A Surgical Quality Improvement Program for BC
Choosing A Surgical Measurement Tool

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A Surgical Quality Improvement Program for BC

Choosing a Surgical Measurement Tool

Executive Summary
There is an undercurrent of belief within surgical services in the province that it is time to develop a more robust surgical quality improvement program. Given that surgical services put patients at risk, and that the application of national statistics from the Baker and Norton study demonstrate some individuals in BC who have surgery may suffer a preventable adverse event up to and including death, the BC Patient Safety & Quality Council (BCPSQC) decided to determine if a more robust strategy to assess and improve surgical quality of care could be designed. There are some excellent strategies in BC to address some of the dimensions of quality, particularly access and satisfaction. Nonetheless, BCPSQC felt it important to provide leadership in all facets of surgical quality, including appropriateness, effectiveness, and safety across all surgical specialties, and to support surgical quality improvement throughout BC.

In order to assess current surgical quality improvement programs and surgical measurement tools, BCPSQC asked Convergent Healthcare Consultants and ELM Group, Quality in Healthcare to collaborate on evaluating different models and to make recommendations relevant to two questions:

- What would be the best surgical measurement tool for BC to use for the continuous monitoring of the surgical quality of care?
- What should be the elements of a surgical quality improvement program and where should the current structures and processes be enhanced?

Comparing surgical measurement tools
A criteria-based literature search identified six surgical quality improvement measurement tools:

1. The Surgical Audit and Peer Review system from the Royal Australasian College of Surgeons (RACS);
2. The National Surgical Quality Improvement Program (NSQIP) from the American College of Surgeons;
3. The Scottish Audit of Surgical Mortality (SASM) program from the National Health Services (NHS) in Scotland;
4. The Surgical Care Improvement Project (SCIP) from a consortium of 9 USA based agencies with leadership from The Joint Commission for Accreditation of Healthcare Organizations (Joint Commission);
5. The Surgical Care and Outcomes Assessment Program (SCOAP) from the Foundation for Health Care Quality of the State of Washington; and
6. The Global Trigger Tool (GTT) sponsored by the Institute for Health Improvement (IHI).

The review team also considered developing a made in BC measurement tool.

The following summary (Table 1) ranks the six surgical quality improvement measurement tools based on the identified criteria.

Table 1: Ranking Measurement Tools

<table>
<thead>
<tr>
<th>Designed to:</th>
<th>Australasian</th>
<th>NHS Scotland</th>
<th>NSQIP</th>
<th>SCIP</th>
<th>SCOAP</th>
<th>Trigger Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measures outcomes as well as process</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Crosses many specialties</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>++</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Data can be compared</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>+</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Risk adjusted for population treated</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Clearly defined definitions of terms, data elements</td>
<td>++</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Demonstrated ability to improve surgical care</td>
<td>++</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Acceptability to surgeons and anaesthetists</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Ability to interface with Cerner or Meditech</td>
<td>-</td>
<td>-</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Report generation and access to data</td>
<td>++</td>
<td>++</td>
<td>+++</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Ease of implementation</td>
<td>++</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13</td>
<td>16</td>
<td>28</td>
<td>13</td>
<td>14</td>
<td>13</td>
</tr>
</tbody>
</table>

**Recommendation**

BCPSQC should adopt the National Surgical Quality Improvement Program (NSQIP) from the American College of Surgeons as the major ongoing measurement tool for a BC surgical quality improvement program.

The NSQIP system is a nationally validated, risk-adjusted, outcomes-based program to measure and improve the quality of surgical care. It allows for valid comparison of outcomes among all hospitals in the program. It facilitates identifying “best practises” and dissemination of shared learning across the sector and is currently the only true surgical database; most of the others are audit tools.

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1 In the Table, each program was given a 0, 1, 2 or 3 plus signs (+) depending on how well the program met the criterion based on the consultants’ interpretation of data provided and information from interviews with knowledgeable informants.
Cost
It would be remiss not to discuss general aspects of the costs of a surgical quality improvement measurement system. Often the easiest costs to attribute to a surgical quality improvement measurement system are the costs directly attributed to the measurement system itself.

