Transforming Gastrointestinal Surgery Outcomes with Stream™ Care: AI-Driven Early Prediction System for Postoperative Complications

Nour Helwa, Olivia Rennie, Manaswi Sharma, Pablo E. Serrano

Introduction and Current Gaps

Gastrointestinal (GI) surgeries are among the most frequently performed procedures worldwide, yet they carry a substantial risk of postoperative complications, including anastomotic leaks, sepsis, and hemorrhage.

These adverse events not only contribute significantly to patient morbidity and mortality but also impose considerable economic burdens on healthcare systems. For instance, anastomotic leaks alone are associated with mortality rates as high as 20.5% and occur in up to 7.5% of patients, while sepsis and hemorrhage can further increase postoperative fatalities by an additional 16% and 4%, respectively.

Such complications often extend hospital stays, drive up readmission rates, and exacerbate the financial strain on healthcare systems, underscoring the critical need for more effective management strategies.

Despite the high incidence and severity of postoperative complications, early prediction remains a significant challenge. Traditional monitoring approaches often lack precision and immediacy to identify at-risk patients, while also tending to focus on individual complications. Addressing this gap requires an innovative approach capable of simultaneously monitoring multiple postoperative risks with high accuracy and actionable insights.

The Solution

To address these challenges, FluidAI's Stream™ Care introduces a groundbreaking solution through real-time, AI-driven predictive technology.

Stream™ Care combines continuous physiological monitoring from proprietary hardware with electronic health record (EHR) data to deliver early and accurate risk predictions for a range of postoperative complications.

Unlike traditional single-complication models, Stream™ Care enables comprehensive, multi-complication monitoring, representing a significant advancement in postoperative care technology.

Stream™ Care operates by seamlessly integrating with existing EHR systems, extracting relevant perioperative data from structured and unstructured sources.

This data is combined with real-time physiological inputs (e.g. continuous analysis of postoperative abdominal drainage fluid) from FluidAI's proprietary monitoring hardware, with features from both sources used to develop machine learning risk prediction models.

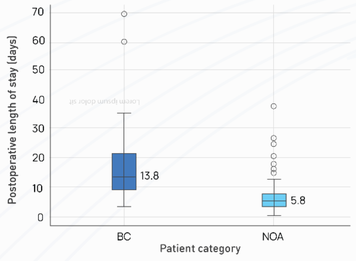
The results are displayed on intuitive dashboards, providing clinicians with clear data visualization and actionable insights - allowing for proactive, data-driven decision-making.

Potential Impact

Stream™ Care has the potential to significantly improve both clinical and economic outcomes in postoperative care. By enabling earlier prediction of complications such as anastomotic leaks, sepsis, and hemorrhage, the platform supports timely interventions that can reduce the failure-to-rescue (FTR) rate and improve overall patient survival.

For example, early identification of anastomotic leaks can decrease mortality and prevent prolonged hospital stays, while proactive sepsis monitoring can mitigate the need for intensive care admissions.

Economically, Stream™ Care offers considerable cost-saving opportunities by reducing hospital length-of-stay (LOS), lowering readmission rates, and optimizing resource utilization.



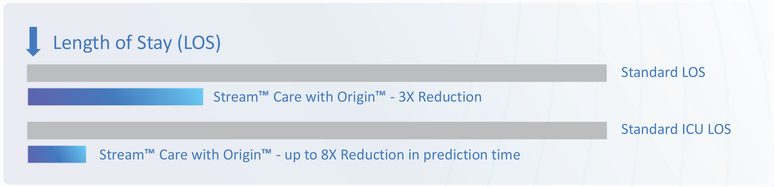
Results from Traditional Feasibility Study

Postoperative length-of-stay for patients with ('BC') and without ('NOA') a clinically significant leak was 13.9 days versus 5.8 days, respectively.

These additional days in hospital represents a significant cost burden, contributing to the additional cost of leak patient, as shown in the table below.

	Non-leak	Leak	P-value
Total Cost of Allied Health	374 [256,522]	**954 [660,1815]**	<0.001
Total Cost of Diagnostic Services	69 [0,213]	**1367 [637,2563]**	<0.001
Total Cost of Food Services	131 [82,207]	**349 [179,580]**	<0.001
Total Cost of Laboratory	2674 [1473,3492]	**3743 [2667,5092]**	<0.001
Total Cost of Medical Diagnostics	93 [79,206]	**157 [79,423]**	<0.001
Total Cost of Pharmacy	640 [459,1061]	**2599 [1496,3558]**	<0.001
Total Cost of Ward	3463 [2478,5164]	**8647 [6488,15773]**	<0.001
Total Overall Cost	20818 [15865,26276]	**34325 [28064,50035]**	<0.001

Median costs [Q1, Q3] of various health services, for patients with and without clinically significant leaks



Up to $43,700 decreased cost of care

Up to 50% lower 30-day readmission

Up to 39% mortality reduction

As one of the first technologies to provide real-time, multi-complication risk monitoring in GI surgery, Stream™ Care represents a paradigm shift in postoperative care. By integrating advanced AI-driven predictive algorithms with evidence-based systems, it delivers unparalleled accuracy and adaptability across clinical settings.

With plans to expand its predictive capabilities and refine its algorithms, Stream™ Care is poised to set a new standard in data-driven surgical care, paving the way for improved outcomes and more sustainable healthcare systems.