PATIENT MONITORING QUALITY IMPROVEMENT PROGRAM: IMPACT ON RESPIRATORY COMPROMISE

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SOCIETY FOR TECHNOLOGY IN ANESTHESIA

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DISCLOSURES
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- Barton Hospital partnered with Medtronic on this program and Medtronic performed the data analysis
- Michael Mestek is a salaried employee of Medtronic

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OUTLINE
SOCIETY FOR TECHNOLOGY IN ANESTHESIA 2017

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

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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

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BARTON HOSPITAL
DRG OVERVIEW

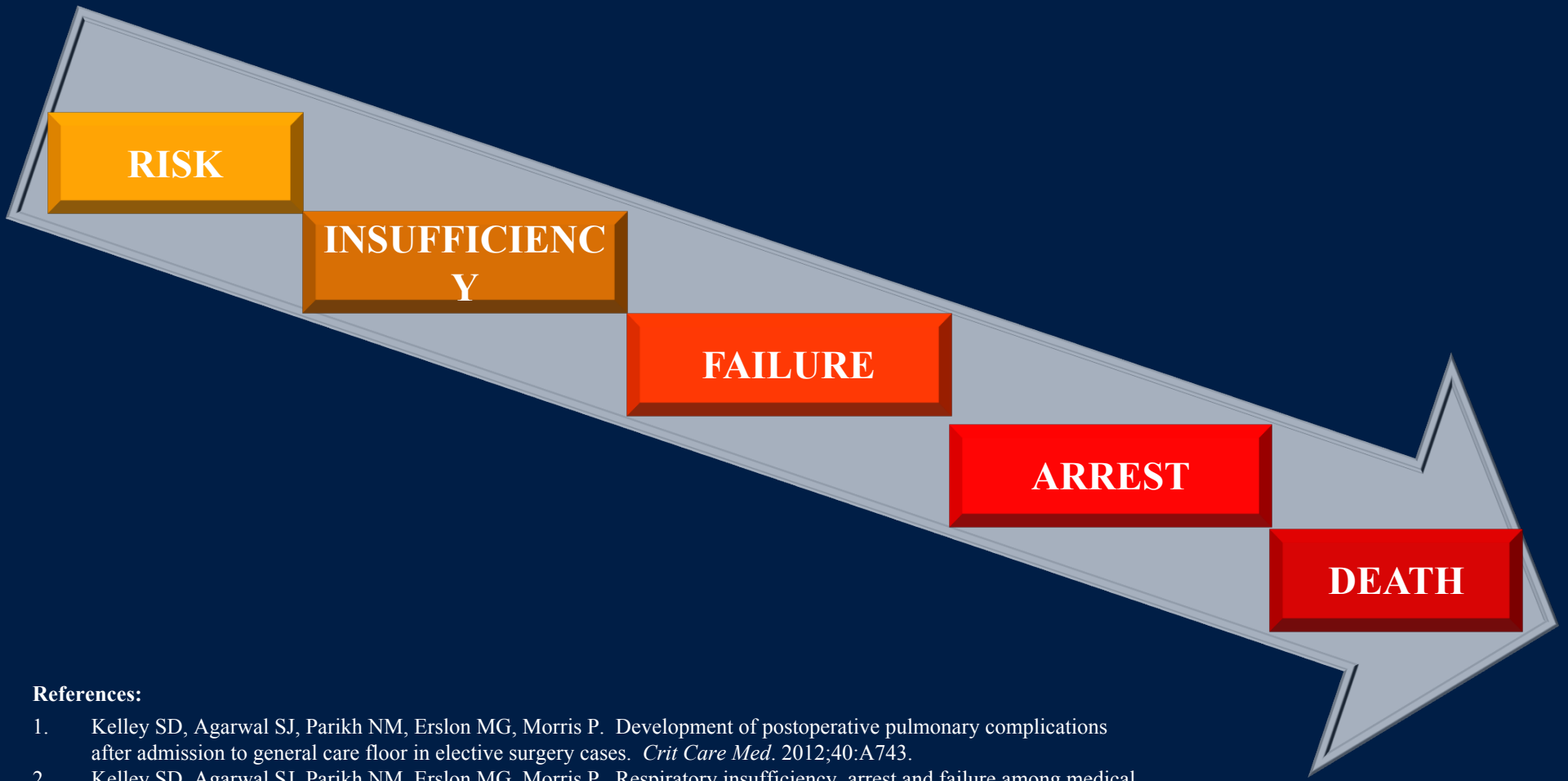
Top 5 DRGs at Barton Hospital	
DRG	**% of Postop Patients**
MAJOR JOINT REPLACEMENT OR REATTACHMENT OF LOWER EXTREMITY W/O MCC	22.9%
CESAREAN SECTION W/O CC/MCC	9.1%
CESAREAN SECTION W CC/MCC	3.7%
LOWER EXTREM & HUMER PROC EXCEPT HIP,FOOT,FEMUR W/O CC/MCC	3.2%
LAPAROSCOPIC CHOLECYSTECTOMY W/O C.D.E. W/O CC/MCC	3.1%