NSQIP has some of the most explicit costing information available. The current annual cost is $35,000 USD per facility. The annual fee includes:

- a number of online tools including QCMitt and the Nurse Workstation for data gathering and submission;
- the cost for education of the Surgical Clinical Nurse Reviewer (SCNR) and testing data quality; and
- access to ACS NSQIP data, facility specific data and online reporting.

The major costs not included in the annual fee include:

- costs associated with quality improvement change management (which may be significant depending on organizational capacity);
- the salary and benefits for the Surgical nurse reviewer and the surgeon champion; and
- possible IT costs.

Compared to other tools, NSQIP is the most expensive program for upfront fees. However, other programs have indirect costs that will be hard to identify and significant in total, more difficult to manage provincially and because of major additional work in the initiation phase, likely to delay the provincial program significantly.

Current surgical quality processes and identifying areas for improvement
The strengths and weaknesses of the current system were assessed and compared to a conceptual framework for an ideal surgical quality improvement program (provided as an appendix). Several important building blocks were identified in that analysis, which would be the foundation of an excellent program. Table 2 summarizes the findings.
Table 2: Building blocks for a surgical quality improvement program

<table>
<thead>
<tr>
<th>Leadership</th>
<th>Current State</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No provincial leadership for surgical quality of care</td>
<td>Opportunity for BC PSQC to create a provincial leadership strategy</td>
</tr>
<tr>
<td></td>
<td>Few surgeon champions</td>
<td>A clear provincial strategy outlining how BC will move towards a surgical QI program</td>
</tr>
<tr>
<td></td>
<td>Most HAs have Board &amp; Management Quality Committees</td>
<td>Additional surgeon champions</td>
</tr>
<tr>
<td></td>
<td>Greater emphasis on financial bottom line vs quality bottom line</td>
<td>Sustained commitment from senior leadership</td>
</tr>
<tr>
<td></td>
<td>Improved adoption of no blame culture</td>
<td>Greater involvement by the Patient Safety Chair</td>
</tr>
<tr>
<td></td>
<td>Establishment of the Patient Safety Chair, UBC</td>
<td>Increasing devolution of financial and personnel management accountabilities</td>
</tr>
<tr>
<td></td>
<td>FMM wait time strategies for surgical procedures</td>
<td>Provincial communication strategy for surgical QI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reward innovation &amp; quality improvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Systems approach to surgical care across HAs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People</th>
<th>Current State</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quality improvement consultants in most HAs</td>
<td>Dedicated personnel for surgical quality improvement including data collection, data analysis and comprehensive reporting</td>
</tr>
<tr>
<td></td>
<td>Few surgeon champions</td>
<td>Formal education in quality improvement methodology &amp; change management in many organizations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Physician performance assessments in conjunction with reappointment process</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Partnership and Resources</th>
<th>Current State</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Node, Safer Healthcare Now</td>
<td>Provincial Collaborative</td>
<td></td>
</tr>
<tr>
<td>CPSI</td>
<td>Enhanced collaboration between MoHS/HAs/Local facilities</td>
<td></td>
</tr>
<tr>
<td>BC Surgical Council</td>
<td>Apparent minimal interaction with Patient Safety Chair</td>
<td></td>
</tr>
<tr>
<td>Accreditation Canada</td>
<td>Minimal dedicated ongoing funding for quality improvement activities including assistance with funding, administrative support, backfilling staff</td>
<td></td>
</tr>
<tr>
<td>PSLS</td>
<td>Lack of a comprehensive electronic medical record</td>
<td></td>
</tr>
<tr>
<td>WHIN</td>
<td>Development of external funding partnerships</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Policy and Strategy</th>
<th>Current State</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality in most organizations’ mission &amp; vision statements</td>
<td>Lack of provincially consistent quality &amp; performance measures</td>
<td></td>
</tr>
<tr>
<td>Disclosure Policy</td>
<td>Informing, Reporting, Just &amp; Trusting Culture policies</td>
<td></td>
</tr>
<tr>
<td>Safety culture survey as part of Accreditation process</td>
<td>Consistent &amp; comprehensive public reporting policy of surgical indicators</td>
<td></td>
</tr>
<tr>
<td>Medical staff bylaws</td>
<td>Consistent comparator measures</td>
<td></td>
</tr>
<tr>
<td>Medical staff rules</td>
<td>MS Rules lack clarity on physician quality accountabilities</td>
<td></td>
</tr>
<tr>
<td>HAs surgical access strategies</td>
<td>Ensure medical staff rules identify the individual and collective role of medical staff in managing quality of care</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Processes</th>
<th>Current State</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAN sporadically utilized throughout the province</td>
<td>Lack of concentrated focus on utilization processes</td>
<td></td>
</tr>
<tr>
<td>Increasing provincial utilization of surgical site marking &amp; surgical pause</td>
<td>Lack of “standard operating procedures” for most surgical activities</td>
<td></td>
</tr>
<tr>
<td>Some surgical reporting in conjunction with Safer Healthcare Now</td>
<td>Greater adoption of surgical site marking, surgical pause, operating room team communication (crew resource management principles)</td>
<td></td>
</tr>
<tr>
<td>Health Authority based quality committees</td>
<td>Surgical check list</td>
<td></td>
</tr>
<tr>
<td>BC Surgical Registry</td>
<td>Lack of human factors analysis in procurement processes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>System remains largely provider focused vs patient focused</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mandatory audit of all surgical deaths</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quality outcomes to free up resources currently spent handling preventable events</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 describes a foundation to build on and indicates where additional effort will be required to create a comprehensive and effective surgical quality improvement program for the province.
Summary
The development and implementation of a provincial surgical quality improvement program is necessary for the province of British Columbia. A strong measurement system provides clinically meaningful data for health care providers to improve patient care. Without credible data, meaningful decisions are difficult to make.

