ROBOTIC ASSISTED SURGERY IMPLEMETATION AT LAKESHORE HOSPITAL
Evaluating the Clinical, Economic and Patient-Reported Benefits of Robotic Assisted Surgery for Cancer Cases in a Community Hospital Setting

1. Investigative Team

Co-Principal Investigators (PI): Dr. Yasmin Halwani (Colorectal Surgery) and Dr Assaad El-Hakim (Urology)

Co-Investigators: Multidisciplinary team including Nursing, Finance, Health Economics, Quality & Patient Safety, and Patient Advisors, McGill University Biostatistics Department

2. Background & Significance

Robotic-assisted surgery has transformed oncologic care in tertiary centres in Canada, but evidence specific to community hospitals remains scarce. Early reports indicate reductions in blood loss, complication rates and length of stay, with comparable oncologic margin control and potential cost savings once learning curves are achieved. Understanding how these advantages translate to a mid-size community setting will inform equitable access to advanced technology across Canada.

3. Preliminary Evidence

- 2025 COMPARE meta-analysis (>1 million cases) showed robotic approaches reduced conversions, transfusions, complications and 30-day mortality versus laparoscopic or open surgery across seven cancer procedures.

- Multi-centre data indicate oncologic and continence outcomes after robotic prostatectomy are comparable between high- and lower-volume hospitals once ~100 cases are accrued.

- Community Medical Center in Missoula, Montana reached 5,000 robotic cases this year, reporting faster recoveries and high patient satisfaction, demonstrating feasibility outside academic centres.

4. Study Objectives

This is a multi-tier study designed to compare robotic surgery at our community hospital with contemporaneous and historic open and laparoscopic cancer surgeries. It will also compare outcomes of robotic surgery with a historic prospectively collected database of approximately 1000 cases of robotic radical prostatectomy and partial nephrectomies by one of the two principal investigators at another tertiary hospital.

Primary Objective

- Compare 30-day composite peri-operative morbidity (Clavien-Dindo), length of stay, and readmission rates

Secondary Objectives

1. Assess cost-effectiveness from hospital and societal perspectives (incremental cost per complication avoided and per QALY gained).
2. Evaluate patient-reported outcomes (PROs) – pain (VAS), quality of life (EQ-5D-5L), functional recovery scales – through 90 days.
3. Characterise institutional learning curve (operating time, console time, conversion rate) across the first 200 robotic cases.
4. Measure staff satisfaction and impact on OR throughput and scheduling.

5. Hypotheses

H1: Robotic surgery will reduce median LOS by ≥1 day and decrease overall complication rate by ≥20 % compared with open and laparoscopic surgery.

H2: Robotic surgery outcomes in a community hospital will be non-inferior (Δ≤5 %) compared to a tertiary hospital.

H3: When capital amortisation is spread over ≥250 cases/year, total cost per episode will be non-inferior (Δ≤5 %) to laparoscopic, and superior to open surgery.

6. Study Design & Methods

- Design: Prospective matched-cohort study with a stepped-wedge roll-out (pre-implementation control period, phased service introduction, full implementation).
- Setting: 250-bed Community Hospital, serving ~400,000 population; newly acquired Robotic Assisted Surgery platform.
- Procedures Included: Colorectal cancer surgery (colectomy and low anterior resection), radical prostatectomy, partial nephrectomy.
- Population: Adults ≥18 y with resectable malignant disease scheduled for curative surgery.
- Sample Size: Based on historical LOS 4.0 ± 1.8 days, detecting 1-day reduction (α 0.05, power 0.80) requires 85 patients/arm; allowing attrition, target n = 200 robotic vs 200 controls over 24 months.
- Matching Variables: Age, ASA class, tumour stage, BMI, surgeon.

7. Intervention & Comparator

- Intervention: Robotic-assisted surgery with standardised ERAS protocols.

- 1st Comparator: Pre-implementation laparoscopic or open approach with equivalent ERAS protocols.

- 2nd comparator: case matched robotic radical prostatectomy and partial nephrectomy performed at another tertiary hospital by Dr El-Hakim

8. Data Collection

Domain	Instruments / Sources	Time Points
Clinical outcomes	EMR, NSQIP definitions	Intra-op, Post-op day 30
Costs	Case-costing system (direct & indirect), patient surveys for out-of-pocket costs	Discharge + 90-days
PROs	EQ-5D-5L, EORTC QLQ-C30, Procedure-specific modules	Baseline, 30-days, 90-days
Learning Curve	OR records (console time, docking, conversions)	Every case
Staff impact	TeamSTEPPS, OR throughput metrics	Quarterly

9. Statistical Analysis

- Descriptive statistics; between-group comparisons via χ^2, t-test/Mann-Whitney; multivariable regression adjusting for confounders.

- Propensity score matching sensitivity analysis.

- Time-series analysis for learning curve (CUSUM).

- Incremental cost-effectiveness ratio (ICER); bootstrap for uncertainty; Cost-Utility using QALYs from EQ-5D.

10. Timeline (Gantt)

Phase	Activities	Months
Start-up	Ethics, training, hire study coordinator	0-3
Baseline Data	Collect conventional cases	0-6
Implementation	Launch robotic programme (surgeon proctoring)	4-6
Recruitment & Data Collection	Ongoing	4-28
Interim Analysis	Safety & learning curve checkpoints	12, 18

Final Data Lock	Clean & verify datasets	18-21
Analysis & Manuscript	Statistical analysis, draft papers	21-23
Dissemination	Conferences, peer-reviewed journals, stakeholder reports	23-24

11. Resources & Budget (CAD)

- Capital: funded via lease x 2 years =
- Operating: Disposable instruments $1850/case x 200 cases =
- Clinical Research Assistant (CRA) 48,000$/year x 2 years =
- **Total incremental research budget**: ≈

12. Ethical & Regulatory Considerations

IRB approval

Informed consent; data privacy under PHIPA/GDPR.

13. Knowledge Translation

- Quarterly briefings to hospital leadership and donors.
- Public webinar series; infographics for patients.

14. Anticipated Impact

The study will supply the first Canadian community-level, multicancer dataset quantifying clinical, economic and experiential benefits of robotic assisted surgery. Positive findings could justify broader provincial reimbursement and help rural/regional hospitals adopt advanced minimally invasive cancer care.

15. References

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