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Introduction

Efficient perioperative patient flow is essential for surgical capacity, cost control, and patient safety. Patient movement across **pre-operative, operating room (OR), post-anesthesia care unit (PACU), and day surgery unit (DSU)** stages requires coordination of patients, staff, information, and resources.

When coordination breaks down, delays, cancellations, and operational inefficiencies occur. These disruptions are often driven by capacity mismatches, communication gaps, fragmented workflows, and staffing misalignment, increasing workload and system-level costs [1].

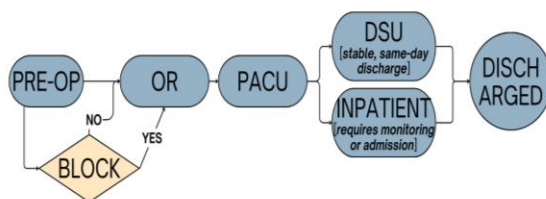


Figure 1: Overview of perioperative patient flow

Objective

This study applies human factors and systems analysis to examine perioperative workflow in a large health system in Ontario, focusing on OR–PACU–DSU transitions to identify bottlenecks and opportunities for improvement.

Methods

Data Collection:

- **Contextual inquiry**
 - Observations and semi-structured interviews conducted across all three sites
- **Operational data extraction**
 - Electronic health record data (April–July 2025)
 - Included: surgical service areas, case types, workflow timestamps, and delay reasons

Data Analysis:

- **Cross-functional process mapping of perioperative workflows**
- **PETT scan (People, Environment, Tools, Tasks)**
- **Fishbone diagram to identify contributing factors to delays**

Results

System Factors	Barriers	Facilitators
People	<ul style="list-style-type: none"> • Late arrivals (surgeons, anesthesia) • Staffing shortages (nurses, clerks) • Communication gaps • Limited housekeeping capacity 	<ul style="list-style-type: none"> • Flow team coordination • Staff adaptability • Experienced housekeeping
Environment	<ul style="list-style-type: none"> • Bed shortages • Seasonal capacity variation • Overnight cleaning gaps 	<ul style="list-style-type: none"> • OR layout efficiency • Morning huddles • Visual management boards
Tools	<ul style="list-style-type: none"> • SmartTrack limitations (no alerts) • Manual workflows (paper/whiteboards) • Equipment shortages/failures • Scheduling variability 	<ul style="list-style-type: none"> • SmartTrack visibility • Standardized checklists
Tasks	<ul style="list-style-type: none"> • First-case delays • Long turnovers • Sequential workflows • Delayed discharge decisions • Shift-change disruptions 	<ul style="list-style-type: none"> • Parallel tasking • Flow coordination routines

Table 1. PETT scan summarizing barriers and facilitators

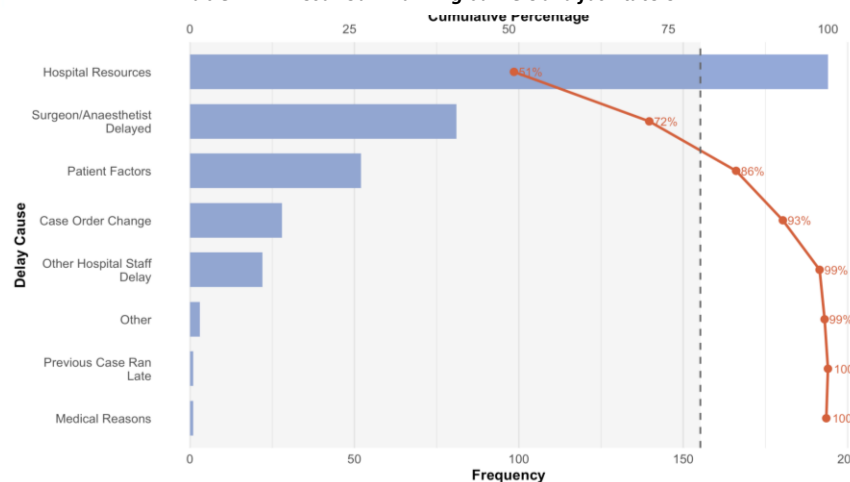


Figure 2. Pareto analysis of primary contributors to surgical start delays

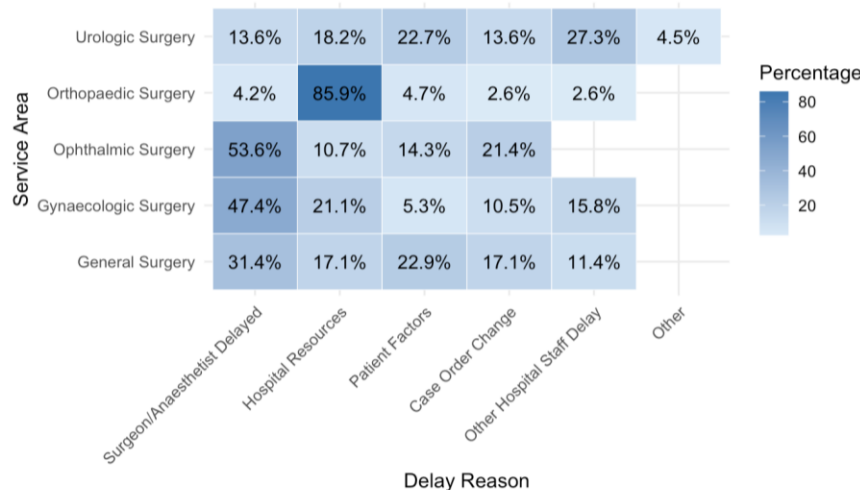


Figure 3. Distribution of delay reasons across top five surgical services

Key Findings

- **21 barriers and 10 facilitators identified across perioperative workflow**
- **Delays are driven by interacting system-level factors**, including staffing constraints, coordination gaps, and workflow variability across stages
- **Breakdowns occur across multiple workflow stages**, rather than at a single point in the system
- **Perceptions of delay vary across professional roles**: Staff often attribute delays to factors outside their immediate control, highlighting the need for system-level coordination.

Preliminary recommendations

- **Increase time transparency** across perioperative workflow: Track and share key timing metrics (*first-case start, anesthesia preparation, turnover time*) to improve coordination[3].
- **Align team expectations for start-of-day readiness**: Clarify responsibilities and timing across anesthesia, surgery, and nursing teams.
- **Reduce OR idle time by coordinating upstream processes**: Ensure patient preparation, anesthesia readiness, and equipment setup.
- **Enable parallel tasking during case preparation**: Prepare patients, instruments, and rooms simultaneously to reduce turnover time and improve flow.

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References

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