Facilitator: Susan McBride, PhD, RN-BC
Panel:
Susan H. Fenton, PhD, RHIA
Marisa Valdes, RN, MSN, CPHQ
Richard Gilder, MS RN-BC

Transforming Digital Data into Useful Information

Acknowledgement: Contribution by TNA/TONE HIT Committee members

TNA = Texas Nurses Association
TONE = Texas Organization of Nurse Executives

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TNA/TONE Health IT Committee

Original Task Force Charge* was to:

• Determine implications of health care informatics for nursing practice and education in Texas

• Include nationally-based Technology Informatics Guiding Education Reform (TIGER) initiative

TIGER Vision: To enable nurses and inter-professional colleagues to use informatics and emerging technologies to make healthcare safer, more effective, efficient, patient-centered, timely and equitable by interweaving evidence and technology seamlessly into practice, education and research fostering a learning healthcare system.

Why Does HIT Matter Deep in the Heart of Texas?

Introduction

Environmental Forces:
- Health Care Reform/ARRA
- Advanced Practice Nurse Roles
- EHR Incentives
- IOM/RWJF Report *Advancing Health Care*
- Informatics Nurse Standards by ANA

CNE for Practicing Nurses
Educational Content Dissemination
Awareness Campaign
Nursing HIT Curriculum Development

Benchmark Reports on Progress

Involving Constituents

Nursing Leaders

T.I.G.E.R Phase III Partnership

Embrace the Technology
Preserve the Art
For 300,000 Texas Nurses

Advisory Committee: Practice, Administration, Education and Vendors/Suppliers
HIT Committee Membership

Composed of TNA and TONE Members from practice and academia

Task Force Members

– Nancy Crider*
– Mary Anne Hanley
– Susan McBride
– Molly McNamara
– Mary Beth Mitchell
– Elizabeth Sjoberg
– Mari Tietze*

Texas Nurses Assoc.

– Ellarene Sanders**
– Joyce Cunningham
– Laura Lerma

* = Co-chairs
** = Interim Executive Director, TNA
State-wide Priorities for 2013

<table>
<thead>
<tr>
<th>CNE Programs</th>
<th>Survey of Nurses’ Experience Using their EHRs*</th>
<th>Packaged Nurse Informatics Content with Support of Faculty for Deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Advanced Webinars</td>
<td></td>
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<tr>
<td>1 Face-to-Face</td>
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</tbody>
</table>

Communication/Networking Sub-committee

TIGER III Initiative Content/Collaboration

* Smith et al. (2011). Developing and testing a clinical information system evaluation tool: Prioritizing modifications through end-user input. *Journal of Nursing Administration*, 41(6), 252 – 258.
Today’s Presentation Objectives

• Explain the national agenda for meaningful use of electronic data to drive down the cost and improve quality in the US.

• Discuss levels of measurement (categorical, continuous scale, or ordinal) and their relationship to importance for correctly analyzing (i.e. “deriving meaningful use from”) health care data.

• Describe the challenges of utilizing data from the clinical setting and outline specific steps to address those challenges.

• Describe a specific example of a metric used in a dynamic feedback loop that demonstrates the challenges of transforming data derived from the clinical setting.
## IOM/RWJF HIT-related Recommendations

<table>
<thead>
<tr>
<th>Content from Report</th>
<th>HowApplied via Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Given the nature of patient data collection, nurses will be integral to proper collection of meaningful use data.</td>
<td>Meaningful use content via CNE, actual exercise in F2F., publications, school of nursing curriculum</td>
</tr>
<tr>
<td>Shifts in time and place of care have significant implications for nursing suggesting that nursing may be delivered remotely—as are EHRs, CPOE systems, lab results, imaging systems, and pharmacies that are linked in the exchange networks.</td>
<td>Remote and health information exchange content via CNE, actual exercise in F2F., publications, school of nursing curriculum</td>
</tr>
<tr>
<td>HIT will fundamentally change the way nurses plan, deliver, document and review clinical care.</td>
<td>Innovative models of care via CNE, actual exercise in F2F., publications, school of nursing curriculum</td>
</tr>
<tr>
<td>HIT will refocus nursing on “high touch” tasks that these technologies cannot readily or appropriately accomplish.</td>
<td>Collaborative role of the nurse in informatics via CNE, actual exercise in F2F., publications, school of nursing curriculum</td>
</tr>
<tr>
<td>HIT will lower cost and improve efficiency, effectiveness and quality of care.</td>
<td>HIT safety and quality content via CNE, actual exercise in F2F., publications, school of nursing curriculum</td>
</tr>
<tr>
<td>Care will be provided in “an interoperable digital commons” requiring more effective multidisciplinary teams. (National Academy Sciences, 2010, p. 3-45).</td>
<td>Interprofessional approach to HIT deployment content via CNE, actual exercise in face-to-face, publications, school of nursing curriculum</td>
</tr>
</tbody>
</table>

