Development of an Automated System for Tracking Bundle Compliance and Patient Outcomes for an Anesthesia Perioperative Consult Service

Authors: Jonathan P. Wanderer, MD, MPhil1,2; Hongjuan Blazer, PhD1; Frank Aline1; Karen McCarthy1; Adam B. King, MD1; Jesse M. Ehrenfeld, MD, MPH1,2,3; Matthew D. McEvoy, MD1

Vanderbilt University, Departments of Anesthesiology1, Biomedical Informatics2 and Surgery3

Background: A key aspect of improving patient care through the Perioperative Surgical Home (PSH) model is having the ability to track compliance with care bundles and determine impact on patient outcomes over time. These data are an essential input to Plan-Do-Study-Act cycles. To have a sustainable implementation plan, it is important to have these data generated in a manner that requires minimal effort, preferably one that is automated. We describe here our experience creating a PSH through our Anesthesia Perioperative Consult Service (APCS), focused on the supporting technology we developed.

Methods: We identified 6 surgical services lines for inclusion in our APCS, and defined the participating surgeons and pertinent surgical procedures. An automated system was established that scanned the surgical schedule for qualifying cases, determined the current APCS staff from our staff scheduling system, and emailed a summarized case list to the APCS team a day in advance (Figure 1). Separately, a Tableau dashboard was created which tracked bundle compliance and patient outcomes (Figure 2). Bundle compliance included utilization of multimodal analgesia, utilization of post-operative nausea and vomiting prophylaxis and perioperative narcotics administered. Outcomes included length of stay, case mix index, postoperative intensive care unit admission, extubation in the OR and hospital readmission.

Results: After 50 weeks of operation, the automated email system identified 1,081 surgical cases. By notifying both the APCS and holding room staff in advance, the system has facilitated timely administration of preoperative multimodal analgesia, including regional blocks. Ten minor revisions of the automated system have been implemented as the APCS inclusion criteria have been iteratively refined. User feedback has been largely positive. Requested enhancements include adding available coagulation testing and identifying anticoagulants in preoperative medication lists. Based on pre- and post-implementation median length of stay differences and case volume, the projected savings in bed-days is estimated at 391 per year.

Discussion: Implementation of a PSH requires a structured approach to identifying specific surgical populations, targeting those populations with standardized care bundles, monitoring compliance with bundles and tracking outcomes to demonstrate value. We have demonstrated that electronic tools can be developed that facilitate these activities and function in an automated fashion. These types of technologies are essential for supporting the sustained outcome improvements possible with the PSH.
Figure 1: Example of an automatically generated email identifying cases for the Anesthesia Perioperative Consult Service for the next day.

Figure 2: Example of the Anesthesia Perioperative Consult Service Tableau dashboard, demonstrating tracking of length of stay for the colorectal surgery service line.