

Improving access to surgical innovation in the community: Implementation of shared access model in Canadian healthcare

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Cite as: *Can Urol Assoc J* 2019;13(9):E300-2. <http://dx.doi.org/10.5489/cuaj.5248>

Published online January 21, 2019

Introduction

When compared to open surgery, evidence supports robotic-assisted radical prostatectomy (RARP) as having shorter hospital stays and reduced overall surgical morbidity, while maintaining oncological and functional outcomes.¹⁻³ However, there are challenges in implementing a robotic surgery program, including considerable startup cost and ongoing funding needs generated by disposable instruments and maintenance costs.

Do the benefits of robotic surgery outweigh these potential concerns? Canadians rightfully expect full access to advanced healthcare technology, but our cost-finite healthcare system demands a deeper understanding of where clinical efficacy and cost considerations may optimally intersect. Recent data from Cancer Care Ontario (CCO) show that from April 2014 to March 2016, 1466 RARP cases were performed in Ontario out of a total of 4751 prostatectomies (30.8%).⁴ Despite higher per-case costs,³ data from the U.K. showed that in high-volume centers, robotic surgery for both renal and prostate cancers is cost-effective after accounting for improved quality of life and patient outcome metrics,⁵ with lower long-term healthcare resource utilization and downstream savings.⁶

Given the financial limitations of the public Canadian healthcare system, new surgical technology is usually introduced in larger academic centers. Innovative approaches that allow wider access to expensive healthcare technology, particularly in community and non-academic centers, must be considered when evaluating common surgical procedures. This article addresses the feasibility of introducing advanced surgical technology at a community-based Canadian hospital, taking a resource-sharing approach

between an academic and community center. We explore whether this shared-access model could serve as a model to help optimally implement robotic surgery on a wider scale in the Canadian healthcare setting.

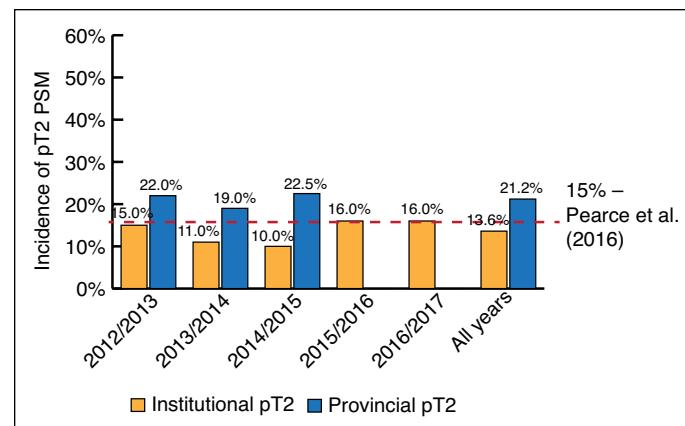
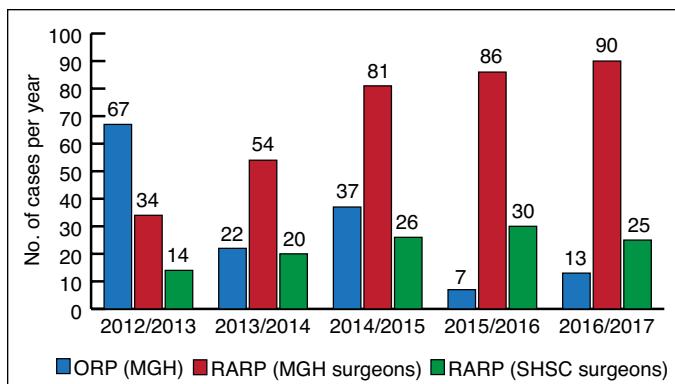
Methods

In 2012, Michael Garron Hospital (MGH), in collaboration with Sunnybrook Health Sciences Center (SHSC), purchased the Da Vinci Si Robotic Surgical System from Intuitive Surgical (Sunnyvale, CA, U.S.). A memorandum of understanding was signed by the two institutions to account for both the maintenance and the case-by-case costs of the platform. A retrospective analysis of the MGH experience with RARP during the fiscal years of 2012/13 to 2016/17 was undertaken. Seven surgeons, four from MGH and three from SHSC, performed exclusively RARP. All surgeons included in the study had no prior robotic surgery experience.

Data was drawn from prospectively collected institutional databases and synoptic chart queries. Financial data was calculated, including a cost-sensitivity analysis, using direct (procedural) and indirect (hospital) costs, prospectively collected through an institutional case-costing database. Institutional outcomes were benchmarked against provincial outcomes, drawn from a CCO report.⁴ Provincial costing data was drawn from a recent Health Quality Ontario (HQO) report examining cost-effectiveness of robotic surgery technology in Ontario.⁷ Blood transfusion data was derived from the Ontario Transfusion Coordinators (ONTraC) database.