The NSQIP system is a nationally validated, risk-adjusted, outcomes-based program to measure and improve the quality of surgical care. It allows for valid comparison of outcomes among all hospitals in the program inside and outside BC. It facilitates identifying “best practises” and dissemination of shared learning across the sector. It currently is the only true surgical database; most of the others are audit tools.

BCPSQC should fully explore the costs and implementation strategies for a BC Surgical Quality Improvement Program using NSQIP as the tool for the ongoing measurement of relevant processes and outcomes.
A Surgical Quality Improvement Program for BC

Choosing a Surgical Measurement Tool

1. Purpose of the Project

In order to assess current surgical quality improvement programs and surgical measurement tools, BCPSQC asked Convergent Healthcare Consultants and ELM Group, Quality in Healthcare to collaborate on evaluating different models and to make recommendations relevant to two questions:

- What would be the best surgical measurement tool for BC to use for the continuous monitoring of the surgical quality of care; and
- What should be the elements of a surgical quality improvement program, and in particular:
  - describe a conceptual framework;
  - describe the current processes for managing quality of care; and
  - describe the existing gaps to be addressed to create a sustainable provincial surgical quality improvement program.

Definitions

Two terms in this paper require clear definitions: surgical quality improvement program and surgical quality improvement measurement tool. These definitions differentiate “program” and “tool.”

A surgical quality improvement program is the composite of all the data and actions intended to assess and improve the quality and patient safety of surgical care. The actions of a surgical quality improvement program may include review of data by a steering committee, development of standards, checklists or protocols, or even additional specific data gathering endeavours such as in-depth chart reviews or focused audits.

A surgical quality improvement measurement tool is the process by which data is routinely gathered to provide information to the surgical quality improvement program as to what actions should be taken. Typically the surgical quality improvement measurement tool is a database designed to gather relevant surgical data elements or to gather data from an audit of procedures or surgical specialties.

