Surgical Performance Tracking in a Multisource Data Environment

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Disclosures

- No conflicts of interest
- No financial disclosure
Objectives

• To discuss the relevance of tracking mechanisms for quality assessment and improvement.

• To present a one site experience at developing a procedure-tracking-system for a neurosurgery practice.
Evolution of Health Care Models

- Physician Centered
  - Basis of care

- Patient Centered
  - Evidence based medicine
  - Clinical guidelines

- Administration Centered
  - Productivity benchmarks
  - Pay-for-performance
Quality of Health Care

Joint Commission

• **Quality of Care:**

  Is the optimal achievement of therapeutic benefit and avoidance of risk and minimization of harm
Quality of Health Care

Institute of Medicine

• **Quality of Care:**
  Is the degree to which health services for individuals and populations increase their likelihood of **desired** health outcomes and are consistent with current professional **knowledge**.
Quality of Health Care

• **Quality of Care:**
  Is the degree of conformity with accepted principles and practices (standards), the degree of satisfying the patient’s needs, and the degree of attainment of acceptable outcomes, while making appropriate use of resources.
Aims of Quality Health Care

- Effective
- Safe
- Patient-centered
- Timely
- Efficient
- Equitable
Quality Care Recognition

- **Perceptive quality**
  Judged by the recipient of care

- **Appreciative quality**
  Peer perception, includes personal judgment and understanding of standards

- **Measurable quality**
  Comparative measures between actual performance and “standards”
Measurable Quality

- Objective character
- Self awareness
- Performance comparison
- Outcome evaluation
- Process monitoring
- Quality improvement
- Resource management
Health Care Registries

Organized systems that use *observational* study methods to collect *uniform* data (clinical and other) to evaluate specified outcomes for a population defined by a particular disease, condition, or exposure, and that serve a predetermined scientific, clinical or policy purpose.
Quality Registries

- Systematic data collection
- Purpose is quality improvement
- Particular health service / condition specific
- Decision support
- Process of care / outcomes of care
- Guidelines application
Large Registries

Pros:
• Epidemiological information
• Multipurpose character
• Comparative effectiveness

Cons:
• Unspecific
• Rely on administrative, claims-based data
• Sensitive to coding variations
• Require dedicated staff and specialized training (Costly)
Small Registries

**Pros:**
- Specific
- Easily developed
- Affordable

**Cons:**
- Limited sample size
- Subject identification
- Manual data extraction
Our Registry

Procedure-based-system to track surgical performance, outcomes and complications for the neurosurgery program at PCH

- Regulatory aspects
- Variable selection
- Data sources
- Platform selection
- Personnel allocation
- Reporting needs
- Automatization
## Regulatory Aspects

### IRB

<table>
<thead>
<tr>
<th>Quality</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processes</td>
<td>Interventions</td>
</tr>
<tr>
<td>Accepted practices</td>
<td>New practices</td>
</tr>
<tr>
<td>No risk to patients</td>
<td>Potential risk to patients</td>
</tr>
<tr>
<td>Institutional</td>
<td>Generalizable</td>
</tr>
</tbody>
</table>
Regulatory Aspects

HIPAA

Hospital Operations: We may use and disclose your medical information if it is necessary to improve the quality of care we provide to patients or to run the Hospital and Clinics. We may use your medical information to conduct quality improvement activities, to obtain audit, accounting or legal services, or to conduct business management and planning.

Phoenix Children’s Hospital Medical and Financial Treatment Agreement
# Variable Selection

## Demographic Data
- Medical Record Number
- Last Name
- First Name
- Date of Birth
- Age at Event
- Gender
- Race
- Ethnicity

## Hospitalization Info
- Diagnosis
- Diagnostic Code(s)
- Condition Group
- Date of Admission
- Date of Discharge
- Length of Stay

## Procedure Details
- Operation
- Operation Date
- Procedure(s)
- Procedure code(s)
- Type of Procedure
- Surgeon(s) and trainee(s)
- Total OR Staff
- Procedure Start Time
- Procedure End Time
- Procedure Duration
- Pre-Hospital Prepping
- Pre-Op Prepping
- Pre-Op Antibiotic
- Pre-Op Antibiotic Administration Time
- Pre-Op Antibiotic Compliance
- Transfusion(s)
- Wound Classification

## Outcome Variables
- Complications
- *SSI Classification
- *Organism
- Readmission 30 Days
- Reoperation 30 Days
- Readmission 90 Days
- Reoperation 90 Days
- *Expected/Unexpected
- *Related/Unrelated
Data Sources

Registration
• AM/PFM

Scheduling/tracking
• MiSYS
• SAM
• Bed Tracking

Clinical
• SCM
• Chartmaxx
• CPM
• Anesthesiology
• Lab
• Radiology
• Pharmacy
Platform Selection

- System availability
- Personnel’s familiarity with the system

SQL
Oracle
Sybase
Redcap
Excel
Access
Report Generation

Periodic QA reports (Monthly)