Results

In total, 453 RARP and 146 open radical prostatectomy (ORP) procedures were completed between April 2012 and March 2017. Average RARP patient age was 62 years, compared to 64 years for ORP. Annual volumes are shown in Fig.1, showing the proportion of cases performed by SHSC surgeons has risen each year. Significant variation in surgeon volume was seen among the two participating sites. Length of stay (LOS)



was consistent with other institution's experiences, with a mean 1.64 days, compared with 2.71 days for ORP cases. Provincial RARP LOS was similar, ranging from 1–3 days across the nine hospitals included in their analysis. Blood transfusion rates remained stable in our RARP cohort, with a mean of 4.39% over the four-year experience, compared to 9.64% in ORP patients, and 6.32% in all prostatectomy patients around the province. Institutional positive surgical margin (PSM) rates were compared to provincial ones in Fig. 2. PSM rates for pT3 disease was 47% at our center, comparable to findings from other series.⁸ Operative times at our program have trended down over the four years, with a 2015/16 average RARP time of 288 minutes. Postoperative complications were seen in 54 patients (16%), of which 19 (5.6%) were urethrovesical anastomotic leaks. Financial data was calculated on aggregate for the year 2015/16 (Fig. 3). Provincial financial compensation for the 2015/16 year for RARP in Ontario was \$7091, approximately half of the per-case cost for our institution.

Discussion

This model of shared access to the surgical robot allowed surgeons from a community hospital to have access to surgical technology that previously was only available to surgeons in academic centers. For a procedure performed as commonly across Ontario as radical prostatectomy, this is desirable. Outcomes were on par with those at a provincial level, supporting this model's ability to widen access without compromising patient safety.

When reviewing this data, we must consider the recent recommendation from HQO that robotic surgery not be publicly funded.⁷ These recommendations cite a lack of high-quality evidence supporting the benefits of this technology, with increased per-case costs in Ontario, alongside a single randomized control trial comparing robotic and open surgery that showed no difference in oncological and functional

patient outcomes.⁹ However, our data demonstrates that it is possible to provide excellent robotic surgical care in an Ontario community hospital setting, with decreased LOS, blood transfusions, and PSM compared to open surgery at our institution. A key concept highlighted by our data is the potential improvement in outcomes within an institution that comes with the introduction of new technology. As volume and experience continues to grow at our center, we anticipate these metrics will continue to improve.

CCO now funds prostate cancer surgery at a 'blended' rate, by assuming that a percentage of cases can be done for less in an open fashion to allow those 'savings' to pay for the robotic approach. From our experience with this shared-access model, we anticipate further scaling of surgical volume and cost-optimization by designating fewer high-volume surgeons to do RARP in our program, developing internal criteria that limits RARP to a subset of patients based on clinical factors, and introducing other oncology procedures and surgical specialties from SHSC to grow the funding pool from provincial sources. This model could be

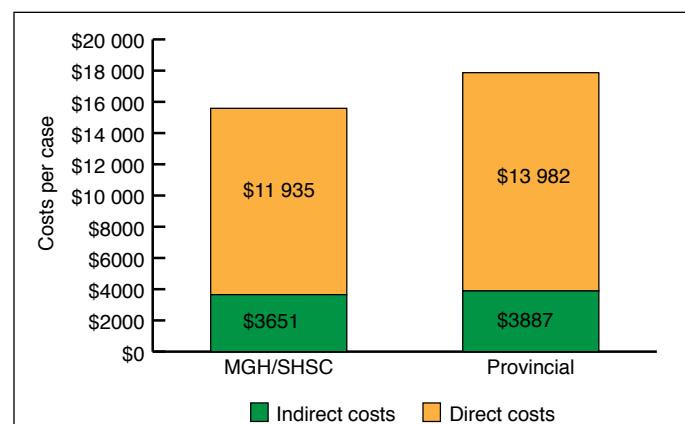


Fig. 3. Direct and indirect and robotic-assisted radical prostatectomy (RARP) costs, institutional vs. provincial. MGH: Michael Garron Hospital; SHSC: Sunnybrook Health Sciences Center.

replicated across different parts of the province and across Canada, where a select number of sites would serve the needs of a larger region.

As Canadians, we want to remain at the forefront of healthcare innovation globally. Robotic surgery is expensive and cannot be maintained long-term through philanthropy alone. Rather, it will ultimately require funding from government to ensure sustainability. Given the rapid uptake of this technology that has already occurred in Ontario, closing active robotic programs is not an option. The future of surgical oncology will require delivery on this platform. Therefore, efforts to look for a more sustainable funding option will be required. Creating a shared-access model and “centers of expertise,” allowing for multiple institutions to pool surgical volume both for RARP and other procedures and specialties to streamline costs, is perhaps a solution that allows government to sustainably fund this technology.

Conclusions

In embracing a strategic partnership with a quaternary level institution, we have demonstrated that it is possible for expensive, cutting-edge medical technology to be introduced in a community hospital setting, allowing wider access for both patients and physicians to innovative health technology. This proposed shared-access model may serve as a guide for institutions in other regions of Ontario and across Canada to implement the inevitable adoption of robotic surgery in a responsible, cost-effective manner for all Canadians.

Competing interests: The authors report no competing personal or financial interests related to this work.

This paper has been peer-reviewed.

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