- Orthopedic procedures are most common and account for ~41% of all inpatient procedures.

RESPIRATORY COMPROMISE: CLINICAL CHALLENGE

Respiratory Compromise

Prevention/Detection | **Current Focus**



References:

1. Kelley SD, Agarwal SJ, Parikh NM, Erslon MG, Morris P. Development of postoperative pulmonary complications after admission to general care floor in elective surgery cases. *Crit Care Med*. 2012;40:A743.
2. Kelley SD, Agarwal SJ, Parikh NM, Erslon MG, Morris P. Respiratory insufficiency, arrest and failure among medical patients on the general care floor. *Crit Care Med*. 2012;40:764.

RESPIRATORY COMPROMISE
RELEVANCE AND CHALLENGES ON MEDICAL/SURGICAL UNITS

- Acute respiratory compromise events are common on inpatient hospital wards[1]
- Closed claims analyses suggest 97% of postoperative opioid-induced respiratory depression events were preventable with improved patient monitoring and intervention[2]
- Continuous monitoring of oxygenation and ventilation has been recommended[3]; however, there are limited data evaluating how this change in practice affects patient outcomes

References:

1. Andersen, Lars W., et al. "Acute respiratory compromise on inpatient wards in the United States: Incidence, outcomes, and factors associated with in-hospital mortality." *Resuscitation* (2016).
2. Lee, Lorri A., et al. "Postoperative Opioid-induced Respiratory Depression: A Closed Claims Analysis." *The Journal of the American Society of Anesthesiologists* 122.3 (2015): 659-665.
3. Joint Commission, and Joint Commission. "Sentinel Event Alert. Safe use of opioids in hospitals. Issue 49; August 8, 2012." (2013).

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

QUALITY IMPROVEMENT PROGRAM
BARTON HOSPITAL APPROACH

- 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)