Although there are multiple explicit definitions for the word “surveillance,” used here it means “a type of observational study that involves continuous monitoring of disease occurrence within a population.”² Surveillance in this sense is used to provide an

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overview of the dimensions of quality not yet measured well in BC – appropriateness, effectiveness and safety.

Context
The BC Patient Safety & Quality Council (BCPSQC) was formed to facilitate a province-wide approach to patient safety and quality, and to assist in quality improvement strategies for various facets of healthcare provision in BC. According to their website:

“BC Patient Safety & Quality Council (BCPSQC) provides system-wide leadership that brings a provincial perspective to patient safety and quality improvement activities. Through collaborative partnerships with health authorities and other health care providers, BCPSQC promotes and informs a provincially coordinated, patient-centred approach to patient safety and quality improvement”.

and,

“The Council will build capacity and expertise in patient safety and quality improvement; support health authorities and other service delivery partners in their continuous effort to improve the safety and quality of care; and will work to improve health system transparency and accountability for the public”.3

BCPSQC felt it was important to provide leadership in the area of surgical quality improvement throughout the province. Surgery is known to be risky; however, it should be emphasized at the outset that the focus on surgery was not because of known problems or concerns. With leadership and work underway in the province to address quality concerns in a data-driven manner, and an undercurrent of belief within surgical services in the province that it is time to develop a more robust surgical quality improvement program, surgery was a natural starting point.

In preparation for leading patient safety and quality in BC, the BCPSQC Council created a matrix outlining the main dimensions of quality it wishes to address in planning any approach to quality improvement. The five dimensions of quality are:

- Acceptability
- Access
- Appropriateness
- Effectiveness
- Safety

3 http://www.bcpsqc.ca/
Table 3 provides the complete quality/safety matrix.

<table>
<thead>
<tr>
<th>Dimensions of Care</th>
<th>Acceptability</th>
<th>Appropriateness</th>
<th>Accessibility</th>
<th>Safety</th>
<th>Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Care that is respectful to patient and family preferences, needs and values.</td>
<td>Care provided is evidence-based and specific to individual clinical needs.</td>
<td>Care provided within a medically indicated time and in an appropriate setting.</td>
<td>Avoiding harm resulting from care.</td>
<td>Care that is known to achieve intended outcomes.</td>
</tr>
<tr>
<td><strong>Dimensions of Quality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staying Healthy Preventing injuries, illness, and disabilities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getting Better Care for acute illness or injury.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living with Illness or Disability Care for chronic illness or disability.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping with End of Life Care to relieve suffering.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Equity</strong></td>
<td>Distribution of health care and its benefits fairly among citizens</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Efficiency</strong></td>
<td>Optimal use of resources to yield maximum benefits and results</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Current BC Surgical Volumes and Estimated Adverse Events**

BC undertakes a significant inpatient and day surgical volume each year. Figures 1 and 2 demonstrate that the number of outpatient procedures outnumbers the number of inpatient procedures by about 3:1 with the total number of surgical cases approaching 475,000 for FY 2007/08. Further, the number of procedures is increasing each year in all Health Authorities, more in the outpatient setting than for inpatients.
Figure 1: BC Surgical procedures FY 2001/02 – 2007/08

![BC Surgical Procedures FY 2001/02 - 2007/08](image)

Figure 2: HA Acute/Rehab Surgery FY 2001/02 – 2007/08

![Health Authority Acute/Rehab Surge 2001/02 - 2007/08](image)
There is no question the vast majority of surgical procedures go well and the patient has an excellent outcome. However, recent literature has suggested adverse events do occur in hospitals and some of these events are preventable.\(^4\) Although the number and severity of the adverse events in BC are difficult to determine, current literature can help provide an estimate. In particular, in the past ten years there have been two seminal research pieces assessing adverse events on patients and the associated implications on the health care system\(^5\)\(^6\).

