

The Health Care Improvement Foundation
2018 Delaware Valley Patient Safety and Quality Award
Entry Form

1. Hospital Name

Einstein Medical Center Montgomery

2. Title Of Initiative

Preventing Opioid-Induced Ventilatory Impairment (OIVI) in Medical Surgical Patients:
From Near Miss to a Technology-Enabled Interprofessional Process Leading to Improved
Outcomes

3. Abstract (Please limit this description to 250 words.)

Each year, up to 730,000 in-hospital cardiopulmonary arrests (IHCA) occur, with nearly half of the patients having received opioids prior to the arrest due to Opioid-Induced Ventilatory Impairment (OIVI) (Overdyk, 2011). In order to reduce OIVI in the med/surg population, our organization implemented a novel screening instrument created by combining several existing evidence-based assessment tools and integrating it into the Electronic Health Record (EHR) (Felhofer, 2014). We hypothesized that our single, combined tool assesses all known risk factors, thus eliminating redundancy of using multiple tools to risk stratify patients. Once identified as high-risk, med/surg patients are monitored using etCO₂ monitoring, which is noted to be the most valuable intervention available to identify and intervene for patients experiencing OIVI (Greenberg, 2018). After a 90-day pilot in Spring of 2017, a 100% reduction of 4 key adverse events (1. Code Blue/Rapid Response team events, 2. Unplanned intubations, 3. Administration of reversal agents such as naloxone, 4. Unplanned transfers to ICU) was obtained. With the success of the pilot, the program was launched on July 1, 2017, for our 36-bed Med/Surg unit and plans are underway to expand the program to a 24-bed Med/Surg Unit in Summer 2018.

Felhofer, K. (2014). Developing a respiratory depression scorecard for capnography monitoring. *Innovations in Pharmacy*, 4(3).

Greenberg, S. (2018). Opioid-induced ventilatory impairment: An ongoing APSF initiative. *NEWSLETTER: The Official Journal of the Anesthesia Patient Safety Foundation*, 32(3)

4. What were the goals of your initiative?

On April 24, 2017, after nearly 2 years of assessment, research, and planning, an interdisciplinary team consisting of nursing leaders, educators, respiratory therapy, pharmacy, quality, risk management, and patient safety, launched a pilot program consisting of a novel assessment tool to screen medical-surgical patients for risk of Opioid-Induced Ventilatory Impairment (OIVI) with intervention using etCO₂ monitoring. The objectives of the pilot were three-fold: 1.) implement the OIVI assessment tool and evaluate its ease of use and effectiveness for screening and risk-stratification 2.) intervene for patients that were screened as high-risk by initiating etCO₂ monitoring 3.)

reduce the number of each of the following by at least 20% from baseline: Code Blue/Rapid Response team events, unplanned intubations, administration of reversal agents such as naloxone, unplanned transfers to ICU.

5. What were the baseline data and the results of your initiative?

In 2015, 68 rapid response team (RRT) calls for respiratory distress were noted. Of those, 62 (91%) resulted in transfers to the Intensive Care Unit. Our goal initially was to reduce the number of transfers to the ICU related to respiratory distress. In conducting further research about OIVI and etCO₂ monitoring, we partnered with a vendor and added more baseline data and outcome goals as a result. Baseline data was isolated using discrete fields in our electronic medical record (EMR) for the period 10/1/2015-9/30/2016 for Med/Surg Patients on a specific floor. There were 5738 patients reviewed with 81 events noted for a rate of 1.412%. Events are defined as meeting any one or more of four criteria: transfer to the ICU, Cardiac Arrest, Unplanned Intubation, Unplanned use of reversal agent.

Data was collected throughout a 90-day pilot period and adjustments were made related to the process measures of the OIVI screening tool and the implementation of capnography, focusing on reduction of nuisance alarms. The nursing and respiratory staff have integrated the assessment and protocol as part of the standard of care. At the end of the 90-day pilot, there were zero Code Blue/Rapid Response team events, zero unplanned intubations, zero administration of reversal agents such as naloxone, and zero unplanned transfers to ICU, showing a 100% reduction in outcome measures. Post pilot, data was analyzed for the 6-month period from 7/1/2017-12/31/2017, showing an overall reduction of 58% for all measures during this time, with a 37% reduction in transfers to the ICU. A rate will be calculated using annual data after 7/1/2018.

6. Describe the interventions that were instrumental in achieving the results for your initiative.

A protocol was developed including an OIVI risk stratification tool integrated in the EMR and a process to screen all patients on the medical surgical unit at set intervals. Capnography (etCO₂) monitoring was selected as the primary intervention. The OIVI risk stratification tool consists of 6 criteria: opioid infusion therapy (such as patient controlled analgesia, CADD pump or epidural infusion); recent unplanned administration of reversal agents; known or suspected OSA/sleep disorder as assessed by STOP-BANG score > 6; opioids and/or concomitant sedatives; stacking (multiple modalities used with overlapping half-life and potencies); general anesthesia in the past 1 to 24 hrs. If a patient has two or more of the 6 six criteria, then the patient qualifies for capnography monitoring; if a patient meets at least one of the criteria, then the registered nurse should consider placing the patient on capnography monitoring. The nurse would also assess the patient using the Passero Opioid-induced Sedation Scale (POSS) to determine level of sedation and appropriate nursing interventions. In summary, the protocol, the technology-integrated risk stratification tool, and etCO₂ monitoring were the 3 key interventions instrumental in achieving our process and outcome goals.