Performance metrics:
- Total procedures
- Procedures by type
- Real vs. projected

Morbidity and mortality
- Complication rates
- Case reports

Outcome metrics
- Expected Outcome achievement
- Re-admission rates
- Re-operation rates
Report Generation

On-demand reports

- SSI initiative
- Department performance reports
- National reports (US News)
- Feasibility analysis
- Resource queries
- Special interest
Automatization

- Sources identification
- Data mining
- System integration
- Data filtering
- User interface
- Report generation

Whirlwind computer MIT 1951
Automatization Plan

Phase 1: Data Mining and Development of User Interface
- Data Warehouse
  - Data mining
- Record filtering

Phase 2: Analysis
- Analysis
  - Back End (populated/manual)
- Data Input
  - Manual fields
  - Data categorization
- Data Visualization
  - Dashboard
  - Reports

Phase 3: Reporting
- Report Generation
  - M&M
  - Weekly
  - Monthly
  - Quarterly
  - Annually

Phase 4: Support/Maintenance
- 1. Condition specific outcome tracking
- 2. Condition specific pathways
- 3. Condition specific alerts
Data Warehouse

- MiSYS
- AM/PFM
- SAM
- SCM
- Chartmaxx
- CPM Surgery
- Lab
- Radiology
- Pharmacy
- Bed Tracking
- Anesthesiology
- Vocera

Data Warehouse/Dump
User Interphase

BNI Documentation Tasks

Choose/Review Patients to Document
Review the list of patients who have been marked as possibly requiring documentation
> 3912 patients to accept/review

Patient Documentation
Perform documentation on the patients that have been marked as relevant
> 3913 patients to document

Access Reports
Only teasing. We don't have any reports at the moment.

Site Administration

Manage Site Dictionaries
Click here to review and edit the dictionaries for this site.

Manage Site Users
Click here to review and edit the dictionaries for this site.
Manual Entry vs. Automatization

• A one year period was selected to compare system reliability (1/1/2014 to 12/31/2014).

• Comparative analysis was performed to evaluate the level of agreement between manually collected data and electronic extraction.
The Discrepancy

20% error observed between both tracking mechanisms and selected standard.

Graph 1. Total Neurosurgery Procedures in 2014
Identifying the Cause

Detailed analysis of a sub-sample (7/1/2014 to 7/31/2014)

- Discrepancies between manually identified records and the standard mostly attributed to underreported emergency procedures and minor office interventions.
- Discrepancies between automatically identified records and the standard attributed to coding deficiencies and integration mechanisms.
- Data content agreement was close to 100%
Learning Points

• Surgical performance tracking is possible with basic institutional resources.
  * Increase team members’ engagement

• Claim coding is inappropriate for record identification.

• Continuous data auditing is imperative.
  * Add new personnel
## Observations

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibiotic Compliance</td>
<td>89.7%</td>
<td>93.4%</td>
<td>96.9%</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>8.20d</td>
<td>9.64d</td>
<td>10.97d</td>
</tr>
<tr>
<td>CSF Leak</td>
<td>2.3%</td>
<td>1.2%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Infection</td>
<td>4.6%</td>
<td>5.1%</td>
<td>3.1%</td>
</tr>
<tr>
<td>New deficit</td>
<td>0.3%</td>
<td>1.8%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Hardware malfunction</td>
<td>3.3%</td>
<td>3.6%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Expected outcome not achieved</td>
<td>2.6%</td>
<td>3.6%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Readmission 30 Days</td>
<td>10.7%</td>
<td>9.9%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Reoperation 30 Days</td>
<td>11.4%</td>
<td>10.7%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Readmission 90 Days</td>
<td>2.0%</td>
<td>3.9%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Reoperation 90 Days</td>
<td>2.0%</td>
<td>3.6%</td>
<td>4.1%</td>
</tr>
</tbody>
</table>
Root Cause Analysis

- Identify target procedures
- Analyze surgeon practice variation data
- Analyze Length of Stay and readmission data
- Define population affected
- Identify improvement opportunities
- Monitor modification impact
## Target Procedures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain Tumor Resection</td>
<td>51</td>
<td>61</td>
<td>53</td>
</tr>
<tr>
<td>Chiari Decompression</td>
<td>38</td>
<td>43</td>
<td>40</td>
</tr>
<tr>
<td>Craniosynostosis repair</td>
<td>60</td>
<td>57</td>
<td>55</td>
</tr>
<tr>
<td>Spinal detethering</td>
<td>42</td>
<td>36</td>
<td>69</td>
</tr>
<tr>
<td>Shunt placement/removal</td>
<td>107</td>
<td>118</td>
<td>88</td>
</tr>
</tbody>
</table>
Next Steps

• Data capture improvement
  * Integration of databases
• Elimination of duplicative effort
  * Duplicate record alert system
• Standardize practice patterns
  * Order sets, operative procedures, etc.
• Establishment of benchmarks
Thank you!

Questions?