In 2003-04, an Institute of Medicine study estimated between 44,000 and 98,000 Americans die annually as a result of medical errors with an associated cost of $17 - $29 billion USD. Various other countries estimate between 2.9% and 16.6% of patients in acute care settings experience one or more adverse events.\(^7\)

In Canada it is estimated there are 9,000 to 24,000 preventable deaths annually.\(^8\) This is greater than the combined number of deaths from HIV/AIDS, breast cancer and motor vehicle collisions. The Baker and Norton study found an incident rate of adverse events at 7.5% and of these, 36.9% would be preventable. Stated differently, of the 2.5 million annual hospital admissions in Canada similar to those studied, about 185,000 of those resulted in the patient suffering an adverse event and approximately 70,000 of the adverse events were preventable. It was estimated this resulted in four to seven extra days in hospital (average = 6 days).

According to surgical data from the BC Ministry of Health Services, there were 119,926 inpatient surgical cases performed in British Columbia in fiscal year 2007/08. Assuming the incident rate (7.5%) from the Baker and Norton study applies to surgical care in BC,\(^9\) in BC there would be 8995 surgical inpatient cases with at least one adverse event. Of these 8995 cases, 3319 (36.9%) would have at least one preventable adverse event: there would be between 589 and 920 preventable deaths.

With an estimate of 3319 inpatient surgical cases with at least one preventable adverse event and an incremental length of stay on average of six days, mitigating preventable adverse events would result in a savings of 19,914 patient days. By eliminating all these preventable adverse events, there would be an additional 54 surgical inpatient beds

\(^4\) Not all adverse events are preventable. For instance, an allergic reaction to penicillin may be not be preventable because there is no previous history of allergy. Conversely, if the patient had a history of allergy to penicillin, and penicillin was given, then it would be preventable.


\(^9\) In the Baker and Norton report, the number of cases with adverse event(s) in surgery accounted for 51% while medical patients accounted for 45%.
available in the province. With an average length of stay for a surgical case of five days, another 3983 surgical inpatient cases could potentially be undertaken.

This estimation describes the preventable adverse event problem facing BC. These events lead to longer length of stays in hospital, temporary or permanent injury, and occasionally death. Preventing these, or significantly reducing their occurrence, would not only benefit patients, but also increase the efficiency of the healthcare system.

In summary, some but not all of the dimensions of quality for surgical services are being monitored in BC. Given that surgical services do put patients at risk and that the application of national statistics from the Baker and Norton study\textsuperscript{10} demonstrate many individuals in BC may suffer a preventable adverse event up to and including death, the BCPSQC has decided to determine if a more robust strategy to assess and improve surgical quality of care could be designed. An effective surgical quality improvement program with a robust measurement system would be able to improve the quality and safety of surgical care.

**Current BC Approach to Understanding Surgical Quality of Care**

There are several initiatives underway in BC to address some of the dimensions of quality.

- The Surgical Registry provides information on the waitlist for surgery, and the Ministry of Health Services has sponsored different patient satisfaction surveys for surgical inpatients. These two activities provide information in the dimensions of accessibility and acceptability respectively.

- A specific database exists to address outcomes for cardiac surgery, which provides excellent data for effectiveness, appropriateness and safety, but it covers only one type of surgery conducted in the province.

- The Patient Safety Learning System (PSLS) tracks voluntary event reporting across the province from all aspects of healthcare and can provide insights into aspects of safety for surgical patients. Event reporting has benefits and weaknesses and cannot be considered to give a full picture of patient safety and other dimensions of quality.

There are also initiatives at the local or regional level, such as the Fraser Health Surgery Collaborative, and the UBC Hip and Knee Program that are demonstrating early success.

In summary, although there are some excellent strategies to address some of the dimensions of surgical quality of care, there are many gaps in how quality is measured across the province that can and should be addressed, especially surgical appropriateness, effectiveness and safety.

\textsuperscript{10} Some of the hospitals participating in the Baker and Norton study were from BC.
Current BC Approach for Improving Surgical Quality of Care

There are many initiatives in BC to improve surgical quality of care. With the current service delivery structure of six health authorities, quality improvement activities are mainly based at the Health Authority or hospital level. For example, Fraser Health has begun to track surgical outcomes using the surgical quality improvement measurement tool called National Surgery Quality Improvement Program (NSQIP) at Surrey Memorial and Royal Columbian Hospitals and is planning to add a third institution, Burnaby Hospital, in the immediate future. And most hospitals have some form of morbidity and mortality reviews where surgeons and others review specific cases or groups of cases to determine if problems exist and how processes should be changed to improve care. The Provincial Safety Learning System allows for voluntary submission of incidents of concern (event reporting) which cover surgical and other patients that can then be analyzed and provide guidance for further action to either change processes or look more deeply into specific areas. However, while these initiatives are good, they neither cover the whole province, nor all surgical procedures.

Not all initiatives are local or regional; the BCPSQC can and should play a critical role in providing leadership and facilitation for improving surgical quality of care in the province. There is national interest and leadership beginning for surgical quality of care as demonstrated by the Canadian Patient Safety Institute. CPSI led the creation of the Safer Healthcare Now initiative which itself is linked to the Institute for Health Improvement (IHI) in the USA and its 100,000 Lives Saved initiative. Safer Healthcare Now formed a Western Node where the Western Provinces are taking part in a surgical strategy primarily based on the principles of the IHI Collaboratives. Many of the six IHI strategies such as surgical site infections and central line infections impact on surgical cases and are implemented at many hospitals throughout the province. The Health Accord of 2000 and subsequent First Ministers Meetings made a commitment to reduce the wait times for various surgical procedures, a strategy with positive impacts in many provinces. The World Health Organization has endorsed the surgical safety checklist which many BC institutions have already or are now actively implementing. The newly formed provincial Surgical Council will provide important advisory information to the Ministry of Health Services pertaining to surgical matters across the province and will almost certainly have a role to play in the provincial perspective.

Although BC has a responsibility for understanding and improving its own quality of care for surgical patients, it does not need to “go it alone.” There are numerous other initiatives in existence and BCPSQC is uniquely placed to provide a liaison between the various groups and strategies.

Current BC Approach for Managing Surgical Quality of Care

Appendix A of this report provides a conceptual overview of the major elements of an effective surgical quality improvement program. It outlines structures and processes integral to improving a system including the roles and responsibilities of physicians and other front line staff, clinical and administrative leaders, and Boards. In order for the structures and processes to function properly, there must be clear policies establishing the roles and responsibilities.
Clinical governance, as it pertains to physicians, is important for the success of any quality improvement program. Although physicians generally are not employees of health care organizations, they are key players in the delivery of safe high quality care to patients. There are a number of structures and process in place to help assure the quality of care meets acceptable standards. The Medical Staff Bylaws and Rules outline the accountabilities and responsibilities of physicians as it pertains to quality of care. At the present time, all health authorities in BC have approved Bylaws and Rules and recently the Rules in some health authorities have undergone revisions.

Clinical departments, whether medical or non-medical, or at the hospital or Health Authority level, have an important role in assuring the delivery of quality patient care. Many medical departments have a form of morbidity and mortality conferences. Each year Department Heads are involved in reviewing the members of their department as part of the annual performance review or reappointment process. The reappointments for medical staff are approved by the Board each year.

A number of health authorities have established interdisciplinary quality committees, both at the management and Board level. The mandate of the committees is to oversee the quality activities of the organization. This oversight is shared with the Health Authority Medical Advisory Committee, which is advisory to the CEO and Board.

Although the fundamental pieces are in place, there remain gaps in the clinical governance as it pertains to medical quality activities. For example: Rules lack specific clarity on roles, responsibilities and expectations for undertaking quality activities; the reappointment process is not as rigorous as it needs to be in many of the health authorities; and the lack of a physician performance assessment in most health authorities limits the reappointment process. If credible outcome data was available, performance assessment for physicians could be enhanced and there would be better understanding of the areas where group or individual performance could be improved.

Finally, many physician leaders, be it department heads, Chiefs of Staff, Medical Directors or Vice Presidents of Medicine, have little in the way of formal education in leadership and quality improvement. The same is true for many leaders in the non-medical disciplines. A need exists for increased investment in physicians and other managers who hold leadership positions.

**Summary**

Generally speaking, the policies and procedures, the people, the committee structures and the expectations exist throughout BC—from the Health Authority to the local level—to provide a firm background on which to build a system designed to better understand the current state of surgical care, to evaluate and respond to the data and to act, making improvements where required across the Province. While there are gaps in knowledge pertaining to appropriateness, effectiveness and safety of surgical care, the absence of a cohesive provincial strategy to understand and improve surgical patient care is perhaps the main missing element. This could be provided by the BCPSQC in collaboration with key stakeholders.
The building blocks are present and there should be every expectation a revised surgical quality improvement program would improve the surgical quality of care to the citizens of BC.
2. Gaps in the Management of Surgical Quality in BC

One framework for outlining the sectors requiring attention in the creation of a provincial surgical quality improvement program can be found in a highly regarded toolkit provided by the European Foundation for Quality Management. The EFQM Model is presented in diagrammatic form in Figure 3.

Figure 3: EFQM Model

The arrows emphasize the dynamic nature of the model. They show innovation and learning helping to improve enablers that in turn lead to improved results. The EFQM model will be used to assess the gaps in the current system.

Context at the beginning of this report outlined a number of strengths found in the current BC quality management system. In comparing the findings with the conceptual framework for an ideal quality management program, gaps were identified that need to be addressed in the creation of a surgical quality improvement program for BC. The gaps are listed in Table 4.

11 www.efqm.org
Table 4: Gaps in the current BC surgical quality management system

<table>
<thead>
<tr>
<th>Leadership</th>
<th>Current State</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• No provincial leadership for surgical quality of care</td>
<td>• Opportunity for BCPSQC to create a provincial leadership strategy</td>
</tr>
<tr>
<td></td>
<td>• Few surgeon champions</td>
<td>• A clear provincial strategy outlining how BC will move towards a surgical QI program</td>
</tr>
<tr>
<td></td>
<td>• Most HAs have Board &amp; Management Quality Committees</td>
<td>• Additional surgeon champions</td>
</tr>
<tr>
<td></td>
<td>• Greater emphasis on financial bottom line vs quality bottom line</td>
<td>• Sustained commitment from senior leadership</td>
</tr>
<tr>
<td></td>
<td>• Improved adoption of no blame culture</td>
<td>• Greater involvement by the Patient Safety Chair</td>
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<tr>
<td></td>
<td>• Establishment of the Patient Safety Chair, UBC</td>
<td>• Increasing devolution of financial and personnel management</td>
</tr>
<tr>
<td></td>
<td>• FMM wait time strategies for surgical procedures</td>
<td>• accountabilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provincial communication strategy for surgical QI</td>
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<tr>
<td></td>
<td></td>
<td>• Reward innovation &amp; quality improvement</td>
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<tr>
<td></td>
<td></td>
<td>• Systems approach to surgical care across HAs</td>
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<tr>
<td>People</td>
<td>• Quality improvement consultants in most HAs</td>
<td>• Dedicated personnel for surgical quality improvement including data</td>
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<tr>
<td></td>
<td>• Few surgeon champions</td>
<td>collection, data analysis and comprehensive reporting</td>
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<tr>
<td></td>
<td></td>
<td>• Formal education in quality improvement methodology &amp; change</td>
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<tr>
<td></td>
<td></td>
<td>management in many organizations</td>
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<tr>
<td></td>
<td></td>
<td>• Physician performance assessments in conjunction with reappointment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>process</td>
</tr>
</tbody>
</table>
## Current State

| Partnerships & Resources | Partnerships & Resources
|--------------------------|--------------------------|
| Western Node, Safer Healthcare Now | Partnerships & Resources
| CPSI | Partnerships & Resources
| BC Surgical Council | Partnerships & Resources
| Accreditation Canada | Partnerships & Resources
| PSLS | Partnerships & Resources
| WHIN | Partnerships & Resources