A Bit of History to lay the foundation…

- President Bush’s goal in 2004

  “… an Electronic Health Record for every American by the year 2014. By computerizing health records, we can avoid dangerous medical mistakes, reduce costs, and improve care.”

  - State of the Union address, Jan. 20, 2004

- Executive order established the Office of the National Coordinator for Health Information Technology (ONCHIT) as part of the Dept of Health & Human Services (HHS)

  – Dr. David Brailer appointed the first National Coordinator

Judy Murphy, RN, FACMI, FHIMSS, FAAN
Deputy National Coordinator for Programs & Policy, Office of the National Coordinator for Health IT, Department of Health & Human Services Washington DC. The Role of Health IT in Health Care Transformation. Transforming Health Care: Driving Policy. 10-12-2012, 9 - 10am.
Fast forward to 2009…

“To lower health care cost, cut medical errors,
And improve care, we’ll computerize the nation’s
health records in five years,
saving billions of dollars
in health care costs and countless lives.”

ELECTRONIC HEALTH RECORDS: A NATIONAL PRIORITY

• February 17, 2009 – the American Reinvestment and Recovery Act (ARRA – Stimulus Bill) is signed into law
  – HITECH component of ARRA provides an incentive program to stimulate the adoption and use of HIT, especially EHR’s
  – Dr. David Bluementhal appointed the new National Coordinator
Meaningful Use as a Building Block

Utilize technology

Access to information

Transform health care

Improved population health
Enhanced access and continuity
Data utilized to improve delivery and outcomes
Data utilized to improve delivery and outcomes
Patient self management
Patient engaged, community resources
Team based care, case management
Registries for disease management
Registries to manage patient populations
Privacy & security protections
Privacy & security protections
Privacy & security protections
Privacy & security protections

Stage 1 MU
Basic EHR functionality, structured data
Privacy & security protections

Stage 2 MU
Structured data utilized
Privacy & security protections

PCMH 3-Part Aim
Care coordination
Evidenced based medicine
Privacy & security protections

ACO’s “Stage 3 MU”
Patient informed
Patient centered care coordination
Registries to manage patient populations
Privacy & security protections
HITECH Act: “A Carrot and Stick Approach”

The Stick

- Eprescribing and quality reporting disincentives—currently reduced reimbursement for lack of technology and reporting

- HITECH Act stipulates disincentives by further reductions in Medicare claims payment for “non-EHR users” starting in 2015

The Carrot

- Unprecedented funding opportunity

- Financial incentives for early adoption and meaningful use
  - Medicare: achieve meaningful use
  - Medicaid: adopt, implement or upgrade “a certified EHR”

Total of $10.7 Billion as of Jan 2013
Paid to hospitals and providers for EHR Incentives
Quality Measurement Enabled by Health IT

• Released July 2012
• Contains a catalog of over 70 activities related to health IT and quality measurement
• Describes possibilities for the next generation of quality measurement
• Illustrates challenges facing advancement

This is all about digital data transformed to useful information!

This panel will discuss the end game of getting to the “golden nuggets” within the digital data to transform raw data to useful information, the challenges in measurement and helpful ways to resolve barriers using “real world” clinical examples.

Susan McBride
PhD, RN-BC

Susan H. Fenton
PhD, RHIA, FAHIMA

Marisa Valdes
RN, MSN, CPHQ

Richard Gilder
RN, MS, CNOR CNI
Introduction to Data Measurement
How Important Is This?