QUALITY IMPROVEMENT PROGRAM
OUTCOMES & ANALYSES

- 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

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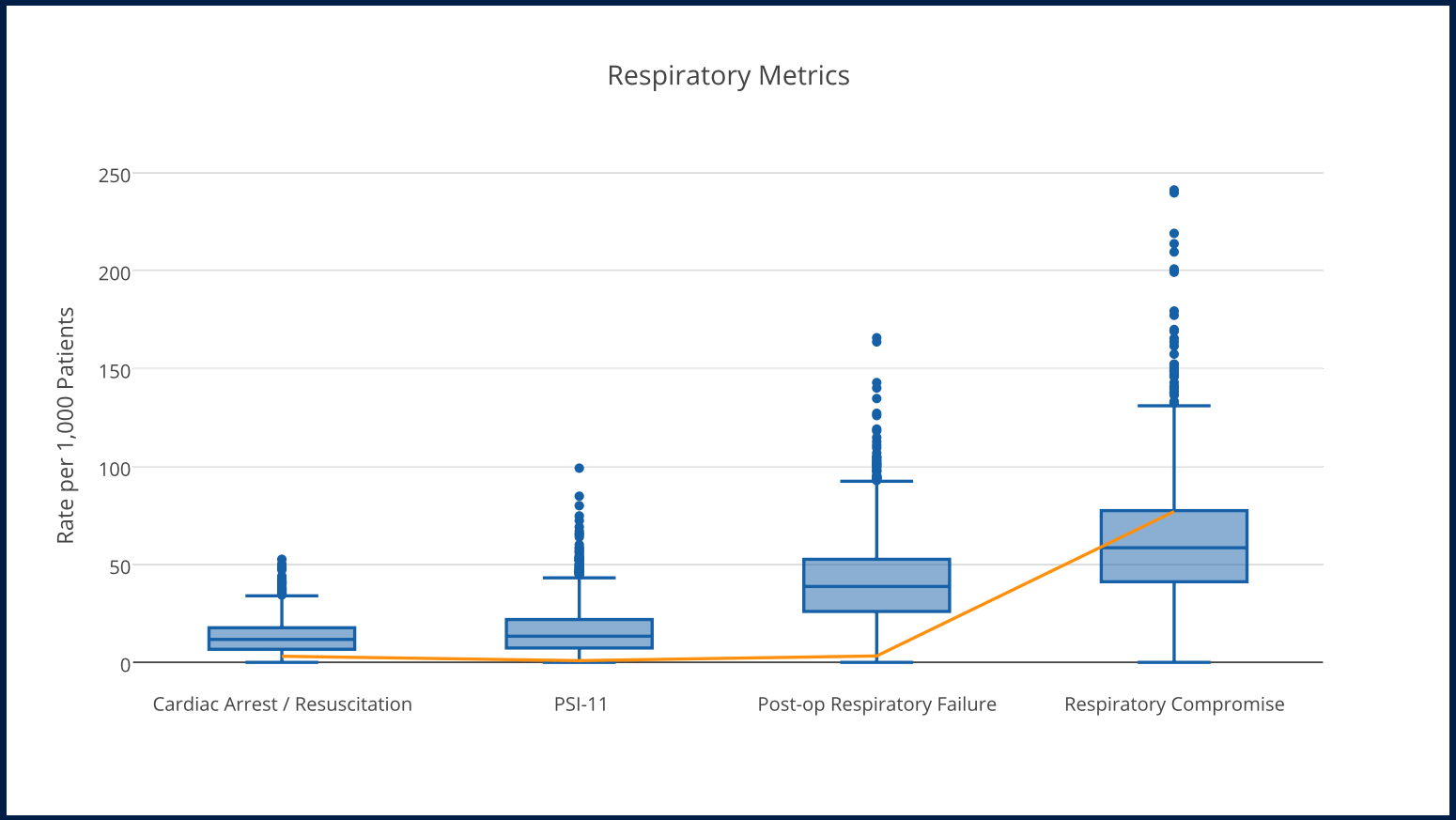
BARTON HOSPITAL BASELINE RESULTS
BENCHMARKS

