BIG DATA: A Leadership Perspective

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AGENDA

• About Harris Health System
• Big Data Definition - Global
• Need for Data Analytics
• Big Data & Data Analytics at Harris Health
• Population Health and Data Analytics
Harris Health System Overview

- 3 Hospitals
- 2 Multi-Specialty Clinics
- 16 Health Centers
- 9 School Based Clinics
- 6 Same Day Clinics
- 5 Eligibility Centers
- 3 Admin Offices
- Mobile Units
- 8,422 Employees
Lyndon Baines Johnson General Hospital

- 328 licensed bed acute care hospital
- U. S.’s Busiest Level III trauma center
- 74,000 Emergency Visits Annually
- Regional Level III NICU
- Outpatient/Ambulatory Surgery Center
BIG DATA
What is Big Data?

- Datasets whose size is beyond the ability of typical database software tools to capture, store, manage and analyze

- Typically either structured or unstructured data

  **Structured** – Currently identifiable by user (i.e. database)

  **Unstructured** – Does not fit easily into traditional relational systems (i.e. email, word processing documents, multimedia, video, PDF files, spreadsheets, social media)

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<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>Name Type</th>
<th>Data</th>
<th>Nullable?</th>
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Source: McKinsey Global Institute & An Auditor’s Guide to Data Analytics
Why Do We Care About Big Data?

• Improve patient care by identifying trends and patterns
  • Identify anomalies and exceptions closer to real-time
• Optimize quality and financial predictive opportunities
• Increase efficiency and reduce costs of care
• Provide timely information for better decision-making
• Assist in performing root cause analyses
• Forecast strategic goal and objective success
Where is Big Data in Healthcare?

- Pharmaceutical Companies
- Medical Imaging
- Research
- Financial Accounting
- Insurance companies
- EMR
- Providers

Big Data
How Does Big Data Become Useful?

Organizations use analytic software tools to convert BIG DATA into useful information.

The bigger and more complex the data, the more complex the software.
Data Analytics?

Examining raw data with the purpose of drawing conclusions about the data and developing interventions

What good is all of this data if nobody knows what it means?

Source: searchbusinessanalytics.techtarget.com
Data Analytics: Technology & Impact

1. Obtain Data
   - Have right fields?

2. Reporting
   - What Happened?

3. Analyze and Monitor
   - What is happening now?

4. Data Mining/Evaluation
   - Why did it happen?

5. Prediction/Simulation
   - What will happen?

Low Complexity of Technology → High Business Value/Impact

Low Business Value/Impact → High Complexity of Technology

What data is available and how is it useful?
What can be told about what has already happened?
What will be useful for management to know about what is happening now?
What is the root cause of what happened?
What will happen in the future?

Source: McKinsey Big-Data Value Team
Big Data and Analytics In the News

How to Navigate Big Data in Healthcare
*CIO – Kaiser Permanente*

Harnessing the Power of Big Data Analytics
*Cleveland Clinic*

Baptist Health Sees Big Payoff Using Predictive Analytics
*Healthcare Finance*

Allina Health and Health Catalyst’s Unusual Deal
*HealthLeaders Media*

ACOs Make Progress in Using Big Data to Improve Care
*Modern Healthcare*

Using Big Data to Target Preventable Readmissions
*Modern Healthcare – Parkland Health System Center for Clinical Innovation*

UCLA Launches Big Data Analytics Lab
*Becker’s Health IT & CIO Review*
Big Data Analytics at Harris Health System
Operations Analysis and Assurance Department

• Executive Administration - Data Analytic Team
• Expertise in Data Analytics, Continuous Monitoring, Internal and IT Audit
• Utilize analytic technology to identify and mitigate risks; assist management in achieving organizational strategic goals
• Provide real-time exception reporting to Executive Leadership
Executive Expectations

100%
- Full population analysis is more accurate for forecasting
- 100% assurance that all data is being reviewed and monitored
- Sampling error and risk are removed when dealing with complete data sets

21st Century
- Staying with the curve of data – not falling behind
- Trending data to identify patterns
- Mining data to find the stories and root causes behind organizational challenges

Quick & Timely
- Management reporting requests are provided closer to real-time
- Provide executives with timely information rather than after the fact
- Mid-course corrections and decisions can still be made by management

