Implications Of Big Data For Behavioral Health & Child Welfare Services

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Jordan Institute For Families, UNC School Of Social Work
What Is Big Data?

Large pools of data (and getting larger each year) that can be captured, communicated, aggregated, stored, and analyzed

“Big Data” defined by –

- **Velocity**: speed of data creation, how much data is recorded each minute of each day
- **Variety**: many stakeholders recording different types of data from different sections of industry
- **Volume**: natural consequence of velocity and variety, pushes existing storage infrastructure to its limits
Where Does “Big Data” Come From?

- 5 billion mobile phones in use
- 500 million people will be using health care mobile applications by 2015
- 30 billion pieces of information shared on Facebook each month
- 235 terabytes of data collected by Library of Congress as of 2011
- Approximately 39% of office-based providers and 35% of non-federal acute care hospitals had implemented at least a “basic” EHR
Why Supermarkets Are Big Data Superstars

Software can generate raw data analysis. It cannot provide insight -- that takes people. Here’s how to translate big data into strong engagement.

By Andy Wood  InformationWeek
October 09, 2013 09:06 AM

In the age of big data, attracting customers should be easier than ever, right? We have the data to prove it.

Facebook's Pitch to Automakers: We Have Reach -- And the Data to Prove It

Social Network Goes Into Digital Upfronts Dangling Data Carrot in Front of Detroit

By: Cotton Delo Published: October 14, 2013

Facebook revved up its clout in Detroit and Los Angeles.

The social network has gone public last year. Facebook would pull its ads from the Detroit News when the paper came back to the fold in a strategic about the overtly

NSA collects millions of email address books globally
Why The Interest In Big Data?

- There is more data
- Data storage and computation capacity is more plentiful and cheaper than ever
- The ability to deploy “big data” is a ‘competitive advantage’ determinant for organizations in every industry sector

Every day, three times per second, we produce the equivalent of the amount of data that the Library of Congress has in its entire print collection, right?

But most of it is like cat videos on YouTube or 13-year-olds exchanging text messages about the next Twilight movie.

Nate Silver
How Big Data Creates Value

- **Creating Transparency**: Making data accessible to relevant stakeholders in a timely manner. Reduces search and processing time.
- **Enabling Experimentation**: Using data to analyze variability in performance, controlled experiments, enables leaders to manage performance to higher levels.
- **Customized Actions**: Providers can create specific segmentations and tailored products and services to meet needs.
- **Improved Decision Making**: Supports improved human decision making, minimizes risk, and expose valuable insights.
- **Encourages Innovation**: Innovative new products & services, enhancing current products & services, inventing entirely new delivery models.

“Right Living” $70 million to $100 million in savings
- Consumer engagement in their health and influencing their choices about diet, exercise, preventive care, and other lifestyle factors via targeted disease prevention and data-enabled treatment adherence programs

“Right Care” $90 million to $110 million in savings
- Providing consumers with appropriate treatment by relying on protocols and coordinated information sharing among caregivers to avoid duplication of effort and avoid less effective treatment

“Right Provider” $50 million to $70 million in savings
- Facilitation of selection of service based on skill sets and ability, rather than job title – driving volume to the right care settings and reducing readmissions and emergency department visits

“Right Value” $50 million to $100 million in savings
- Using value-based reimbursement via payment innovation and provider payment transparency

“Right Innovation” $40 million to $70 million in savings
- Identifying new approaches that improve productivity or lead to better patient outcomes
Big Potential For Efficiencies

A comparison with OECD countries suggests that the total economic potential for efficiency improvements is about $750 billion

Per capita health expenditure and per capita GDP, OECD countries, 2007

$ purchasing power parity (PPP)

Per capita health expenditure

SOURCE: Organisation for Economic Co-operation and Development (OECD)
“Big Data” Is the Goal Of Push For Interoperable EHRs: A Platform For Health & Human Service Informatics

Bioconnectivity
- Single Real-Time Clinical, Admin, & Cost Data Set
- Connection of & Access To All Data Sets Via Web Tools -- For Consumers, Professionals, Health Systems

EMRs & EMR Data (NHIN of the future)

Clinical Data From New Diagnostics & Neurotech

Clinical Metrics From Telehealth
The Big Application For “Big Data”? Payer Focus On Reducing Health Care Costs High-Needs Complex Consumers

- 5% of U.S. population account for half (49%) of health care spending
  - $11,487 per person

- 50% of population account for only 3% of spending
  - $664 per person
Coordination Of Care & Integrated Services A New Payer Focus

Integration of Primary Care & Behavioral Health Coordination of behavioral health services and primary care services to improve consumer services and outcomes

Integration of Primary Care & Chronic Disease Management Coordination of services to manage and address multiple chronic disease states within or parallel to primary care

Coordination more important than integration
For The 95%: Primary Care–Focused Models
Spend Less Via Consumer Engagement