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



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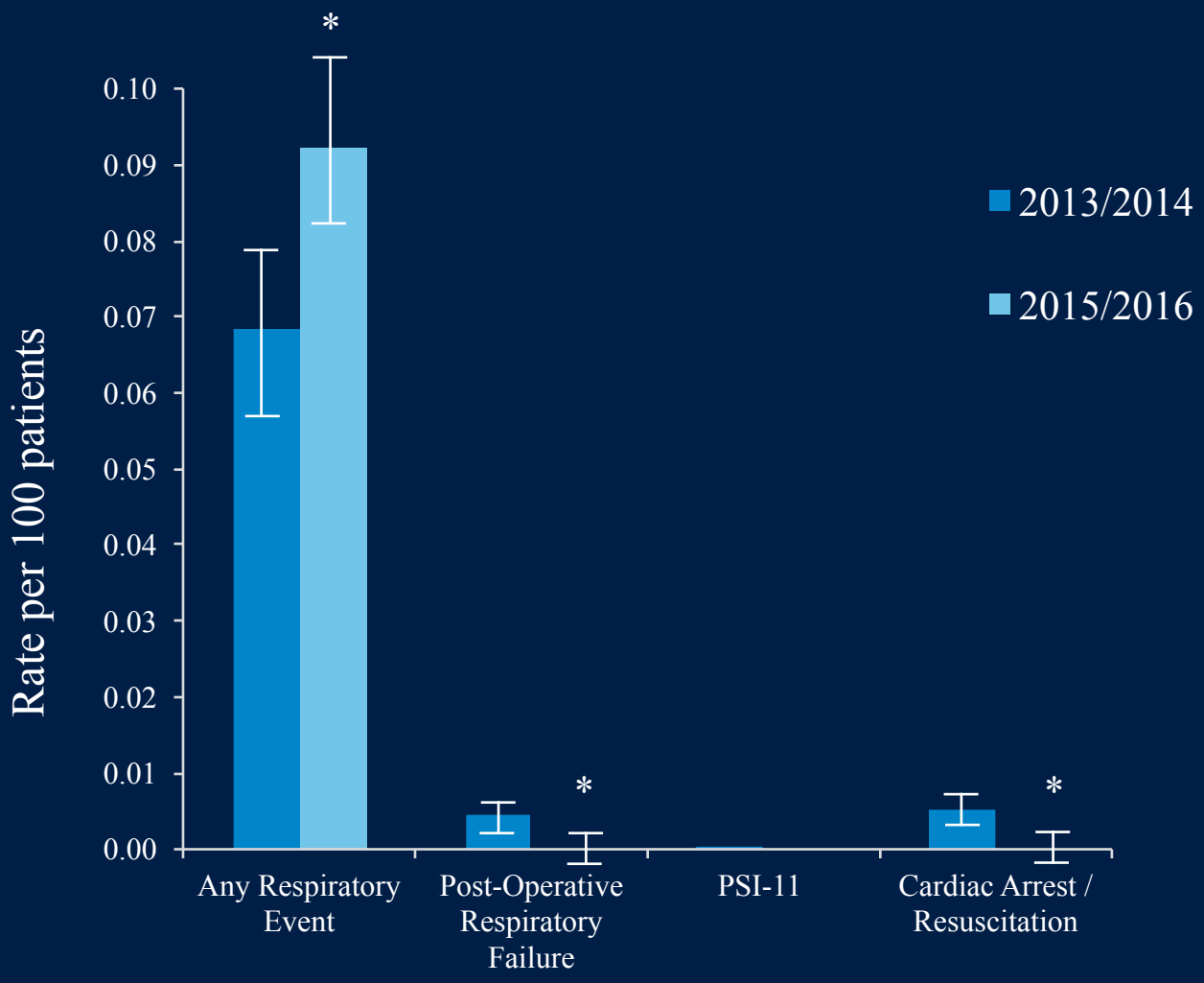
RESULTS
CHANGE IN METRICS FROM 2013/2014 TO 2015/2016