• From a business-process viewpoint, the health care industry performs only two kinds of actions: medical procedures to support diagnosis, therapy, or disease prevention; **and the acquisition, use, communication, and storage of information.**

Measures or Data Types Review

- **Categorical or Discrete**: usually mutually exclusive
  - Nominal – only have names or labels
    - Race
    - Gender
  - Ordinal – order or rank of the labels has meaning
    - Stage of cancer
    - Education level
Measures or Data Types Review

- **Continuous**: numerical and many different values
  - **Ratio**: There is a true zero, so no negative numbers. The intervals between the points are all the same.
    - Days of Care
    - Age

- **Interval**: No true zero point, the intervals between points are all the same.
  - Temperature
Data Display and Presentation

- Ideal Graphs… (Tufte, 2001)
  - show the data.
  - induce the viewer to think about the substance rather than the methodology, graphic design, the technology, or other things.
  - avoid distorting what the data have to say.
  - present many numbers in a small space.
  - make large data sets coherent.
  - encourage the eye to compare different pieces of data.
  - reveal the data at several levels of detail.
  - serve a reasonably clear purpose.
  - are closely integrated with the statistical and verbal descriptions of the data set.
Bar Charts

- Show comparisons between groups
- Can be vertical (aka column charts) or horizontal
- Can be a histogram (next slide)
- Can be Pareto (most to least)
SPSS Histogram

Histogram
for Race = White

Mean = 47.48
Std. Dev. = 29.003
N = 781

Frequency

Age
Stacked Bar Graph

HIM 4331 Grade Distribution

This graph is total fiction. It does not represent actual grade distribution.
Line Charts

- Used for large amounts of data occurring over time
Pie Charts (or Shape Charts)

- Display data as a proportion of a whole
- No axes
- Can explode out for emphasis
- Can be any shape
Polar or Radar Charts

- Multiple series of categories of data
- Larger values are farther from the center

![Polar or Radar Chart](image-url)
Scatterplots or scatter charts

- Values represented as a series of points on a chart
- Distributions of values and clusters of data
- Displaying and comparing numerical data
Display in Action!


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**EHR Status by Physician Age**

- We currently use an EHR.
- We plan to implement an EHR.
- We do not plan to implement an EHR.

**Qualified for EHR Incentive Payments**

Forty-one percent of physicians report they qualified for stimulus incentives and either received them already or are expecting them. A large minority of physicians don’t know if their practice qualified for the stimulus incentives (42 percent). This is most likely because these physicians are not involved in practice management decisions.
Creating Operational Definitions of Measures

Data Analysis - The Standardized Infection Ratio (SIR)
- Numerator Data
  - Healthcare-associated infections (HAI)
  - Indwelling catheter
  - Catheter-associated UTI (CAUTI): Location of attribution, Date of event

Data Analysis - CAUTI Rate per 1000 Catheter Days
- Denominator Data
  - Urinary tract infection (UTI)

CDC Website – Catheter-associated Urinary Tract Infections (CAUTI) FAQs, Toolkits, Resources, Monitoring, etc.
http://www.cdc.gov/HAI/ca_uti/uti.html#rphp
Challenges – Real World Example

NETWORK OF TEMPORAL EVENT DATA (PROCESS NOISE) SEQUENCE & FLOW OF INFORMATION (SIGNAL)

TRANSFORMING DATA (PROCESS NOISE) INTO USEFUL INFORMATION (SIGNAL) – CAUTI EXAMPLE OF CHALLENGES TO SIGNAL PROPAGATION

PATIENT

CATHETER IS PLACED – CAUTI PROTOCOL IS INITIATED

MONITOR FOR CHANGE IN CAUTI DENOMINATOR STATUS

INFORMATION SYSTEM - EHR

PATIENT IS IN CAUTI DENOMINATOR TRUE

FALSE

CAUTI NUMERATOR AND DENOMINATOR METRIC DATA

CAUTI METRIC REPORTING, ARCHIVE, CODIFICATION DISTRIBUTION, AND MESSAGING

MESSAGING TO PHYSICIANS, NURSES, CAUTI METRIC

LAB

CULTURE & SENSITIVITY POSITIVE

LAB REPORT

PHARMACY

ORDER CULTURE & SENSITIVITY

ASSESS LAB RESULTS, ORDER ANTIMICROBIAL, ORDER CATH CHANGE OR REMOVE, MONITOR CAUTI MESSAGING

CPOE FOR ANTIMICROBIAL

ORDERS TO PHARMACY AND NURSING

PHYSICIAN

NURSE

MONITOR FOR UTI

UTI SUSPECTED: NOTIFY PHYSICIAN, SEND LAB, GIVE ANTIBIOTIC, CHANGE OR REMOVE CATH

ADMINISTER ANTIMICROBIAL, CHANGE OR REMOVE CATHETER, CONTINUE TO MONITOR PATIENT AND CPOE MESSAGING FROM CAUTI METRIC AND EHR

TRAFFIC JAM!
What Makes Using the Electronic Health Record Data SO DIFFICULT?