- Management via ACOs, medical homes, and primary care
- Specialist role is secondary
- Focus on prevention and wellness
- Consumer self-care and consumer convenience is key
- Web presence (optimization, reputation, etc.) critical for consumer referrals
- Health information exchange a requirement

Services for 95% of consumers via primary care–directed models

- Primary care relationships with clearly defined specialty service
- Consumer ‘experience’ (and preference) critical
- Web presence key referral mechanism
- Health information exchange capabilities
For the 5%: Intensive Coordinated Care Models
Spend Less By Investing More

• Coordination of medical, behavioral, and social service needs by specialty group within larger system
  ◦ Health homes
  ◦ Waiver-based HCB programs
  ◦ PACE programs
  ◦ Specialty care management programs

• Assumption of performance risk (with or without financial risk)

✓ Cross-specialty and cross-system care coordination capability
✓ EHR system and HIE with real-time care management metrics
✓ Performance-based contracting and risk-based contracting capabilities

Specialty coordinated care systems for ‘high needs’ consumers -- the new ‘carve out’ model
**Children In The Child Welfare System: The Ultimate Complex Consumer**

- Significant health care needs of children in child welfare system
- Behavioral health drives Medicaid expenditures more than physical health
- Collaboration between child welfare, Medicaid, and behavioral health important for effective treatment and care
- Centralized reporting, diagnostic and treatment standards improve outcomes, reduce costs and facilitate an aligned system of services with shared values
Technology Has Changed The Playing Field.

New Technologies Allow Greater (& More Effective) Integration & Coordination Of Care

- Telehealth and virtual consultation changing geographic market boundaries
- Interoperable electronic recordkeeping systems capture health information
- Participation in health information exchange programs provides cross-organization data exchange
- Smartphone and other technologies for inexpensive consumer-directed disease management
So Much Data, So Little Time
The Challenge Isn’t Getting The Data –
There Is So Much Of It

The challenges are...
## Anatomy Of Big Data In Health & Human Services

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Billing, personal health records, electronic health records, registries meaningful use requirements, etc.</th>
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<tbody>
<tr>
<td>Exchange</td>
<td>Health Information Exchanges (HIE)</td>
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<tr>
<td>Database</td>
<td><strong>BIG DATA</strong></td>
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<td>Tools</td>
<td>Dashboards and decision support</td>
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Four Distinct Data Pools in U.S. Health & Human Service System – With Little Integration

Pharmaceutical & R&D Data: Clinical trial data, patient registries, etc.
Owner: Pharma companies and academia

Clinical and Service Data: EHR data, consumer service records, medical images, etc.
Owner: Service provider organizations

Integration Of Data Pools Required

Activity and Cost Data: claims, units of service, payment rates, etc.
Owner: Payers and care management organizations

Consumer Behavior, Personal Metrics, And Sentiment Data
Owners: Consumers, caregivers, provider organizations, payers, and data intermediaries
<table>
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<tr>
<th>Consumer Uses Of “Big Data”</th>
<th>Professional &amp; Service Provider Organization Use Of “Big Data”</th>
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<tr>
<td>• Self–management</td>
<td>• “Personalized medicine” approaches to care management</td>
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<tr>
<td>• Self–directed personalized medicine</td>
<td>• Use of clinical decision support (for quality improvement, cost containment, and liability reduction)</td>
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<tr>
<td>• Health plan selection</td>
<td>• Treatment protocol design via comparative effectiveness research</td>
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<tr>
<td>• Professional/provider selection</td>
<td>• Remote patient monitoring with advanced analytics applied to consumer profiles</td>
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<tr>
<td>• Treatment selection via available comparative effectiveness research</td>
<td>• Communication via online platforms and communities</td>
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<tr>
<td><strong>Payers &amp; Care Management Organization Use Of “Big Data”</strong></td>
<td><strong>Policymakers Use of “Big Data”</strong></td>
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<td>------------------------------------------------------------</td>
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<tr>
<td>• Benefit design and payer policy via comparative effectiveness research</td>
<td>• Public health improvement via improved surveillance and automated response systems</td>
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<tr>
<td>• Analyzing disease patterns – with in prevention planning and see in clinical decision support tools</td>
<td>• Analysis of disease patterns and patterns of social problems</td>
</tr>
<tr>
<td>• Performance-based/value-based reimbursement plans for service provider organizations</td>
<td>• Development of policies to provide system incentives using comparative effectiveness research</td>
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<tr>
<td>• Outreach to consumers via online platforms and communities</td>
<td>• Performance-based/value-based reimbursement to health plans and provider organizations</td>
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<tr>
<td></td>
<td>• Statistical tools and algorithms to improve clinical trial design</td>
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From Data To Action...

- **Information literacy**
  - Knowledge and skill to record, retrieve, analyze and communicate data

- **Performance measurement**
  - Benchmarks
  - Management dashboards
  - Metrics based management

- **Metrics–based management**
  - Track current performance
  - Proactively manage performance and address future issues
  - Value–based reimbursement
Three Phases Of Operational Information Literacy

Retrospective

Foundational phase of data tracking and analysis. Gathering of basic factual information about services, quality, financial performance. “What Happened” reporting

Directive

Informational literacy, technology is used to direct team member activities. Metrics based management that improves processes and performance with data informed decision making.