* $P<0.05$

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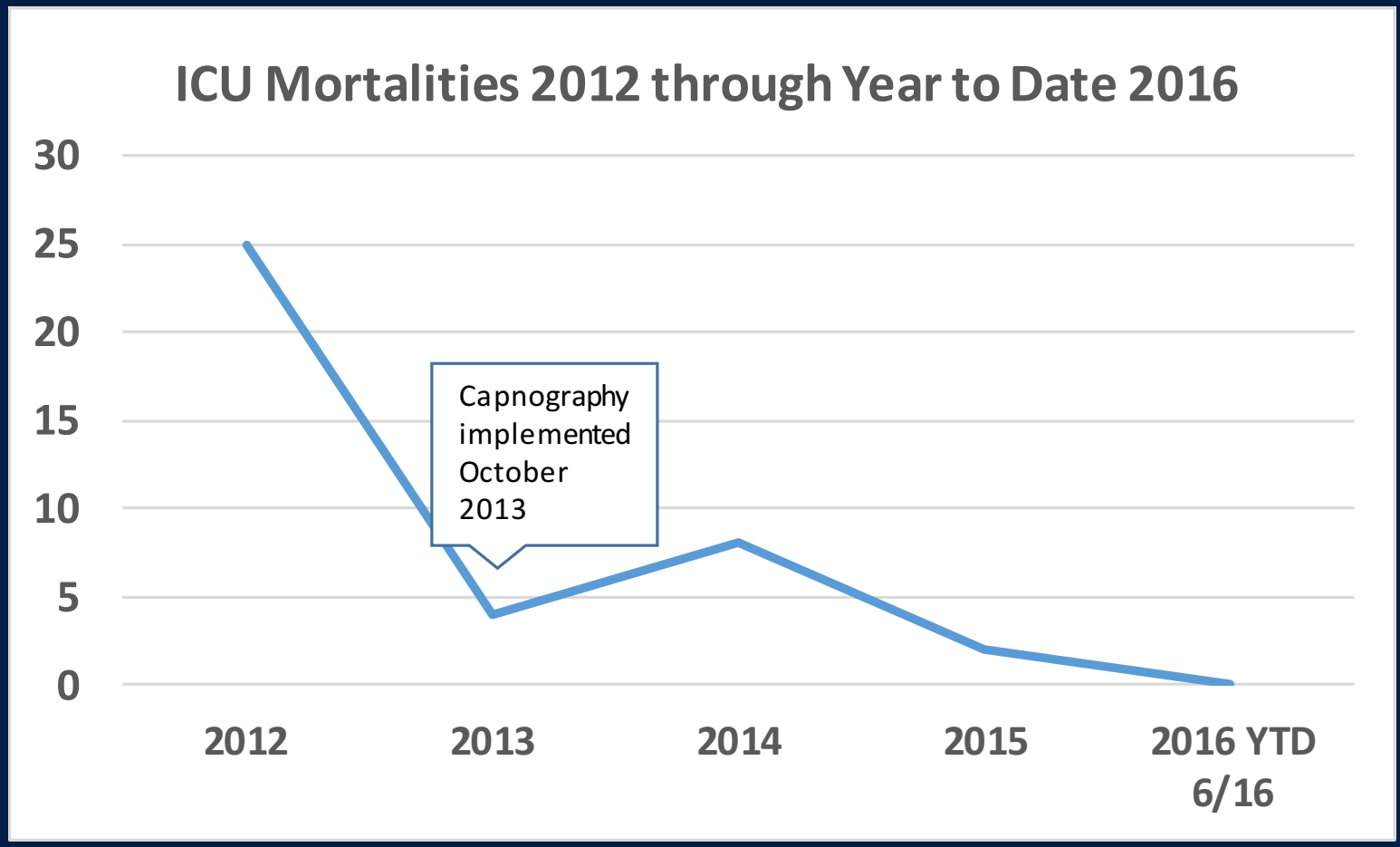
RESULTS
ABSOLUTE & RELATIVE CHANGE FROM 2013/2014 TO 2015/2016

Event	2013/2014	2015/2016	P-Value
Any Respiratory Event	90 (6.84%)	87 (9.22%)	0.03
Postoperative Respiratory Failure	6 (0.45%)	0 (0.00%)	0.02
PSI-11	1 (0.01%)	0 (0.00%)	0.39
Cardiac Arrest / Resuscitation	7 (0.52%)	0 (0.00%)	0.02

RESULTS
ADDITIONAL METRICS

	2013/2014	2015/2016	P-Value
LOS for Respiratory Event	9.16	6.48	0.04
ICU Transfers	36.6%	36.7%	0.98
Mortality	3.3%	0.0%	0.08

