<td>Tricyclic antidepressant</td>
<td>29</td>
<td>0.01</td>
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<tr>
<td>Second generation SNRI</td>
<td>59</td>
<td>0.03</td>
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<tr>
<td>Second gen antidepressant non-SSRI</td>
<td>802</td>
<td>0.36</td>
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Where do we go from here:

“How can we leverage existing data systems to improve the well-being of children?”
Policy Example:

Example of a conversation that might occur during a state/county/MCO level planning meeting:

Agency Director (Health): “The teen pregnancy thing is killing us, the governor is making it a priority”.

Agency Director (CPS) to her Services Specialist: “Say, Bob, what percentage of our sexual abuse kids go on to have teen pregnancies?”

Service Specialist Bob (checks his pad): “just a second... uh... about 35% of girls. The average state level is 8%. Oh... and of our kids, only 20% get first trimester prenatal care, compared to 75% statewide. Infant mortality comparisons are really ugly, too.”

Agency Director (CPS), addressing Agency Director (Health): “Thanks, Bob. Sounds like maybe we need to get together with your people over at the Health Department.”

CPS Caseworker Example:
Let’s say a worker gets a 5 year old noted by day care to have a history of bruising and to be somewhat fearful and socially withdrawn.

Without integrated database: There are no CPS priors.

With integrated database: The family has no priors with CPS, but...

• Boyfriend has a number of arrests for violent behavior and alcohol use. He has a recent visit to the ER for acute alcohol intoxication. Two years ago the boyfriend had a TRO filed against him by a prior girlfriend.
• The child does not have needed immunizations and has had two ER visits which may appear suspicious in retrospect.
• The mother is about to have her TANF expire, has prior convictions and Medicaid history of drug abuse and is delinquent with her last visit to drug court.

With this information, this case moves from a low to high level of concern.
Information like this could save lives.

What are the challenges to Child Welfare/Behavioral Health in accessing and utilizing BIG data

More likely to be human concerns not technological barriers

1) Legal and ethical implications with privacy
2) Technical support and workforce
3) Uncertainty about quality and consistency of data
4) Prioritization of human/financial resources
5) Up-front investment requirements
6) Moving from “turf” to team
7) Others?
What will the (near) future look like?

Who will benefit from immediate access to large amounts of information?
Do we **eventually** expect the same trend in child welfare and behavioral health?
Group Discussion

• We are going to continue working on building “multi-sector” datasets, if you had access, how would you use it?
• What else would you want to know about children in PRTFs?
• How could an individual child and family team use this type of data?
Other Comments and Questions?

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