Risk & Events
- Ability to quickly identify and mitigate global healthcare challenges and threats
- Unexpected events and surprises can be better dealt with if executives have the information they need to address fast-emerging threats
Analytic Software - ACL

• Integrates data analytic capabilities with risk management, audit tracking, remediation, and management dashboards

• All analysts are ACL Certified Data Analysts (ACDA)

• Winner of The ACL Impact Award for Best Use of Analytics - International competition with top Fortune 500 companies
# How Big & How Much?
## Operations Analysis & Assurance Department Data Analytic Projects

<table>
<thead>
<tr>
<th>ACCOUNTS PAYABLE</th>
<th>PAYROLL</th>
<th>LAB</th>
<th>BED UTILIZATION</th>
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<tr>
<td>8 Million records Annually</td>
<td>850,000 records Annually</td>
<td>80,000 records Annually</td>
<td>676,000 records Annually</td>
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<tr>
<td>800+ Million Paid Invoices Annual</td>
<td>$518 Million Annual</td>
<td>$11.5 Million Spend</td>
<td>250,000 Total Bed Days</td>
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<td>170 GB Data (Total Project)</td>
<td>26 GB Data (Total Project)</td>
<td>23 GB Total Project Size</td>
<td>2 GB Total Project Size</td>
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<tr>
<td>1 GB of Data per Month</td>
<td>1 GB of Data per Pay Period</td>
<td>1 GB of Data per Month</td>
<td>170,000 MB of Data per Month</td>
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<td>23 Tables /2000+ fields per record</td>
<td>59 fields per records</td>
<td>16 fields per record</td>
<td>21 fields per record</td>
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<tr>
<td>16 Trillion Data Points</td>
<td>50 Million Data Points</td>
<td>1.3 Million Data Points</td>
<td>14 Million Data Points</td>
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</table>
Accounts Payable Project

Transaction population trend and comparison analysis

Identify and summarize top vendors, top cost centers, top locations and GL Account by transaction volume

Monitor specific GL Accounts (such as T&E expenditures)

Perform Sample Tests by Vendor:
- Payment total > invoice total or contract total
- Payment greater than invoice (by more than 25%)
Payroll Project

Management reporting is more timely

Premium labor expenses are analyzed closer to real-time
- Reports on a monthly or quarterly basis
- Results for the month and fiscal year or calendar year to date
- Reduction in incremental overtime

Identification of employees deviating from policy

Identification of potential overpayments
Automated the monthly review of laboratory and blood invoices

- Provide continuous monitoring for $11.5 M annual laboratory and blood expenses
- Review 100 percent of the laboratory and blood transactions monthly
- Identify inaccurate charges and charges belonging to other hospitals.
- Compare invoice charges, patient data, and contract prices
- Analyze invoices for exceptions and anomalies
Bed Utilization Project

Provide information to the Board of Managers regarding the utilization of hospital beds by facility, type, and clinical service line

Trend and analyze key metrics - average daily beds, bed turnover rate, average time to admit, and average length of stay

Identify anomalies and exceptions relative to bed capacity and bed utilizations

Ability to trend patient flow by nursing unit daily/monthly
Supply Chain Management Project

• Hire, retain and invest in analytics expertise
• Capture all relevant operational data in real-time
  • Purchasing, invoice volume, exception rates and vendor connections
  • Forecasting, Warehousing and waste elimination
• Build a cross-functional team that includes clinicians
  • Embed analytics into daily operations
• Increase analytical rigor and contract management
Automation and process improvement eliminates or reduces labor needed in process steps while significantly increasing accuracy and cycle-time.
Operations Analysis & Assurance Projects

- Automate the review of high risk contracts
- Automate the review of employee benefits and insurance claims
- Automate of the review of 340B Drug Replacement Pricing
- Automate exception reporting and dashboards
Population Health and Data Analytics
Managing Three Distinct Populations Essential to Profitability

Third-Party Information Valuable But Should Not be Sole Determinant in Segmentation Strategy

- **High-Risk Patients**: 5%; complex
- **Rising-Risk Patients**: 15-35%; may have conditions not under control
- **Low-Risk Patients**: 60-80%; any conditions minor, easily managed

