Use of a Wireless Continuous Pulse Oximetry System for Improved Patient Safety

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Summary

Continuous monitoring of patients, especially those on opioids, are initiatives of all those concerned with patient safety, including The Joint Commission. A wireless, continuous pulse oximetry system is used on a busy surgical unit to provide the nurses with direct surveillance of their patients even when they are not in the room. This system alerts the nurses to deteriorations in the patient's condition allowing them to intervene quickly to prevent harm to the patient.

Article

It's 7:10pm, several years ago. I'm listening to a report on my six patients for the nightshift. Report on Mrs. Crosswell in room 987 (the room farthest from the nurses' station) states that she is a 71-year-old patient of Dr. Ceilton who had an L2-5 laminectomy/fusion. The patient returned from the PACU around 4:30pm and has been rather drowsy since her arrival on the unit. She frequently takes

off her nasal cannula O2 and pulse ox spot checks have been around 90 percent. She is on hydromorphone patient controlled analgesia (PCA) with settings of 0.2mg every six minutes with no lockout for her patient controlled dose. She reported muscle spasms when she was last rounded on, so Flexeril 10mg was given at 6:30pm. Neurovascular status is fine with good movement and sensation throughout lower extremities.

7:30 p.m. Report is finished and I'm starting down the hall to check on Mrs. Crosswell. I'm stopped by the nurses' aide who tells me that my patient in 977 has called out twice for pain medication. I stop at my computer, review his pain meds, retrieve them from the med room, and medicate the patient. Once he's medicated, he states he needs to use the bathroom, so I assist him to the bathroom.

7:45 p.m. I'm heading back down the hall to check on Mrs. Crosswell when I hear a commotion in room 983. Fearing that the patient might have fallen, I go into that room to find that luckily, she only knocked some items off her bedside stand. I clean up the area and make sure she has what she needs, then head to the kitchen to obtain more ice water for her since she had knocked hers over.

7:55 p.m. I'm heading back down the hall to check on Mrs. Crosswell. The patient's family in 975 stops me as the IV pump is beeping in that room. I duck in to fix the pump.

8:00 p.m. I'm heading back down the hall to check on Mrs. Crosswell. On entering her room, I hear slow, sonorous breathing. The patient will not arouse for me, and a check of her pulse ox reveals that she is at 72 percent. I don't know how long she's been that low. A Condition C (rapid response team) is called, and the team arrives to assist with Mrs. Crosswell. Luckily, she is revived and is able to remain on the unit.

Fast forward to today. Same scenario, however we now have the Masimo Patient Safety Net (PSN) (Masimo, Irvine, CA) continuous pulse oximetry. At 7:35pm, while I'm in the med room, my PSN pager goes off, alerting me that Mrs. Crosswell's SPO2 has dropped to 80 percent. I immediately go to her room, awaken her, and increase her O2. Her oxygenation improves to 92 percent. I leave her room to administer the pain meds knowing that if she desaturates again, I will be paged. Since I was alerted quickly when she started to desaturate, I was able to intervene and eliminate the need to call a Condition.

The Masimo Patient Safety Net is a dedicated, wireless paging system that communicates patient alarm conditions to the nurse. The system incorporates an alarm escalation process. Initially, there is a 15 second delay at the bedside, which provides the patient time to correct the alarm state on their own. After those initial 15 seconds, an audible bedside alarm sounds. This may be enough to arouse the patient. If this alarm state persists for 15 seconds, the bedside nurse is paged. If the bedside

nurse is unable to respond within 60 seconds, both the bedside and the charge nurse will receive a page. If there is no response within three minutes, both pagers again receive an alert. This allows the nurse to intervene in a short amount of time before the patient becomes hypoxic.

On our busy 25-bed orthopaedic unit at UPMC Presbyterian, the PSN is used on all patients for the first 24 hours postoperatively, any patient on a PCA pump, patients with obstructive sleep apnea (OSA), or suspected OSA, or any patient as deemed necessary by nursing judgement.

During the first year of use, improvements to patient safety were realized as a result of using the PSN. First, 50 percent fewer patients went to monitored telemetry beds directly from the PACU than previously. This was significant as this assured that the orthopaedic patients came to the orthopaedic floor instead of a medical telemetry unit. It was also noted that 38.4 percent fewer patients were transferred to telemetry beds later in their hospital stay since we were now able to monitor their continuous pulse ox as well as pulse rate. These patients generally would have been transferred to a step-down unit for closer monitoring.

During the early use of the PSN, a change in the number of Condition C's (rapid response team) called was not different. However, a recent review of the Condition C's called on our unit compared to both a similar orthopaedic

unit in a sister hospital as well as on another busy surgical unit at UPMC Presbyterian (abdominal surgery) revealed that our use of Condition C calls is 50 percent less than the other two units. The cost savings is being analyzed, but is anticipated to be significant. It is felt that because the PSN is being used, the nurse is notified quickly of patient deterioration and is able to intervene before the patient requires the rapid response team.

In addition, anecdotally, patients have been diagnosed with OSA and been referred for further testing and treatment as an outpatient, and numerous patients have been diagnosed with pulmonary emboli, pneumonia, or a mucus plug. These conditions were all found as the patient's SpO2 was not returning to baseline in previously healthy patients.

Perhaps the most important factor is the fact that the nurses now feel that they have direct patient surveillance even when they are not able to be in the patient's room. This is like the case of Mrs. Crosswell at the beginning of the article. I knew I needed to check on her, but interruptions prevented me from getting there in a timely fashion. Having the PSN allowed me to know exactly when she was deteriorating so she could be "rescued" before any harm came to her. We continue to use the PSN today, and continue to have "saves" from the rapid notification.

Works Cited

Carlson, J. "Continuous Pulse Oximetry Monitoring with Clinician Notification is Associated with Lower Patient Mortality in Post-Surgical/Medical Patients." *Respiratory Care* 58, No. 10 (2013): 1784.

McGrath, Susan, Andreas Taenzer, Nancy Karon, and George Blike. "Surveillance Monitoring Management for General Care Units: Strategy, Design, and Implementation." *The Joint Commission Journal on Quality and Patient Safety* 42, No. 7 (2016):293-302.

Miller, Phyllis. "A Centralized Monitoring Approach to Pulse Oximetry for Patients on Opioids." *Biomedical Instrumentation & Technology* Sept/Oct (2017):408-13.

Taenzer, Andreas, and George Blike. "Postoperative Monitoring – The Dartmouth Experience." *APSF Newsletter* 27 (2012):1,3-4,21.

Taenzer, Andreas, Joshua Pyke, Susan McGrath, and George Blike. "Impact of Pulse Oximetry Surveillance on Rescue Events and Intensive Care Unit Transfers." *Anesthesiology* 112, No. 2 (2010):282-87.

Author Bio

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