PATIENT MONITORING QUALITY IMPROVEMENT PROGRAM: IMPACT ON RESPIRATORY COMPROMISE

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1BARTON HEALTHCARE & 2MEDTRONIC MEDICAL AFFAIRS

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SOCIETY FOR TECHNOLOGY IN ANESTHESIA
▪ Barton Hospital partnered with Medtronic on this program and Medtronic performed the data analysis

▪ Michael Mestek is a salaried employee of Medtronic
I. Introduction: Quality Improvement Partnership

II. Respiratory Compromise: Clinical Challenge

III. Methods: Role of Patient Monitoring

IV. Results: Impact on Patient Outcomes

V. Conclusions & Future Directions
QUALITY IMPROVEMENT PROGRAM
QUALITY IMPROVEMENT PROGRAM
MAIN OBJECTIVES

1. Benchmark an institution’s postoperative respiratory related events and cost vs. the national average

2. Determine impact of continuous capnography & pulse oximetry monitoring on postoperative respiratory related events

3. Provide quantitative assessment relating the incorporation of patient monitoring with impact on key quality and cost metrics
BARTON HOSPITAL
OVERVIEW

Located in South Lake Tahoe, California

- Opened in 1963
- Sole Community Provider
- 63 Bed General Acute Care
- 10 Bed Perinatal
- 8 Bed Intensive Care
- Leapfrog Hospital Safety Score A

- Mentor Hospital California Hospital Association
- Recognized as a Top Performer by the Joint Commission
- Four Star Rating for Patient Experience
### BARTON HOSPITAL

#### DRG OVERVIEW

<table>
<thead>
<tr>
<th>DRG</th>
<th>% of Postop Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAJOR JOINT REPLACEMENT OR REATTACHMENT OF LOWER EXTREMITY W/O MCC</td>
<td>22.9%</td>
</tr>
<tr>
<td>CESAREAN SECTION W/O CC/MCC</td>
<td>9.1%</td>
</tr>
<tr>
<td>CESAREAN SECTION W CC/MCC</td>
<td>3.7%</td>
</tr>
<tr>
<td>LOWER EXTREM &amp; HUMER PROC EXCEPT HIP,FOOT,FEMUR W/O CC/MCC</td>
<td>3.2%</td>
</tr>
<tr>
<td>LAPAROSCOPIC CHOLECYSTECTOMY W/O C.D.E. W/O CC/MCC</td>
<td>3.1%</td>
</tr>
</tbody>
</table>

- Orthopedic procedures are most common and account for ~41% of all inpatient procedures.
RESPIRATORY COMPROMISE: CLINICAL CHALLENGE
Prevention/Detection | Current Focus

Respiratory Compromise

RISK

INSUFFICIENCY

FAILURE

ARREST

DEATH

References:


RESPIRATORY COMPROMISE
RELEVANCE AND CHALLENGES ON MEDICAL/SURGICAL UNITS

• Acute respiratory compromise events are common on inpatient hospital wards¹

• Closed claims analyses suggest 97% of postoperative opioid-induced respiratory depression events were preventable with improved patient monitoring and intervention²

• Continuous monitoring of oxygenation and ventilation has been recommended³; however, there are limited data evaluating how this change in practice affects patient outcomes

References:
QUALITY IMPROVEMENT PROGRAM
PURPOSE STATEMENT & HYPOTHESIS

- **Purpose:** To assess the impact of a quality improvement program (QIP) that established continuous capnography and pulse oximetry monitoring in recovery settings for high-risk patients.

- **Hypothesis:** The institution of continuous respiratory monitoring would reduce respiratory-related events.
QUALITY IMPROVEMENT PROGRAM: METHODS
A hospital Patient Safety Committee instituted the QIP with continuous capnography and oximetry monitoring in October 2013 on the Orthopedic, Medical/Surgical, Intensive Care and Post-Anesthesia Care Units.

