Big Data – A Framework for Measuring the Value of Nursing

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has no real or apparent conflicts of interest to report
Session Objectives

Attendee will be able to:

• Identify why the use of big data and data science is transformational to the future of nursing practice, quality and research

• Describe the national Nursing Value Data Model to measure patient-level nursing intensity and costs per patient in multiple care settings to support the continuum of care and to produce objective measures of nursing care value

• Identify new nursing business intelligence and analytic tools that will utilize the rich clinical, operational, financial, and quality/safety outcome data currently available to measure and compare nursing care value
Healthcare Business Model Changes

### Current Focus
- Care providers working independently
- Treating all patients the same
- Avoiding the sickest chronically ill patients
- Being responsible for those who seek services
- Offering care at centralized facilities
- Maximizing the use of resources and assets
- Putting forth best efforts

### Future Focus
- Collaborative teams of providers
- Customizing health care for each patient
- Providing special chronic care services
- Being responsible for the needs of the community
- Providing care at sites convenient to patients
- Applying appropriate levels of care at the right place
- Becoming high-reliability organizations
April 20, 2016

**Healthcare IT, Big Data Investments Surge in Q1**

George Leopold

Venture capitalists poured more than $1 billion into the healthcare IT sector during the first quarter of 2016 as investors look to target data analytics and telemedicine for growth.

The first three months also saw several large big data acquisitions as key players like IBM’s Watson Health unit continued their buying sprees.

Market researcher Mercom Capital Group reported that venture funding for healthcare IT and “digital health” soared 27 percent over the previous quarter during the first three months of this year. A total of 146 deals involving private equity and corporate venture capital generated quarterly investments totaling $1.4 billion, Mercom said. Investments totaled $1.1 billion in the previous quarter.
Data-Driven Decision-Making

Traditional Approach

- Financial Data
- Operational Data
- Human Resources Data
- Clinical Data

Manual Synthesis

Decision
Limitations of the Traditional Approach

- Interactions between data silos often under/over estimated
- Time-consuming
- Delayed
- Resource intensive

Variables important to nursing are often messy or missing
3 V’s of Big Data
Big Data – The Nightingale Connection

Diagram of the Causes of Mortality in the Army in the East

Value of nursing care
Digitization of the electronic health record
Where is the nurse-sensitive data?

- Pain control
- Pressure ulcer
- History of fall
- Ability to ambulate
- Mental status
Making Health Care Data Actionable

Clinical decision support

Practice

Research

Staffing

Policy

Your documentation is just the beginning!
DATAFICATION

When words become data that is machine readable

• Promote standardized terminologies (i.e. SNOMED CT, LOINC)
• Recommend research-based assessment scales and instruments
• Recommend that ANA-recognized nursing terminologies be consistently updated
• Promote consistent use of discrete data elements in support of research, analytics and knowledge generation
Clinical Intelligence and Analytics

![Diagram showing the relationship between complexity and utility/competitive advantage in analytics. The diagram includes categories such as standard reporting, ad hoc reporting, query/drill down, alerts, simulation, forecasting, predictive modeling, optimization, and stochastic optimization. The x-axis represents complexity, and the y-axis represents utility/competitive advantage. The diagram is adapted from Competing on Analytics, Davenport and Harris, 2007.]
Clinical Intelligence and Analytics

For this specific, complex process, how can we achieve the best outcome?

In general, how can we achieve the best outcome?

What will happen next if?

If trends continue what would happen?

Hypothetically what could happen?

What actions need to be taken?

What exactly is the problem?

On demand: What’s happening?

Static: What’s happening?

Adapted from Competing on Analytics, Davenport and Harris, 2007
<table>
<thead>
<tr>
<th>STAGE</th>
<th>Description</th>
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<tbody>
<tr>
<td>7</td>
<td>Personalized medicine &amp; prescriptive analytics</td>
</tr>
<tr>
<td>6</td>
<td>Clinical risk intervention &amp; predictive analytics</td>
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<tr>
<td>5</td>
<td>Enhancing quality of care, population health, and understanding the economics of care</td>
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<tr>
<td>4</td>
<td>Measuring and managing evidence based care, care variability, and waste reduction</td>
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<tr>
<td>3</td>
<td>Efficient, consistent internal and external report production and agility</td>
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<tr>
<td>2</td>
<td>Core data warehouse workout: centralized database with an analytics competency center</td>
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<td>1</td>
<td>Foundation building: data aggregation and initial data governance</td>
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<td>0</td>
<td>Fragmented point solutions</td>
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</table>
# New Generation of Analytics Maturity

<table>
<thead>
<tr>
<th>FROM</th>
<th>TO</th>
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<tbody>
<tr>
<td><strong>FROM Traditional Approach</strong></td>
<td><strong>TO Mature Analytics Adoption</strong></td>
</tr>
<tr>
<td>Managing Projects</td>
<td>Developing products</td>
</tr>
<tr>
<td>Analytics as a demand driven support function</td>
<td>Analytics as a strategic business function</td>
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<tr>
<td>Data development driven by demand, developed for single use</td>
<td>Strategically build reusable data assets</td>
</tr>
<tr>
<td>Proliferation of dashboards and reports</td>
<td>Focus on capabilities, support with repeatable framework of tools</td>
</tr>
<tr>
<td>Hypothesis (Questions) are pre-defined</td>
<td>Questions are not pre-defined, start with the data</td>
</tr>
<tr>
<td>Timeline is project driven</td>
<td>Timeline is based on gaining capabilities</td>
</tr>
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</table>

Used with permission HIMSS C&BI Work Group
Improved patient care through sharable, comparable data sensitive to nursing practice

www.nursing.umn.edu
The Concept – Value of Nursing Care

• Stop seeing nurses as a cost and start seeing them as a solution...

• Start measuring the affirmative actions of nurses, not just prevention of bad things happening
Value Equation

Business model

Value = Quality / Price

Health care model

Value = Outcomes / Price
New Models for Measurement

- One to one - individual patient to individual nurse
- Understand variability by nurse attributes i.e. licensure, experience, certification, etc.
- Actual nurse staffing cost by staff mix, day of stay, DRG, LOS, nursing unit, etc.
- Actual patient outcomes by individual nurse, nurse care team and full care coordination (future)
Nursing Value Data Model v.20

- Organized by:
  - Facility
  - Patient
  - Nurse/provider
  - Revenue/cost
- Incorporates unique RN identifier
- Electronic health record & system agnostic
- Setting neutral

Pilot Research Study

• The purpose of the study is to examine and explore the relationship between individual nurses and each patient in an acute pediatric hospital setting.

• The study leverages existing electronic data (EHR & other systems) to identify effects of nursing care and effects of individual nurses on selected outcomes of care.

• In particular the overall short term outcomes of care and nursing financial outcomes of patient care.
Future Directions

• Continue to add research sites (3 to date)
• Link all providers to person, family, community (primary, LTC, School)
• Follow patient/person across encounters/setting of care
• Direct tie to value-based health care
• Nursing costs & characteristics analyzed to person/population level outcomes
Imagine...

Semantically Interoperable Healthcare focused Apps

Healthcare App Store
Neonatal bilirubin alerts
Today’s Billboard

BIG DATA NEEDS NURSES
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