Financial Analysis Indicates Necessity of Managing Rising-Risk Patients

5 Year Margin Projection by Risk Management Level:

- Baseline, no management by risk level: (9.7%)
- Managing high-risk only: (4.9%)
- Managing high-risk and rising-risk patients: 3.0%
Population Health Management
The Ordered Checklist for Your 3-5 Year Journey

1. **Registries**: Evidence-based definitions of patients to include in the PHM registries
2. **Attribution & Assignment**: Clinician-patient attribution algorithms
3. **Precise Numerators**: Discrete, evidence-based methods for flagging patients in the registries that are difficult to manage in the protocol, or should be excluded from the registry, altogether
4. **Clinical & Cost Metrics**: Monitoring clinical effectiveness and total cost of care (to the system and the patient)
5. **Basic Protocols**: Evidence based triage and clinical protocols for single disease states
6. **Risk Outreach**: Stratified work queues that feed care management teams and processes for outreach to patients
7. **External Data**: Access to test results and medication compliance data outside the core healthcare delivery organization
8. **Communication**: Patient engagement and communication system about their care, including coordination of benefits
9. **Education**: Patient education material and a distribution system, tailored to their status and protocol
10. **Complex Protocols**: Evidence based triage and clinical protocols for comorbid patients
11. **Coordination**: Inter-physician/clinician communication system about overlapping patients
12. **Outcomes**: Patient reported outcomes measurement system, tailored to their status and protocol
The Future of Big Data: 10 Predictions

1. Visual data discovery tools will grow 2.5 times as fast as the remaining business intelligence market

2. In 5 years, cloud-based will out-pace on-site solutions 3:1

3. By 2018, there will be a shortage of skilled staff

4. A unified data platform architecture (information management/analysis/search) will become the base for analytics

5. Applications that incorporate advanced and predictive analytics will grow 65% faster than other applications without predictive functionality
The Future of Big Data: 10 Predictions

6. Most large organizations will purchase external data by 2019

7. Organizations will increasingly adopt technology to continuously analyze streams of events

8. Over the next 4 years, decision management platforms will grow 60% for increased decision making and knowledge retention

9. Rich media analytics (video/audio/image) will grow 3 times in 2015 and be a key driver for big data analytics investment

10. Half of all consumers will interact with cognitive computing services by 2018
Big Data – Analytics Challenges

• Costs
• Lifestyle Choices
  • Limited Possible Interventions
• Synchronizing Clinical/Financial/Operational Efforts
• Predictive Validity
  • Predictive Modeling Error (S)
• Adapting and Evolving Factors
• Data Breaches and Fraud Prevention
QUESTIONS?
THANK YOU!
Special Thanks to the Harris Health System Operations Analysis and Assurance Team

Desolyn Foy, CPA, CIA, ACDA – Director, Operations Analysis & Assurance
Christina Ervin, ACDA – Senior Operations Assurance Analyst
Esha Rau, CISA, CFE – Senior Operations Assurance Analyst
Jessie L. Tucker III is the Executive Vice President and Administrator of Harris Health System's Lyndon B. Johnson General Hospital and the American College of Healthcare Executives (ACHE) Regent for Southeast Texas. Prior to joining Harris Health in March of 2009, Jessie retired from the Army after a 24 year career progressing from Private to Lieutenant Colonel. As a third generation veteran, he served in Army health leadership and policy positions around the world culminating with his appointment as the COO of one of the Army’s largest health systems. From 2006-2012, Jessie served as a Commission on Accreditation of Healthcare Management Education (CAHME) Commissioner and has served on various local and national ACHE committees over the past 20 years.

Jessie holds a B.S. in Business Administration from the University of South Carolina, an M.A. in Management from Bowie State University, an MBA from Troy State University, and a Ph.D. in Administration-Health Services from the University of Alabama at Birmingham. He is a board certified Fellow of the ACHE, a Certified Financial Manager and a certified Six Sigma Black Belt. Jessie is the 2007 recipient of the Robert S. Hudgens Memorial Award for Young Healthcare Executive of the Year and received the military's Legion of Merit when he retired from the Army in 2009.

Jessie and his wife Patricia have been married for over 25 years and have a 4 year old son and a 10 year old daughter.