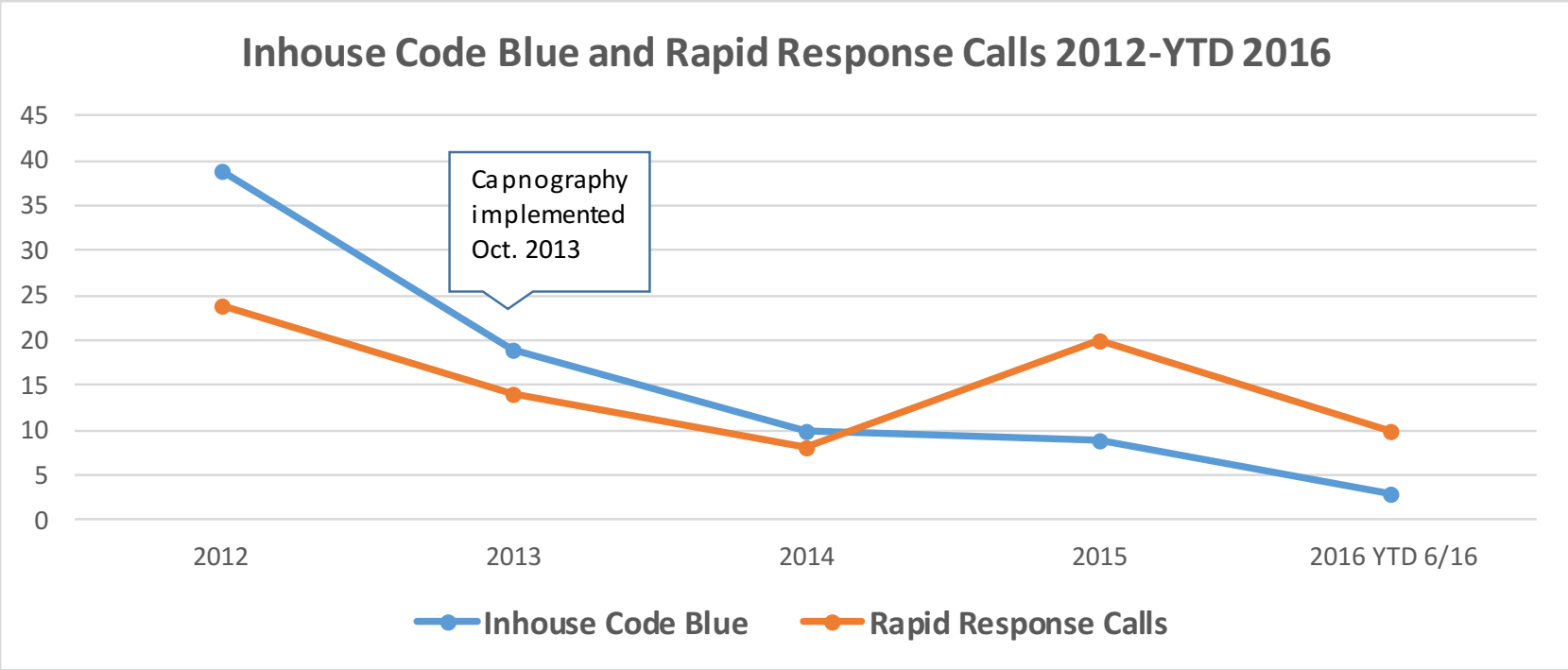
BARTON MORTALITY RESULTS
JOINT COMMISSION PUBLICATION



References:

O'Farrell, C., & Evans, D. (2017). Spotlight on Success: Barton Health Improves Capnography Safety. *Joint Commission: The Source, 15*(1), 7-20.

BARTON CODE BLUE & RRT RESULTS
JOINT COMMISSION PUBLICATION



References:

O'Farrell, C., & Evans, D. (2017). Spotlight on Success: Barton Health Improves Capnography Safety. *Joint Commission: The Source*, *15*(1), 7-20.

CONCLUSIONS

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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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APPENDIX