Screening and Monitoring of Postoperative Respiratory Compromise to Reduce Code Blues

Authors: Dennis Jensen RRT¹, Joseph Williamson RRT¹, Greg Allen MD¹, Bryan Wales MD¹, Cari Pearson MN RN-BC¹, Edna Zeller MSN RN-BC CDE¹, Shanna Myers MSN RN¹, Linda Foist MSN RN CNRN CCRN¹, Diane Damitio BSN RN MBA¹, Michelle James MM BSN RN MBA CCRN¹, Greg Spratt BS RRT, CPFT²

Background: Respiratory Compromise (RC) is a state in which there is a high likelihood of decompensation into respiratory insufficiency, failure or death, but in which specific interventions (enhanced monitoring and/or therapies) might prevent or mitigate decompensation.¹ RC is the leading cause of ICU admissions,¹,³,⁴ rapid response calls⁴,⁵, and code blues⁶,⁷. Costs for RC are among AHRQ’s ‘Top 5 Most Rapidly Increasing Hospital Costs’.⁸ General Care Floor patients who develop RC have 29 times higher mortality.⁹ In an analysis of primary respiratory arrests, 64% were classified as potentially avoidable.ˣ

Despite recommendations from many organizations including APSF¹⁰ and the Joint Commission¹¹ recognizing the importance of continuous electronic monitoring for patients receiving opioids, many hospitals still rely on intermittent vital sign checks which may leave patients at risk of unrecognized RC.

Methods: A retrospective quality analysis was performed for a program designed to reduce ‘code blue’ events from RC on 3 postoperative GCFs. Data was collected for a period of 20 months prior to, and 36 months following, the program implementation. The program consists of STOP-BANG screening and continuous capnography/oximetry monitoring for those patients with a score of ≥ 5. Patients with an Integrated Pulmonary Index™ (IPI) score of ≤ 7 based on capnography/oximetry received further assessment and intervention per hospital protocol (Figure 1).

Results:

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<th>Prior to program implementation (20 month baseline) - January 2012- August 2013.</th>
<th>Total Non-ICU Code Blues at Hospital (per month)</th>
<th>Code Blues on 3 postoperative general care floors included in program (per month)</th>
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<td>107 total codes / 20 months = 5.35 codes/ month</td>
<td>43 total codes / 20 months = 2.15 codes/month</td>
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After program implementation (36 month period) September 2013-August 2016.

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<th>293 total codes/36 months</th>
<th>31 total codes/36 months</th>
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<td>8.13 codes/month</td>
<td>0.861 codes/month</td>
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Prior to program implementation, there were 2.15 codes per month on the floors included. Following program implementation, there were 0.861 codes/month representing a 60% reduction in codes/month on postoperative floors in the program. No capnography-monitored patients experience a code blue.

**Conclusions:** Upon implementation of STOP-BANG screening and capnography/oximetry monitoring with IPI of those at increased risk, there was a 60% decline in code blue events on the postoperative GCFs. Broader application of this protocol to patients receiving opioids may result in reductions in serious adverse patient outcomes.

**Author Notes:**
1. Affiliated with Providence St. Peter Hospital in Olympia, WA.
2. Director of Market Development at Medtronic.

**Fig 1. Screening, Monitoring, and Intervention Protocol**

- **Monitor and Evaluate the Patient**
  - Pre-operative STOP-BANG Questionnaire: Score of ≥5
  - If score is ≥5, continue monitoring.

- **Assess Patient and Evaluate Data**
  - If IPI ≤7
    - Call Rapid Response, Respiratory Therapy & Physician and/or Code Blue
    - Support services: Transfer to higher acuity care
    - Monitor IPI. If ≥8, continue monitoring.
  - If IPI ≥8
    - Increase frequency of vital signs and monitor closely
    - Respiratory Therapy to notify physician if no events within 48 hours.

- **Interventions**
  - Verify CO2 > 60 with ABG. Check for apnea > 6/hr (in bed)
    - Consider oxygen, ABG, and BIDAP. Transfer to higher acuity care.
  - Verify CO2 > 60 with ABG. Check for apnea > 6/hr (in bed)
  - Evaluate ON-LIC and current pain medication dose
  - If IPI > 8, report non-compliance to physician.
References: