SPECIALIST SERVICES COMMITTEE

Surgical Patient Optimization Collaborative (SPOC)

SPOC

ECONOMIC EVALUATION REPORT V.2

Prioritize Consulting Ltd
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Introduction

The economic evaluation estimates the net financial impact of the Surgical Patient Optimization Collaborative (SPOC) for four procedures. The four procedures are: arthroplasty, colorectal surgery, gynecology, and urology (elective surgeries only). The analysis included seven SPOC sites, listed in Table 1.

Table 1: SPOC sites

Site
Cowichan
UHNBC
Burnaby
Royal Inland
Nanaimo
Campbell River
Prince Rupert

Methods

To estimate the financial impact of SPOC, we first estimated the impact of SPOC on the rates of post-surgical complications and on the operative length of stay (LOS from operation to discharge), and we calculated the additional costs or savings associated with those changes. We then added the cost of delivering SPOC to arrive at the net financial impact. The post-surgical complications included in the evaluation were: surgical site infection, urinary tract infection, and re-operation.

To estimate the impact of SPOC on the rates of complications and re-operation we compared the rates and LOS at the SPOC sites to the rates and LOS from Provincial NSQIP data. All health authorities in BC agreed to allow the use of NSQIP data for this project except VCH. Therefore, Provincial NSQIP data used included 20 of 23 NSQIP sites.

The complications and LOS were costed using the CIHI costing calculator, supplemented with other reports from CIHI. In-patient and re-operation costs are listed in Table 2. The cost of delivering SPOC in each site was identified through Doctors of BC financial data. The analysis was conducted by procedure and not by site. The time horizon was 30 days post-surgery, and the perspective is that of the health system (i.e., patient out of pocket costs were not included).

Table 2: In-patient and re-operation costs by procedure*

Procedure	Day in hospital $	Post-surg reoperation $
Arthroplasty	$2,323	$15,261
Colorectal	$1,777	$19,192
Urology	$2,964	$9,784
Gynecology	$3,148	$9,759

*Source: CIHI cost calculator, using BC only data from 2018 (latest currently available)

Note that while the SPOC sites included data on transfusion, DVT and PE, those complications were not included in the analysis because NSQIP data did not provide a comparator for those. Also, while re-admission data was available for both SPOC sites and NSQIP sites, we did not include re-admissions in the evaluation because costs associated with re-admissions are largely capture in the costs of infections and re-operations. The analysis spanned between 16 and 23 months depending on when the SPOC program was launched at a given site (as early as mid 2019 through to mid 2021).

Results

The SPOC program costs ranged from as low as $54 per patient to as high as $1789 per patient across the seven sites. The variability in cost is in part related to the number of patients optimized at a given site (i.e., those sites with higher numbers of patients had lower per patient costs). The average spent on SPOC was about $88,000 per site over an average study period of 19 months which translates to an average monthly spend of about $4600.

In Table 3 and 4 the rates of complications and LOS for SPOC sites and NSQIP sites are presented.

Table 3: SPOC rates

Procedure type	Cases (n)	% post-surg SSI	% post-surg UTI	Reoperation rate	LOS
Arthroplasty	2695	1.37	0.33	0.33	1.99
Colorectal	90	2.22	0	3.33	3.51
Gynecology	66	1.52	0	0	0.66
Urology	119	0	0.84	0.84	0.80

Table 4: NSQIP rates

Procedure type	Cases (n)	% post-surg SSI	% post-surg UTI	Reoperation rate	LOS
Arthroplasty	15960	1.62	0.87	1.36	2.52
Colorectal	3904	8.42	3.10	3.40	5.83
Gynecology	11023	2.81	3.20	1.13	1.25
Urology	7423	1.93	3.12	1.41	1.67

Table 5 reports the net financial impact of SPOC, per patient optimized (a negative number is a savings).

Table 5: Summary of main results

Procedure type	Average cost of optimization per patient	Average cost impact of SPOC per patient*	Net financial impact of SPOC, per patient optimized*
Arthroplasty	$193	-$1514	-$1320
Colorectal	$1789	-$6450	-$4661
Gynecology	$502	-$2588	-$2086
Urology	$502	-$3432	-$2931

* Negative reflects lower cost with SPOC

Table 6 shows the potential net financial impact of SPOC at the provincial level, based on the average number of NSQIP patients from 2018 and 2019 (note 2020 data was not included with artificially low procedure counts due to the pandemic) by procedure type (excluding VCH).

Table 6: Net cost savings with optimization (by % of optimization)

Procedure type	Net savings: 100% of NSQIP patients optimized	Net savings: 75% of NSQIP patients optimized	Net savings: 50% of NSQIP patients optimized	Net savings: 25% of NSQIP patients optimized
Arthroplasty	$7.1M	$5.4M	$3.6M	$1.8M
Colorectal	$5.8M	$4.3M	$2.9M	$1.4M
Gynecology	$7.8M	$5.8M	$3.9M	$2.0M
Urology	$7.6M	$5.7M	$3.8M	$1.9M
TOTAL	$28.3M	$21.2	$14.2	$7.1M

For those four procedures alone, net annual savings with SPOC implementation could range from about $7.1M to over $28M.

Discussion

The aim of the economic evaluation was to determine the net financial impact of SPOC across four procedure types. In all four procedures, savings were identified on a per patient basis, after accounting for the cost of delivering SPOC. The reason for those savings is that for each of the four procedures, SPOC rates of SSI, UTI and re-operation were found to be lower than the corresponding NSQIP rates and the LOS was shorter, also for each of the four procedures. SPOC optimized patients had lower rates of complications and shorter LOS across the board.

The primary driver of the cost savings for SPOC patients is shorter length of stay. For arthroplasty, for example, LOS was found to be 21% shorter for SPOC patients compared to NSQIP patients. At a per day

hospital stay cost of over $2300 for arthroplasty patients these savings quickly add up. A secondary driver of savings for optimized arthroplasty patients was re-operations. The re-operation rate was 75% lower for SPOC patients, which has a significant financial impact noting a re-operation cost of over $15,000 per patient.

While the results are impressive, there are some important caveats to keep in mind. First, one cannot say with certainty that the SPOC patients reflect the broader set of patients captured in the NSQIP data. There was potential selection bias with the SPOC patients in that those patients either more likely to have better outcomes or more likely to benefit from optimization could have been preferentially selected for the program. Also, the teams at SPOC sites were highly engaged and the target patient populations may have already been the focus of previous quality improvement work, which means that the outcomes at SPOC sites may have been superior to the NSQIP control group even before the SPOC intervention and therefore, the observed difference in outcomes between 2 groups may not be due solely to the SPOC intervention. Second, noting that both re-operation and other adverse events were included in our analysis, there is the potential for some double cost counting which could mean that our results overstate the program's impact. However, we expect that the per patient cost of delivering SPOC will go down over time, which could mean that our results understate the program's impact. Third, as mentioned above, the NSQIP data utilized exclude VCH. Fourth, the sample size for SPOC patients in three of the four procedure types is small. Further study would determine whether the observed results are a true representation of reality.

Conclusion

Across all four procedure types included in the economic analysis reported herein, SPOC patients had lower rates of SSI and UTI, lower re-operation rates and shorter operative LOS when compared to a broader set of BC NSQIP patients. This translated into net per patient savings across the four procedure types of between $1300 and $4600. Should SPOC be implemented more broadly, these per patient savings represent potential annual savings for BC (based on non-VCH 2018/2019 NSQIP volumes) ranging from $7.1M to $28.3M.