• Lack of Data and Data Quality Standards
• Lack of Real-world Quality Measures
• Lack of Effective Analytics Approaches
• Lack of Trained Personnel
• Data Collection is Hard!
Data and Data Quality Standards

- **Data Standards**
  - All fields are not defined
  - Allowable values or even allowable ranges are not established for all structured fields
  - Static vs. dynamic data
  - What should be considered clinical data?

- **Data Quality Standards**
  - What is acceptable data quality?
  - How do we measure it?
  - How do we transport the quality standard with the data?
  - Who will do this work?
Lack of Real-World Quality Measures

• Or quality measures with the good data we do have are not always adequate
  – Coated catheter use?
  – Foley bag positioning?
  – Lab result variation?
  – Other?
Lack of Effective Analytics Approaches

• Modeling and other advanced approaches are rare
• Translation is very difficult
  – How do you incorporate into the knowledge base?
  – How do you communicate it to clinicians real-time?
How do we get to ‘real’ Meaningful Use?

Stage 1

Data Capturing & Sharing

Stage 2

Advanced Clinical Processes

Stage 3

Improved Patient Outcomes
Meaningful use of Electronic Health Records (EHR’s)

• Reporting eCQM’s requires retooling of existing legacy core measures into e-measures

• A subset of NQF endorsed measures has been retooled for use in an electronic environment (HITECH)

• Meaning and intent of CQM’s remains intact between traditional (manual) quality measures and those specified as electronic measures.
## Challenges/Advantages of e-derived CQM’s

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects on clinician workflow</td>
<td>Little manual abstraction</td>
</tr>
<tr>
<td>Placing the patient first</td>
<td>Larger samples</td>
</tr>
<tr>
<td>Very resource intensive:</td>
<td>Improved coordination and communication among providers</td>
</tr>
<tr>
<td>- People</td>
<td></td>
</tr>
<tr>
<td>- Systems</td>
<td></td>
</tr>
<tr>
<td>- Additional applications</td>
<td></td>
</tr>
<tr>
<td>Measures not extensively tested</td>
<td>Safer care</td>
</tr>
<tr>
<td>New patient safety problems</td>
<td>Patient access to health information</td>
</tr>
<tr>
<td>End user adoption</td>
<td>Strong clinical decision support</td>
</tr>
<tr>
<td>Adoption of the ‘right’ clinical decision support</td>
<td>Better care, better performance measurement systems</td>
</tr>
<tr>
<td>Privacy and security issues</td>
<td>Improved ability to measure and report performance</td>
</tr>
<tr>
<td><strong>Stroke 2 – Antithrombotic Therapy Prescribed at Discharge (NQF # 0435)</strong></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td><strong>Data Element</strong></td>
<td><strong>CMS/TJC specifications manual</strong></td>
</tr>
<tr>
<td>Antithrombotic therapy prescribed at discharge</td>
<td>Derived: Antithrombotic therapy prescribed at discharge Atomic Data Element: Discharged medication ordered (C83 discharge med section/medication coded, product name</td>
</tr>
<tr>
<td><strong>Allowable answers</strong></td>
<td>Yes – Prescribed at discharge</td>
</tr>
<tr>
<td>No – Not prescribed or unable to determine</td>
<td></td>
</tr>
<tr>
<td><strong>Medication Value Set Code</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Stroke Antithrombotic medication permissible value set</strong></td>
<td>ASA Bayer’s Children ASA Children’s Aspirin Baby Ecostein Low Strength Adult Enteric coated baby aspirin…….(partial list)</td>
</tr>
<tr>
<td><strong>Data source</strong></td>
<td>Consultation notes Discharge Summary Medication Reconciliation Form</td>
</tr>
</tbody>
</table>
e - Measure Specifications
Stroke 2/e measure # 104/NQF 0435

- Population Criteria
- Data Criteria
- Reporting Stratification
- Additional Data Elements

Building and reporting a CQM from your EHR

Data criteria (QDM Data Elements)

