

Overuse of Continuous Pulse Oximetry in the Hospital

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Story from the Front Lines

A man in his 70s with a history of hypertension and coronary artery disease presented to the emergency department with cough, generalized weakness, and decreased appetite. His vital signs were normal other than hypoxia to 84% on room air, and he was placed on 3L nasal cannula. During his initial work up, he tested positive for influenza A, and was found to have multiple infiltrates on chest x-ray, concerning for a community-acquired pneumonia. He was started on antibiotics and Tamiflu, and admitted to the medicine floor with continuous pulse oximetry (CPOX) monitoring. His oxygen levels remained greater than 90% throughout his stay, however several times nursing staff had to respond urgently to his room when he accidentally removed his pulse oximetry finger monitor. He was weaned to 2L by his second day of hospitalization, and discharged home with supplemental oxygen and directions to follow up with his primary care provider.

Teachable Moment

Pulse oximetry is typically measured intermittently, usually every 4 hours on medical-surgical inpatients, as a part of regular vital sign checks. These periodic vital sign checks (including temperature, heart rate, blood pressure, respiratory rate, and pulse oximetry) can help follow trends in physiologic status, and identify patients at risk for clinical decline. As an alternative to periodic vital sign checks, patients can be placed on a continuous device for real-time monitoring of their heart rhythm and peripheral oxygen levels. While there are clear guidelines with regards to indications for continuous telemetry monitoring, there are no guidelines and little literature available that discusses appropriate indications for use of CPOX, and multiple potential harms from over-utilization.

Regarding indications for CPOX, there is some evidence for use in post-operative patients. A 2017 meta-analysis of 9 studies examining adult post-surgical patients prescribed opiates found that patients that were continuously monitored (versus routine nursing spot-checks) had a significant improvement in detection of oxygen desaturation with a trend toward fewer ICU transfers (1). There are a number of studies that show a benefit (decreased hospital length-of-stay, intensive care unit (ICU) days, code blue events, and cost) in patients on a continuous heart rate and respiratory rate monitor, but these studies did not include CPOX monitoring alone (2,3). There were no studies identified that compared use of CPOX versus regular vital sign checks in non-ICU patients with community acquired pneumonia or influenza, as was the case in our patient.

There are several potential harms associated with use of continuous monitoring devices. First, overuse use can contribute to alarm fatigue. A CPOX machine may alarm at times that are not truly urgent; for example, when a pulse oximetry finger reader is not well-connected to a patient's finger and there is poor plethysmography, the monitor may falsely report a low reading. The more these machines signal or alarm at inaccurate times, the more staff become desensitized to alerts, which can lead staff members to potentially ignore or delay responding to true alarms (4). There is a sense of "security" when placing a patient on continuous monitoring, which may, in fact, be false.

Unnecessary continuous pulse oximetry can be costly and harmful to the patient. According to a 2013 study, cardiac telemetry costs an average of \$82 per patient per day, and utilizes 90 extra minutes of daily nursing time (5). While this study did not look at CPOX specifically, the suspected time and financial requirements are likely similar. CPOX can also be emotionally distressing to patients, who do not understand what the bedside monitor alarms mean. The numerous wires associated with a CPOX monitor may hinder a patient's ability to complete their activities of daily living, causing increased bedbound status and hypothetically increasing delirium and hospital length of stay.

The Society of Hospital Medicine recommends against use of continuous, non-protocol driven telemetry in non-ICU patients. However, there are no recommendations specific to use of CPOX without cardiac monitoring, and therefore a need for additional research into appropriate, evidence-based use. For our patient with influenza and community-acquired pneumonia, it is likely that his monitor did value to his care. A more appropriate course of action would have been to monitor oxygen saturation on routine vitals checks, titrating oxygen accordingly. This approach would have most likely resulted in similar length of stay, fewer distractions for nursing staff, and an improved patient experience.

Sources

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