

Impact of Adherence to a Province-Wide ERAS Program on Colorectal Surgery Outcomes

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Background:

- Enhanced Recovery After Surgery (ERAS) pathways are **evidence-based, multimodal perioperative care protocols** designed to attenuate surgical stress, preserve physiologic function, and accelerate recovery.
- However:
 - Clinical benefit is **strongly adherence-dependent**.
 - Implementation across large systems is complex.
 - Variation in adherence persists across patient populations and hospital settings.
 - It remains unclear which **specific ERAS elements** most strongly drive certain outcomes.

Objective:

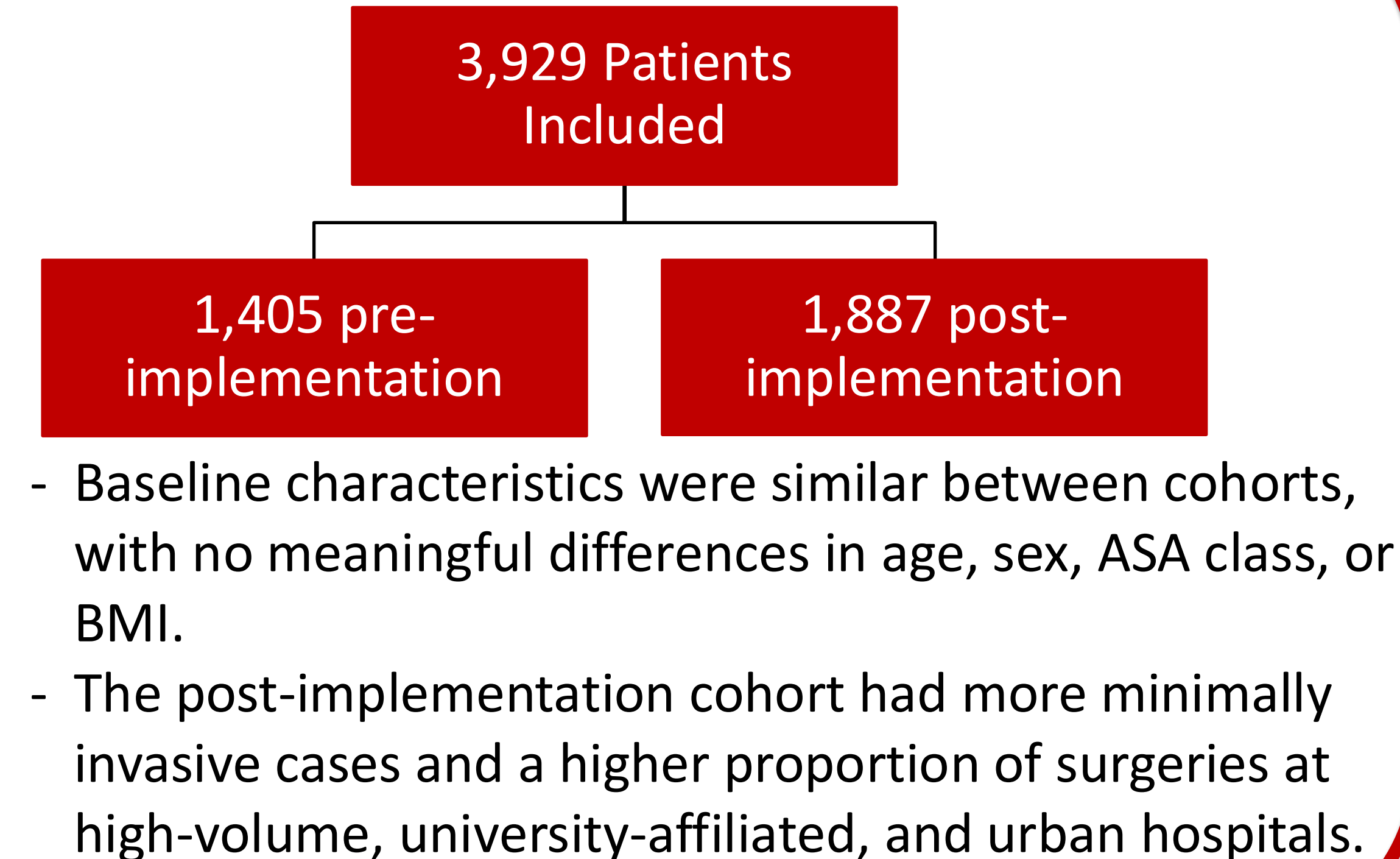
To evaluate the impact of the Quebec ERAS colorectal program by comparing pre- and post-implementation outcomes, examining the effect of overall and element-specific adherence on 30-day outcomes, and identifying patient-, operative-, and hospital-level factors associated with adherence to inform future quality improvement.

Methods:

- **Design:** Province-wide ERAS implementation across 65 hospitals. Adults undergoing colectomy were included in a pre-implementation cohort (Sept–Nov 2022, retrospective) and post-implementation cohort (Aug 2024–Jan 2025, prospective).
- **Exposure:** Adherence to 18 ERAS elements, calculated as the proportion achieved per patient.
- **Outcomes:** 30-day total LOS (index + readmissions), complications, ED visits, readmissions, reoperations, mortality.
- **Analysis:** Multilevel regression assessing implementation and adherence, adjusting for patient, operative, and hospital factors with clustering by hospital and time.