- "Diagnosis, Active: Hemorrhagic Stroke" using "Hemorrhagic Stroke Grouping Value Set (2.16.840.1.113883.3.117.1.7.1.212)"
- "Diagnosis, Active: Ischemic Stroke" using "Ischemic Stroke Grouping Value Set (2.16.840.1.113883.3.117.1.7.1.247)"
- "Encounter, Performed: Emergency Department Visit" using "Emergency Department Visit SNOMED-CT Value Set (2.16.840.1.113883.3.117.1.7.1.292)"
- "Encounter, Performed: Inpatient Encounter" using "Inpatient Encounter SNOMED-CT Value Set (2.16.840.1.113883.3.117.1.7.1.23)"
- "Intervention, Order: Palliative Care" using "Palliative Care SNOMED-CT Value Set (2.16.840.1.113883.3.526.2.1076)"
- "Intervention, Performed: Palliative Care" using "Palliative Care SNOMED-CT Value Set (2.16.840.1.113883.3.526.2.1076)"
- "Medication, Allergy: Antithrombotic Therapy" using "Antithrombotic Therapy RxNorm Value Set (2.16.840.1.113883.3.117.1.7.1.201)"
- "Medication, Discharge: Antithrombotic Therapy" using "Antithrombotic Therapy RxNorm Value Set (2.16.840.1.113883.3.117.1.7.1.201)"
- "Medication, Order: Antithrombotic Therapy" using "Antithrombotic Therapy RxNorm Value Set (2.16.840.1.113883.3.117.1.7.1.201)"
- "Medication, Order not done: Medical Reason" using "Medical Reason SNOMED-CT Value Set (2.16.840.1.113883.3.117.1.7.1.473)"
- "Medication, Order not done: Patient Refusal" using "Patient Refusal SNOMED-CT Value Set (2.16.840.1.113883.3.117.1.7.1.93)"
- "Patient Characteristic Birthdate: birth date" using "birthdate LOINC Value Set (2.16.840.1.113883.3.560.100.4)"
- Attribute: "Diagnosis: Principal Diagnosis" using "Principal Diagnosis SNOMED-CT Value Set (2.16.840.1.113883.3.117.2.7.1.14)"
- Attribute: "Reason: Carotid Intervention" using "Carotid Intervention Grouping Value Set (2.16.840.1.113883.3.117.1.7.1.204)"
- Attribute: "Discharge status: Discharge To Another Hospital" using "Discharge To Another Hospital SNOMED-CT Value Set (2.16.840.1.113883.3.117.1.7.1.87)"
- Attribute: "Discharge status: Left Against Medical Advice" using "Left Against Medical Advice SNOMED-CT Value Set (2.16.840.1.113883.3.117.1.7.1.308)"
- Attribute: "Discharge status: Discharged to Home for Hospice Care" using "Discharged to Home for Hospice Care SNOMED-CT Value Set (2.16.840.1.113883.3.117.1.7.1.209)"
- Attribute: "Discharge status: Patient Expired" using "Patient Expired SNOMED-CT Value Set (2.16.840.1.113883.3.117.1.7.1.309)"
- Attribute: "Discharge status: Discharged to Health Care Facility for Hospice Care" using "Discharged to Health Care Facility for Hospice Care SNOMED-CT Value Set (2.16.840.1.113883.3.117.1.7.1.207)"
Data Collection is Hard!

- Unless it’s automated, each additional data element costs money
- Humans make errors
- Accounting for different purposes of the data, i.e., codes are used for reimbursement first and must be assigned according to those guidelines, is hard when analyzing data
Lack of Trained & Experienced Personnel

- Must understand healthcare operations AND data analytics
- Be able to use new tools and understand the methods
- Clearly explain processes and results to others
Strategies to address challenges

• Strong and systemic data governance
• Systematic review and validation
• Improve/adopt codification systems
• Support and education for end users
• Improve and facilitate workflow to promote adoption
References & Resources

1. CDC Website – Catheter-associated Urinary Tract Infections (CAUTI) FAQs, Toolkits, Resources, Monitoring, etc. [http://www.cdc.gov/HAI/ca_utti/uti.html#rphp](http://www.cdc.gov/HAI/ca_utti/uti.html#rphp)


HIT Committee, Communication Sub-committee: Networking

HOW TO GET AND STAY CONNECTED IN TEXAS

1. LinkedIn site – search on “groups” for DFW Nursing Informatics Community, and join
2. eList -- email MaryBethMitchell@TexasHealth.org
3. Plan of events – frequent educational/networking sessions
4. TNA pilot blog/email – TNA sponsored blog/twitter/email in development
Contacts

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Imagination is more important than knowledge
-- Albert Einstein