- 7. Describe the key steps required to successfully replicate this initiative throughout the region. (Please limit this description to 100 words.)**

The OIVI risk stratification tool & the POSS scale assessment tool can easily be implemented as a routine practice of nursing evaluation for all patients receiving opioid therapy due to ease of use, and provides the nurse an accurate representation of the patient's respiratory status. Furthermore, etCO₂ monitoring is a readily available, non-invasive technology that is shown to be the most effective means of detecting OIVI early in order to intervene to prevent adverse outcomes.

- 8. Explain how the initiative demonstrates innovation (Please limit this description to 100 words.)**

To confirm the lack of using etCO₂ monitoring as a standard of care, in 2015, a survey was conducted of facilities within a 40-mile radius confirmed that none of the facilities are currently using etCO₂ monitoring in medical-surgical areas. The first 24 hours of opioid therapy is the most dangerous time for OIVI and opioids remain commonplace on medical surgical units where patients are not continuously monitored for respiratory depression. Our program demonstrated that our single, combined tool, integrated into an EHR, assesses all known patient risk factors, thus providing an efficient method to assess patients for

- 9. How does this initiative demonstrate collaboration with other providers within the continuum of care? (Please limit this description to 100 words.)**

To develop the program, a team consisting of quality coordinators, risk management, respiratory therapists, pharmacists, nursing directors and managers, nursing educators, anesthesiology, and pulmonology collaborated on issues key to preventing OIVI. The team reviewed the existing literature and best practices, created a risk stratification tool, investigated current technology related to etCO₂ monitoring and created a pilot program. A subcommittee was then convened to engage and educate the nursing staff, respiratory staff, and physicians. The process began, at times, in Pre-Admission testing and led to referrals for outpatient follow-up related to suspected OSA encountered during the inpatient visit.

- 10. Explain ways in which senior leadership exhibited commitment to the initiative (Please limit this description to 100 words.)**

The COO and CNO encouraged the team to apply for a hospital Innovation Grant which was obtained in July 2016 and secured funding for the project which was used to purchase equipment and train staff. The project team reports bi-annually to the Board of Directors and annually to the hospital grant leadership team. The Senior leaders continue to support the program beyond the pilot and have provided operational funding to continue the program to all inpatient areas. The team has also receives support from the Chair of Anesthesiology for communication to medical staff and securing revision approvals.

- 11. Appendices (i.e., tables and graphs)**

Patient Outcomes and Staff Training Data



8 PATIENTS
DID NOT SUFFER AN ADVERSE OUTCOME

A re-assessed rates based on the reduction of adverse outcomes compared to the initial baseline rates since the start of the measurement period.

Outcome Data from July 1, 2017-
 December 31, 2017



86 %

NURSES AND RESPIRATORY THERAPISTS HAVE COMPLETED PRODUCT TRAINING



58 %

REDUCTION OF ADVERSE OUTCOMES



We are on track for a 20% reduction of adverse outcomes

Training Data current as of
 March 2018

NALOXONE ADMINISTRATIONS

▼100 %

UNPLANNED INTUBATIONS

▼100 %

CODE BLUES

NA

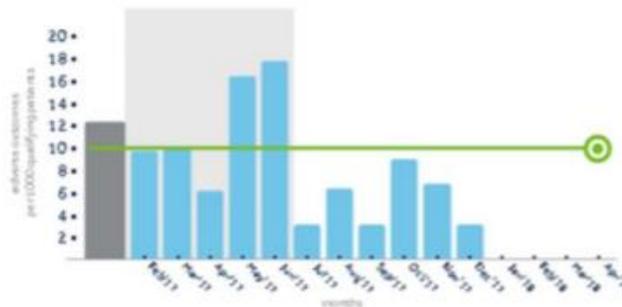
GCF TRANSFERS TO ICU

▼37 %

ADVERSE OUTCOMES TREND

6 months of participation since start of the measurement period

- Baseline average over 15 months
- Measured adverse outcomes
- 20% reduction target
- Grace period



Finance

\$36,994.80

GRANT DOLLARS SPENT ON 10 MEDTRONIC CAP20p MONITORS

\$2k

TOTAL SPEND ON GCF CAPNOGRAPHY CONSUMABLES

Total spend includes any spend on GCF Capnography consumables since the start of the measurement period

\$ 144k

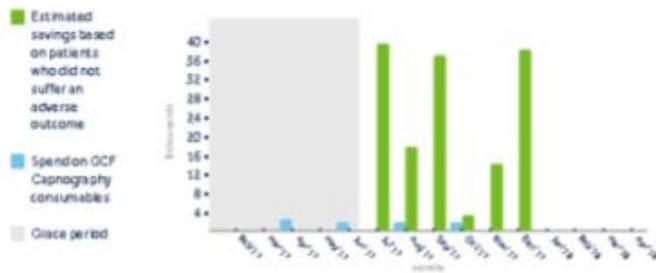
ESTIMATED SAVINGS BASED ON PATIENTS WHO DID NOT SUFFER AN ADVERSE OUTCOME

\$ 18k

Cost per patient to your hospital (default is \$10k^{1,2})

FINANCIAL SAVINGS TREND

6 months of participation since start of the measurement period



¹ Premier database retrospective study on 2013. \$18k average based on total bed/costs of care for patients with post-operative pulmonary complications versus comparable patients.

² Bailey SA, Sarrasin, Durkin, King, Endon, Mary, Florida, Peter. Respiratory Inefficiency, Atelectasis and Salvage Among Medical Patients on the General Care Floor. Crit Care Med 2012; 40(12) (Suppl): 114.