An Innovative AI Platform to Reign in Growing Surgical Instrumentation Costs: A Case Study

Victoria Jenkins, MSM, BSN, RN, CNOR, CSPD*; Deb Sparks, MSM, BSN, RN, CNOR*; Suneel Shorey, MBA, BPharm (Hons.)**;
Jason Rawlings, CSPD**; Krishna Yalamanchili, MBA**; Marguerite Johnson, MBA, BSN, RN, FACHE**

* MetroHealth Medical Center, 2500 Metrohealth Dr., Cleveland, OH; 44109   ** Pegasys Med/Fortive Corporation, 6920 Seaway Blvd., Everett, WA; 89203

Background

The problem of unnecessary and excessive instrumentation in Hospital and ASC surgical trays[1], well documented in clinical literature, is immense and aggressively growing. Historically, hospitals have attempted to solve this problem through anecdotal surveys of what staff believes is used in each tray, but this effort is rarely successful due to the lack of real data.

Left unsolved; an average US Hospital annually will throw away….

OR	SPD
2,600 hours[2] WASTED TIME in the OR	**$925,880**[4] THROWN AWAY in a 6 OR US hospital
148 hours[3] LOST in avoidable case delays	**9,880 hours**[5] **4.75 FTE** UNECCESSARY SPD Labor

And this problem will keep on growing at 9.9%[6] annually.

The impact of this problem is being exacerbated in the current post-COVID climate of staffing challenges, bandwidth constraints, and the financial implication of reduced elective procedures. Many hospitals are being taken to a breaking point.

There has never been an accurate data-driven approach of addressing this problem until now…

Objectives

As part of a larger effort to identify cost-saving opportunities in the Surgical Department, MetroHealth (MH) leaders identified surgical tray optimization as an area of focus. With no definitive data to help inform the opportunity, MH partnered with Pegasys Medical to create a roadmap to solve this issue.

Methods

Three Laminectomy Trays (String, Lumbar and Cervical) were chosen for an initial evaluation.

The ORion image capture platform was provided by Pegasys and placed in every Operating Room using the three trays.

Data Collection

A Scrub Tech or Circulating Nurse captured an image of used instruments at the end of each procedure as part of their natural workflow.

AI Data Cleansing

Captured images were uploaded to the Pegasys cloud-based image processing engine where a proprietary Artificial Intelligence technology was used to transform the collected images into actual usage data.

Optimization and Data Analytics
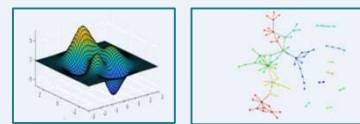
MetroHealth worked with the Pegasys team to identify its most important factors for tray optimization. Pegasys then customized the deep learning and computationally intensive algorithms to produce an ideal output.

Results (SPD)

Based on the captured usage data across the three trays, the ORion platform identified $26,188 and 200 SPD hours that could be saved.
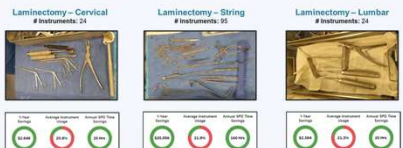
The leaders at MetroHealth further identified tray inventory reduction and physical storage space maximization in the SPD as a key priority area.

Multi-Tray Service Line Optimization

By customizing the output of ORion's deep learning algorithms, Pegasys identified further opportunities for tray optimization including the ability to reconfigure the three trays into two and reduce inventory by 33%. Further to this multi-tray reconfiguration, an additional the total projected savings increased to **$31,810 and 208 SPD hours** across 3 trays.

Across MH's 350 tray configurations the total savings opportunity is **$3,711,167 and 24,267 hours of SPD labor (11.5 FTE).**

Results (OR)

In addition to the considerable SPD savings outlined by implementing ORion, MetroHealth was able to generate significant savings in the Operating Room.

Optimizing surgical trays can save an OR approximately 21 minutes and 40 seconds in every procedure due to an overall reduction in instrumentation having a direct impact on room setup & breakdown time[2].

Using these assumptions, MetroHealth projects to save **327 Hours** per year in the OR, which is equivalent to **130 additional procedures** annually[7].

MetroHealth also measured the impact of adding ORion's data collection to the Operating Room's workflow at the end of procedure. EMR data showed no increase on OR turnover times as a result of ORion data capture. Observations of the OR workflow showed data capture was able to be completed in less than 30-seconds and fit into the natural procedure-end workflow for a Circulating Nurse or Scrub Tech.

Scrub Tech and Nurse Feedback[8]
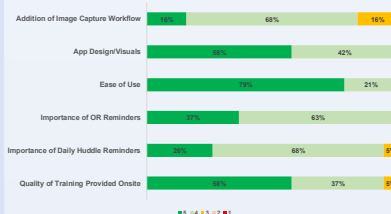
Conclusions

Hospitals and ASCs are under tremendous operational strain related to ever-increasing labor costs; forcing healthcare leaders to implement innovative cost containment strategies which do not impact existing clinical & operational workflows.

Pegasys' ORion Surgical Tray Optimization platform represents a novel, innovative and evidence-based AI approach that can generate **significant cost and labor savings** with **little or no disruption** to existing workflows.

This novel platform offers additional exciting opportunities to leverage this collected data set and drive tray standardization within service lines and ultimately across facilities.

References

[1] Helmkamp, J. K., Le, E., Hill, I., Hein, R., Mithani, S., Codd, P., & Richard, M. (2021). Addressing Surgical Instrument Oversupply: A Focused Literature Review and Case-Study in Orthopedic Hand Surgery. HAND, 15589474211001172.
[2] Virginia Mason Institute (2020, October 12). Case study: Surgical setup reduction improves patient outcomes. Virginia Mason Institute™. 3% annual inflation rate used.
[3] Cox Bauer, Callie & Greer, Danielle & Vander Wyst, Kiley & Kamelle, Scott. (2016). First-Case Operating Room Delays: Patterns Across Urban Hospitals of a Single Health Care System. Journal of Patient-Centered Research and Reviews. 3. 125-135. 10.17294/2330-0698.1265
[4] University of Chicago, Stockert, E. W., & Langerman, A. (2014, June). Assessing the Magnitude and Costs of Intraoperative Inefficiencies Attributable to Surgical Instrument Trays (No. 1072–7515/14).
[5] Time-stamp study of SPD Labor time spent processing each instrument in decontamination and assembly. Observed 20 seconds in Decontamination and 10 seconds in Assembly. Conservatively estimated 20 seconds total.
[6] Censis Instrument Tracking data for 100 sites over a 10-year period
[7] Average procedure time = 2hrs, 30 mins
[8] Internal data from scrub tech & circulating nurse feedback survey

Contact Information

Deb Sparks, MetroHealth; dsparks@metrohealth.org
Victoria Jenkins, MetroHealth; vjenkins@metrohealth.org
Suneel Shorey, Pegasys; suneel.shorey@pegasysmed.com