How COVID-19 Accelerates the Case for Digital Surgery Solutions

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Problem

The COVID-19 pandemic has significantly impacted surgical care in three major ways:

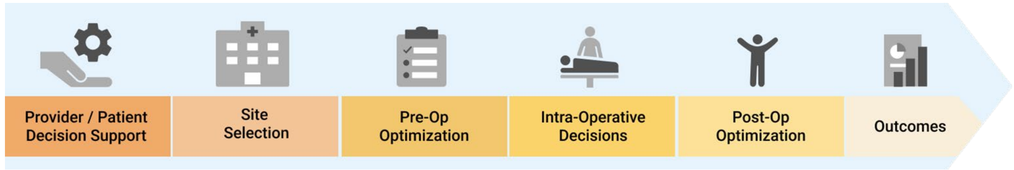
1) There are backlogs of surgical cases due to canceled surgeries.
2) Hospital resources are constrained as COVID-19 patients continue to fill beds amid shortages of healthcare staff, who have left the field at an unprecedented rate.
3) Due to anxieties related to COVID exposure, patients desire facilities for care such as ambulatory surgical centers where some of those risks can be mitigated with shorter stays.

Digital Surgery Solution

As hospitals continue to emerge from the pandemic and strategically allocate resources, personalized care has come to the forefront. Applying machine learning models to patient data can guide surgical. decision making and allocation of resources.[1] This project examined the use of the KelaHealth platform, which applies a dynamic cycle of patient-specific predictions, stratified interventions, and outcomes tracking to help address the immediate needs brought to the forefront by COVID but shifts to a longer-term paradigm of data-driven personalized and improved surgical care.

Results

The KelaHealth platform recommends actionable interventions within existing surgical workflows. It alerts surgeons to a patient's risk for complications and identifies ways to reduce that risk, using tailored interventions that optimize each patient for surgery.



In a recent 12-month prospective study conducted at Duke University since the inception of the pandemic, we found 21% reductions in renal complications and a 24% reduction in readmissions in colorectal patients (*manuscript in review*). Conservatively, this showed a $1M cost savings per 1,000 patients served. Implementation of this risk-based approach also showed a 41% reduction in surgical site infections (SSI) in a vascular procedure.[2]

COLORECTAL	21% & 24% Reduction in AKI & Readmission	1M Cost Savings
VASCULAR	41% Reduction in SSI	26% Cost Savings
CARDIAC	3M Saved per year in a single surgery	50% Cost Savings

Conclusions

Post-pandemic, there is a heightened need to prioritize and minimize risk for surgical patients. Incorporating a machine learning based platform into surgical workflows to inform personalized care allows for data-driven allocation of resources and reduction of surgical complications.

References

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2. Chang B, Sun Z, Peiris P, Huang ES, Benrashid E, Dillavou ED. Deep Learning-Based Risk Model for Best Management of Closed Groin Incisions After Vascular Surgery. J Surg Res. 2020 Oct;254:408-416. doi: 10.1016/j.jss.2020.02.012. Epub 2020 Mar 17. PMID: 32197791.