Selecting a patient population:
- Postoperative
- Known OSA
- High-risk patients, defined as STOP-BANG scores ≥ 3
QUALITY IMPROVEMENT PROGRAM
BARTON HOSPITAL METHODS

- Benchmarking to establish a baseline:
  - Performed by comparing hospital data vs. 2013 HCUP National Inpatient Sample

- 38 months of data on 2,258 postoperative discharges were analyzed using UB04 billing data:
  - Comparisons were made between all metrics at the start (2013-2014) and at the end of the QIP monitoring period (2015-2016)
Respiratory adverse events (RAE) were evaluated as:

1) **All respiratory events** including any secondary respiratory diagnosis of hypoxemia, asphyxia, respiratory arrest and failure

2) **PSI-11** (secondary diagnosis of respiratory failure and/or re-intubation/mechanical ventilation)

3) **Postoperative respiratory failure**

4) **Cardiac arrest/resuscitation**

Changes in length of stay for RAE, ICU transfers and mortality were also determined.
QUALITY IMPROVEMENT PROGRAM: RESULTS
BARTON HOSPITAL BASELINE RESULTS
BENCHMARKS

- Barton Hospital has respiratory events less frequently than the national average and ranks in the top 25% of all hospitals across all respiratory metrics.
RESULTS

CHANGE IN METRICS FROM 2013/2014 TO 2015/2016

* * P<0.05
## RESULTS

### ABSOLUTE & RELATIVE CHANGE FROM 2013/2014 TO 2015/2016

<table>
<thead>
<tr>
<th>Event</th>
<th>2013/2014</th>
<th>2015/2016</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Respiratory Event</td>
<td>90 (6.84%)</td>
<td>87 (9.22%)</td>
<td>0.03</td>
</tr>
<tr>
<td>Postoperative Respiratory Failure</td>
<td>6 (0.45%)</td>
<td>0 (0.00%)</td>
<td>0.02</td>
</tr>
<tr>
<td>PSI-11</td>
<td>1 (0.01%)</td>
<td>0 (0.00%)</td>
<td>0.39</td>
</tr>
<tr>
<td>Cardiac Arrest / Resuscitation</td>
<td>7 (0.52%)</td>
<td>0 (0.00%)</td>
<td>0.02</td>
</tr>
</tbody>
</table>
### RESULTS

**ADDITIONAL METRICS**

<table>
<thead>
<tr>
<th>metric</th>
<th>2013/2014</th>
<th>2015/2016</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS for Respiratory Event</td>
<td>9.16</td>
<td>6.48</td>
<td>0.04</td>
</tr>
<tr>
<td>ICU Transfers</td>
<td>36.6%</td>
<td>36.7%</td>
<td>0.98</td>
</tr>
<tr>
<td>Mortality</td>
<td>3.3%</td>
<td>0.0%</td>
<td>0.08</td>
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BARTON MORTALITY RESULTS
JOINT COMMISSION PUBLICATION

ICU Mortalities 2012 through Year to Date 2016

Capnography implemented October 2013

References:
Inhouse Code Blue and Rapid Response Calls 2012-YTD 2016

Capnography implemented Oct. 2013

References:
CONCLUSIONS
SUMMARY OF RESULTS
IMPACT ON RESPIRATORY COMPROMISE

- QIP was associated with a decrease in:
  1. Postoperative respiratory failure
  2. Cardiac arrest/resuscitation events
  3. Length of stay from a respiratory event

- The program did not result in changes in:
  1. PS-11
  2. ICU transfers
  3. Mortality

Conclusion: Continuous monitoring with both capnography and pulse oximetry may improve quality by helping to reduce severe respiratory adverse events and length of stay for high risk patients
QUALITY IMPROVEMENT PROGRAM
LIMITATIONS & FUTURE DIRECTIONS

- Pilot program with a small sample size

- Data did not identify who was monitored by capnography and pulse oximetry

- This analysis could be improved by identifying which patients were monitored with capnography and pulse oximetry, treated with Naloxone, or given PCA, potentially through Chargemaster codes
QUESTIONS

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