Results:

Patient Demographics:



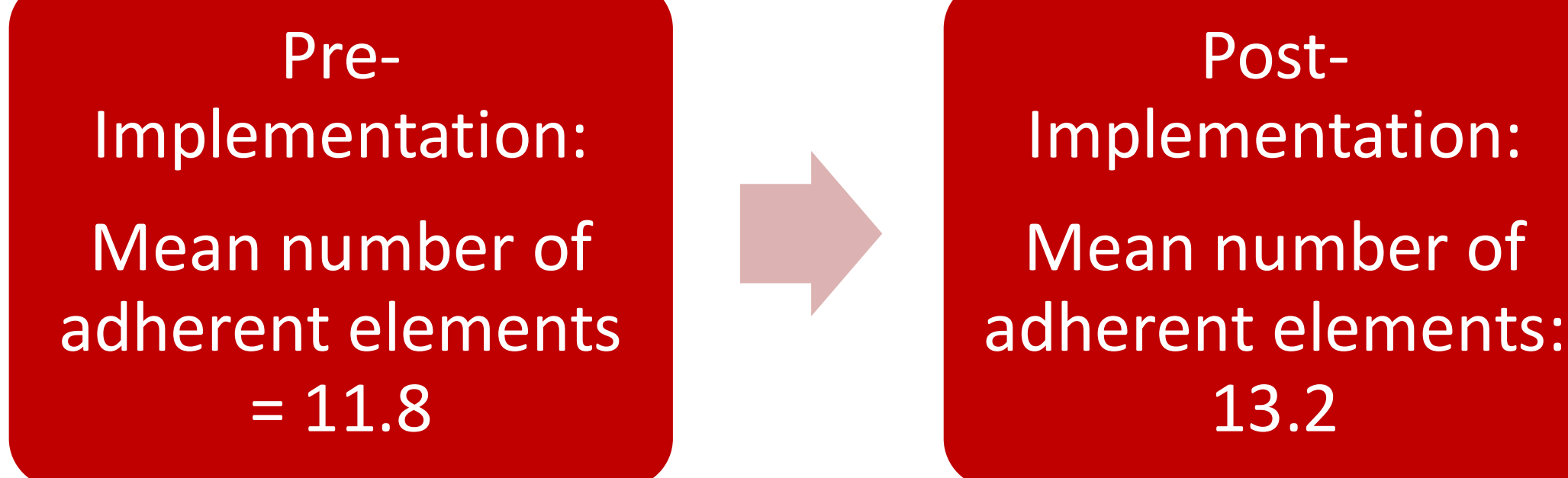
Outcomes:

	Pre-Implementation Cohort	Post-Implementation Cohort
Median Length-of-Stay	4 Days	3 Days
Discharge ≤3 days	44.6%	50.4%
30-Day Complications	-	↓ Post-operative nausea and vomiting

- ERAS program implementation itself was not independently associated with reductions in mean LOS or 30-day complications. Instead, overall adherence was the primary driver of improved outcomes.

Adherence to ERAS Pathways:

- Mean overall adherence across both cohorts= 70% (± 13.8) corresponding to an average of 12.6 elements/ 18 ERAS pathways



Corresponding to an increase of +1.4 elements, which represents a 7.6% increase in adherence

- The following table shows factors which were associated with lower and higher adherence to ERAS pathways in our study

Lower Adherence	Higher Adherence
Age >75	Urban hospitals
Open surgery	University-affiliated hospitals
Diverticular disease	High-volume centers
Stoma closure	
Rural hospitals	
Non-university hospitals	
Low-volume centers	

KEY MESSAGES

1. In this provincial ERAS implementation, higher adherence to ERAS pathway elements was the primary driver of benefit, with greater adherence associated with shorter length of stay and lower 30-day complication rates.
2. Specific ERAS elements were independently associated with improved outcomes. Multimodal analgesia, early urinary catheter removal, and early mobilization were associated with both reduced length of stay and lower complication rates.

Adherence and Postoperative Outcomes:

Adherence Tertiles and Outcomes
Higher adherence was associated with improved postoperative outcomes.

Adherence Level	Outcome
Low (3-12 elements)	Higher 30-day complications
Mid (13-14 elements)	Shorter LOS vs low
High (15-18 elements)	Shortest LOS

- No significant differences were observed in ED visits or readmissions.
- In multilevel regression analyses, mid- and high-level ERAS adherence and minimally invasive surgery were independently associated with shorter length of stay. Conversely, older age, ASA ≥ 3 , and small bowel resection were associated with longer LOS.
- Analysis of individual ERAS elements showed that antimicrobial prophylaxis, multimodal analgesia, early urinary catheter removal, early oral intake, and early mobilization were independently associated with reduced LOS. Multimodal analgesia, early catheter removal, and early mobilization were also associated with lower 30-day complication rates.