A postoperative patient outcome dashboard for individualized and team performance feedback

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Background: The perioperative period is a data-rich environment, with the potential for improving personal and population-level postoperative outcomes through digital health innovations. Yet much of the data collected remains inaccessible to clinicians; anesthesiologists often lack the information needed to assess their performance or know their patients' outcomes beyond discharge from the operating room. Professional anesthetic practice and outcomes can be improved with data-driven performance feedback [1,2]; e.g., individualized feedback improves anesthesiologists' temperature monitoring compliance during spine surgery [3]. Feedback is most effective when it is individualized rather than unit-wide, locally relevant, and from a credible source [4]. A recently established BC Children's Hospital Post-Operative Follow Up (POFU) registry presents an opportunity to develop a dashboard for anesthesiologists to reflect on their patients' postoperative outcomes and hypothesize that this feedback will motivate potential personal and population-level improvements in anesthetic care.

Methods: This quality improvement (QI) project was exempt from research ethics approval. The POFU registry captures outcomes from all outpatient procedures at our tertiary pediatric center and obtains age, sex, and scheduled procedure, from the operating room scheduling system. Nurses record rescue opioids and antiemetic medications given in the Post Anesthesia Care Unit (PACU). Within 24 hours of discharge, the PACU nurses telephone the parent for a follow-up report on post-discharge nausea, vomiting, pain, bleeding, return to normal behavior, eating and drinking, urination, and seeking urgent care. Exploratory data analysis removed data artifacts and estimated data distribution. An interactive dashboard was created using Microsoft's Power BI, co-developed with feedback from five anesthesiologists over four rounds of iteration. De-identified patient outcomes are visualized at anesthesiologist and department levels.

Results: The dashboard prototype (Figure 1) contains three pages: 1) anesthesiologist's PACU pain and nausea summary; 2) 24-hour postoperative outcomes summary; and 3) practice profile. Anesthesiologists highlighted the importance of allowing an individual provider to compare performance with their peers anonymously, which required additional de-identification and security. We added the ability to filter and drill down into results based on the patient demographic and procedure type, as anesthesiologists valued the ability to interpret and compare postoperative outcomes using known risk factors. Follow-up phone call data from 5,976 cases between Sep/2020 and Sep/2021, and PACU data from 2,610 cases between Apr/2021 and Sep/2021, were captured for pilot analysis; 3,891 (65%) follow-up calls were completed successfully. Cases with missing data were excluded from the analysis of that outcome, but not from other analyses. Prevalence of undesirable postoperative outcomes was generally low: pain or nausea in PACU requiring opioid (7.6%) or anti-emetic (1.3%) rescue medications, and moderate to severe 24-hour postoperative nausea (0.9%), vomiting (1.1%), pain (4.0%), or bleeding (1.0%).

Conclusion: Preliminary results established design requirements for the outcome dashboard, which is being deployed by the anesthesia department, allowing additional usability testing and feedback into the effectiveness of the visualization approach. Long-term clinical impact on group performance and outcome variability will be evaluated in 6 months.
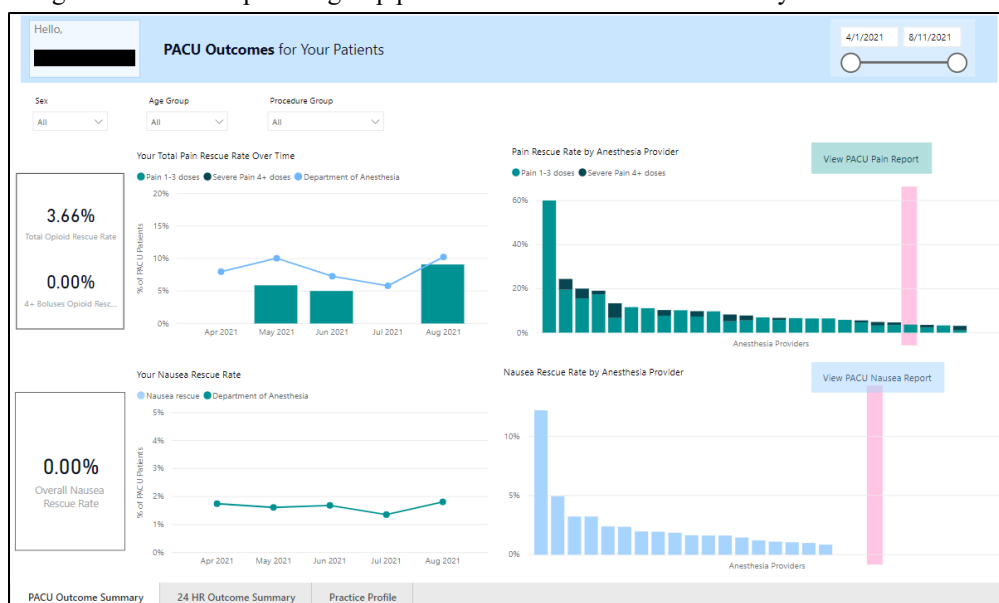
References: [1] Br J Anaesth. 2012 Jul;109(1):80–91. [2] Heal Serv Deliv Res. 2015 Jul;3(32):1–248. [3] Can J Anaesth. 2017 Mar 26;64(3):245–51. [4] J Health Serv Res Policy. 2015 Jan;20(1 Suppl):26–34.

Figure 1: *Example of the dashboard's PACU pain and nausea rescue summary page. The page displays (from left to right) the individual's overall pain and nausea rescue rate, monthly average of individual vs. department rescue rates, and the individual's ranking among their peers. The page can be filtered by demographics and surgical procedure group. The page provides navigational buttons to view detailed reports of PACU pain rescue and PACU nausea rescue.*