Predictive

Advanced information literacy allows management teams to model and forecast what is likely to happen. Data is used to predict and plan for possibilities.
San Francisco Department Of Public Health Shared Youth Database (SYDB)

- Systematically identify at-risk youth through shared, Department Human Services, Community Behavioral Health (CBH), and Criminal Justice
- Cross over clients demonstrated increased risk of committing a serious crime
  - 51% involved in multiple service systems were convicted of serious crime
  - 1/3 had been served by all three agencies
  - 88% committed crime more than 90 days after becoming crossover client
Shared Youth Database (SYDB) System Participants

Where Are Policymakers Using Big Data?

CHARTING THE TRAJECTORY OF SAN FRANCISCO'S AT-RISK YOUTH

1ST FOSTER PLACEMENT
2ND FOSTER PLACEMENT
COUNSELING FOR SEXUAL ABUSE
COUNSELING (ORG #1)
COUNSELING (ORG #2)
INTERVENTION SERVICES (HIGH RISK)
ACCESSORY TO CRIME
JUVENILE DETENTION
PROBATION VIOLATION
COUNSELING (BOYS & GIRLS CLUB)
INTENSIVE THERAPY (SAM-BA)
RESIDENTIAL TREATMENT

6 YRS
8
10
12
14
16

MORAN SERVICES
HEALTH
JUVENILE JUSTICE

Enters the system aged 7 through two foster care placements by DHS, referred to counseling for sexual abuse.
Series of referrals by Community Behavioral Health (CBH) for increasingly high-risk behavior.
First involvement with criminal justice, violates probation and is ultimately referred for residential treatment at 15.

How could we have better-intervened? | Were these services coordinated? | How many kids are on this trajectory?
Uses of Shared Youth Database (SYDB) Information

1. Currently used to improve case coordination, reports on overlapping clientele improved ability to provide wraparound case management structure.

2. Future use in identifying policies and programs that are ‘most effective’
“MaGIK” -- Indiana DCS “Management Gateway for Indiana’s Kids”

- Multi-department data set based on the “Casebook” format developed in Annie E. Casey Foundation initiative
- Now includes mental health, but plan to expand to juvenile justice, schools, social services, and other agencies
- Currently being piloted in two counties
“MaGIK” Performance Measures

1. Entries/exits in foster care
2. Diversions
3. In-home vs. residential care
4. Visitation by bio family
5. Case management
6. Length of stay in foster care
7. Local placement
8. Maltreatment in foster care
9. Permanency timeliness
10. Repeated maltreatment
11. Sibling placement
“MaGIK” Results

- 40% decline in residential placement
- 15% decline in foster care
- 30% increase in in-home “placements”
- 90% increase in kinship care
- 70% increase in adoptions
- Use of data to build collaboration between families, providers, courts and other key community players
The state moved Medicaid off a standalone mainframe to an open-source solution that consolidates state government data.

Agencies participating include:
- Department of Community Health (Medicaid, human services)
- State Police
- Department of Corrections
- Natural Resources
- States Court Administration Office

10,000 individuals from 21 different state agencies in dataset.

State has developed secure access controls which determine who can see specific rows and columns of data, and protects confidential data.
Results of Michigan’s Shared State Government Data

1. DHHS uses data to determine the best placement for emergency foster care – using data tied to mapping to find an appropriate home within the same neighborhood or school district

2. By accessing motor vehicle records and hunting and fishing licenses, the state located parents who were behind in child support, or had never started paying in.

3. With the birth records, the state can identify children born to Medicaid parents and get them enrolled in the managed care plan their parents are in.

4. Immunization tracking ensures works with Well Child program to monitor children in Medicaid.

5. Improved performance of state’s lead poisoning prevention program -- the state reduced the number of cases of lead poisoning by 35 percent from 2003 to 2007, and increased the number of Medicaid–enrolled 3–year–olds screened for lead from below 50 percent in 2003 to 72 percent in 2009.
Impediments To Optimizing Use of “Big Data” In Health & Human Services

- Technology infrastructure at public and private service organizations
- Data policies
  - Privacy, security, intellectual property, and liability
  - Personal data offer most significant human benefits but is also viewed as most sensitive
- Shortage of the analytical and managerial talent necessary to make the most of the data
  - U.S has a shortage of 140k–190k analytical talent, and 1.5M managers and analyst to make big data decisions
- Organizational cultural change to embrace analytics and metrics-based management
Distinguishing the signal from the noise requires both scientific knowledge and self knowledge.

Nate Silver
The market intelligence to navigate. The management expertise to succeed.

20+ years of market intelligence and management consulting
500+ years of collective team experience
40,000+ executive subscribers