Using Data to Improve Care In The NORA Setting

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Disclosures

No financial relationships with the manufacturers of health care products.

- Currently serving on
  - AQI Data Definitions Committee
  - AQI Data Use Committee
  - AQI Registry Operations Committee

- Prior support from
  - Support from NIH R01 EB020666-01A1 (Identification, Extraction and Display of Clinical Data Patterns with Application to Anesthesia Workflows)
  - Support from NSF 1526014 (Analysis and Tools for Auditing)
  - Funding from IBM as part of the CMS Artificial Intelligence Health Outcomes Challenge
Learning Objectives

– Describe how data can be extracted from the electronic health care record
– Understand the role of 3rd party systems in generating data for quality
– Review results from analyses of large NORA data sets
Our Data Conundrum
Our Data Conundrum

...how can we make our data more useful?
Build a Data Model

• VUMC Perioperative Data Warehouse Model
  – VPIMS + Clarity + Caboodle
  – Singular representation of cases from 2000 – today
    • Patient: Demographics, comorbidities
    • Case: Times, meds, fluids, staff, etc
    • Outcomes: PONV, AKI, etc
    • Admission: Length of stay, mortality
  – Requires a lot of mapping and validation

• Other models: MPOG, NACOR, Caboodle
Reporting Platforms

- **Chronics**
  - Reporting Workbench
    - (recent data, <30 days)

- **Clarity**
  - Crystal Reports

- **Caboodle**
  - Slicer Dicer

Your favorite SQL client
An Example

• How many times did we lose an airway in GI the past 30 days?
  – Defined as any SpO2 < 50%
Create a New Report
Add location and dates
Add SpO2 < 50%
Completed Report
Anesthesia Records In GI With SpO2 <= 50% (Last 30 Days) [18567321] as of Tue 4/19/2022 10:40 AM

<table>
<thead>
<tr>
<th>Date</th>
<th>Patient Name</th>
<th>Diagnosis</th>
<th>Procedure</th>
<th>Anesthesiologist</th>
<th>Pre Note</th>
<th>Post Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>03/23/22</td>
<td>Chronic pancreatitis, unspecified pancreatitis type (CMS/HCC)</td>
<td>ESOPHAGOGASTRODUODENOSCOPY WITH ENDOSCOPIC ULTRASOUND (NA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04/07/22</td>
<td>Odynophagia</td>
<td>EGD (N/A Esophagus)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04/18/22</td>
<td>Encounter for screening colonoscopy</td>
<td>COLONOSCOPY (N/A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Intravenous Infusion
- Propofol 10 mg/mL
  - 100 mg
- Lidocaine PF 20 mg/mL
  - 100 mg
- Succinylcholine 20 mg/mL
  - 20 mg
- Paralyzing agent
- Norfloxacin 7.4
  - 250 mL

Blood Products
- None

Intraprocedure I/O Totals
- None

Responsible Staff
- 03/23/22
  - Name
  - Role
  - Begin
  - End

3 results
An Example

• What’s the NORA acuity like over the past 6 months, aside from GI?

  – Defined as
    • Interventional radiology
    • Fluoroscopy
    • MRI
    • CT (ED, main hospital)
Number of Anesthesia Records by Billed ASA Score
Last 6 months

- ASA 1: 6
- ASA 2: 58
- ASA 3: 334
- ASA 4: 140
- ASA 5: 3

Compare to rest of population

SlicerDicer
Roadmap

- How to get quality data out of your EHR
- Systems for quality data capture
- Review of NORA “big data” analyses
Data from Patients

- Patient satisfaction surveys
Data from Patients

**SurveyVitals**

- **144 Surveys Today**
- **2 Alerts Today**
- **0 Contact Requests**

**APSQ2 Experience**

- **Composite Rank (30 days)**: 76%
- **Composite Mean**: 4.78/5
- **Surveys**: 2,636
- **Response**: 51.1%
- **Alerts**: 64
- **Question Areas**:
  - Best: Overall
  - Worst: Contact Requests
  - Improved: Communication
- **Top & Bottom Divisions**:
  - 99% Rads
  - 41% VWCH
- **Data Sources**:
  - Upload Quality: 90.70%
  - Successfullly Processed: 6,156
Non-EHR Data from Providers

- Quality Capture Application

> Quality Capture App entry not completed, please enter QCA.

Epic Database

QCA Database

Requirement completed?

Details of event
Non-EHR Data from Providers

- QCA Dashboard, NORA Filtered
Use a Data Model

- Automated system that retrieves EHR data for postoperative outcomes, detecting
  - PONV
  - Reintubation
  - Care escalation
  - Positive troponin
  - Acute kidney injury
  - Rapid response calls
  - In-hospital mortality
- Feedback provided
  - Weekly summary email

Roadmap

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NACOR

• AQI chartered in 2008 by ASA to develop the National Anesthesia Clinical Outcomes Registry

• Millions of cases from thousands of practices
  – “Mile wide”

• Minimal Data Elements
  – Staff information
  – Anesthesia dates/times
  – Patient characteristics
  – Procedure codes
  – Anesthesia type
  – Diagnosis codes
  – Payment type
  – “Inch deep”

# NACOR

<table>
<thead>
<tr>
<th><strong>Strengths</strong></th>
<th><strong>Limitations</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Great capture of anesthetics across the US</td>
<td>• Significant missingness for some data elements</td>
</tr>
<tr>
<td>• Longitudinal data</td>
<td>• Not much granular data</td>
</tr>
<tr>
<td>• (10+ years)</td>
<td>• Data is variable by practice</td>
</tr>
<tr>
<td>• Represents different types of practices</td>
<td></td>
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<tr>
<td>• Supported by the ASA</td>
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</table>
NORA Complications

- NACOR 2010-2013
  - 12,252,846 cases
  - Most common complication PONV (1.06%)
  - Lower overall mortality than OR locations (0.02% vs 0.04%, P<0.0001)
  - Higher mortality in cardiology and radiology (0.05%)
  - Growth in GI cases

Growth of NORA

- NACOR 2010-2014
  - 5,929,953 NORA; 12,387,574 OR cases
  - Older patients
  - Sicker patients
  - More outpts
  - More NORA

NORA By Day and Night

- NACOR, 2010-2015
  - 4,948,634 cases
  - 4.3% during after hours
    - Higher ASA scores
    - Longer cases
  - GI cases least frequent

The Conclusion Slide

- You too can get useful data out of your EHR
- You can do much more with modeled data
- You can get useful data from systems interfaced with your EHR
- NACOR can tell us a bit about NORA
Thanks!

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