## Gaps

| Policy & Strategy | Policy & Strategy
|-------------------|-------------------|
| Quality in most organizations’ mission & vision statements | Policy & Strategy
| Disclosure Policy | Policy & Strategy
| Safety culture survey as part of Accreditation process | Policy & Strategy
| Medical staff bylaws | Policy & Strategy
| Medical staff rules | Policy & Strategy
| HAs surgical access strategies | Policy & Strategy

## Processes

| Processes | Processes
|-----------|-----------|
| Tools such as LEAN sporadically used throughout the province | Processes
| Increasing provincial utilization of surgical site marking & surgical pause | Processes
| Some surgical reporting in conjunction with Safer Healthcare Now | Processes
| Health Authority based quality committees | Processes
| BC Surgical Registry | Processes

## Gaps

| Processes | Processes
|-----------|-----------|
| Provincial Collaborative | Processes
| Enhanced collaboration between MoHS/HAs/Local facilities | Processes
| Apparent minimal interaction with Patient Safety Chair | Processes
| Minimal dedicated ongoing funding for quality improvement activities including assistance with funding, administrative support, backfilling staff | Processes
| Lack of a comprehensive electronic medical record | Processes
| Development of external funding partnerships | Processes

## Gaps

| Policy & Strategy | Policy & Strategy
|-------------------|-------------------|
| Lack of provincially consistent quality & performance measures | Policy & Strategy
| Informing, Reporting, Just & Trusting Culture policies | Policy & Strategy
| Consistent & comprehensive public reporting policy of surgical indicators | Policy & Strategy
| Consistent comparator measures | Policy & Strategy
| MS Rules lack clarity on physician quality accountabilities | Policy & Strategy
| Ensure medical staff rules identify the individual and collective role of medical staff in managing quality of care | Policy & Strategy

## Processes

| Processes | Processes
|-----------|-----------|
| Lack of concentrated focus on utilization processes | Processes
| Lack of “standard operating procedures” for most surgical activities | Processes
| Greater adoption of surgical site marking, surgical pause, operating room team communication (crew resource management principles) | Processes
| Surgical check list | Processes
| Lack of human factors analysis in procurement processes | Processes
| System remains largely provider focused vs patient focused | Processes
| Mandatory audit of all surgical deaths | Processes
| Quality outcomes to free up resources currently spent handling preventable events | Processes
3. Review of the surgical quality improvement programs and surgical measurement tools

Methodology
Web based searching was used to identify the various surgical quality improvement programs and surgical measurement tools available. The initial focus of the review was on the measurement tool; however, the quality improvement program surrounding the measurement tool is as important as the tool itself. That said, by separating the two aspects--measurement tool and quality improvement program--it is possible to assess the specifics of the tool and identify program characteristics independent of the tool that have a high potential for positively impacting a BC surgical quality improvement program.

The search was not based on reviewing the literature to determine the evidence for current best practices: most surgical quality improvement programs describe the methodology used to arrive at its best practice standards. Nor were all areas of surgery included: BC currently has a strong database in place to follow cardiac patients and the interventions. The objective was to find a tool with wide application across surgical disciplines including, when feasible, paediatric surgery.

When available, references demonstrating the affect of the surgical measurement tool and the larger quality program were collected as a guide to determine if specific programs had been evaluated or could demonstrate effectiveness.

Criteria to compare surgical measurement tools
A set of criteria were used to compare and rank the various surgical measurement tools according to strengths and weaknesses.

Please note that program costs are discussed in Section 4 of this report. Once the “best” measurement tool is identified, various approaches to implementing the tool within a surgical quality improvement program can be considered to manage the impact of cost.

Criteria

*Measures outcomes as well as process:* the measurement tool should be able to measure patient outcomes such as mortality, complications such as infections, and processes such as the delivery of antibiotics on time or glucose control.

*Crosses many specialties:* the tool should be applicable to all surgical specialties practised in BC, including paediatric surgery, with the exception of cardiac surgery.

*Data can be compared:* there are two main ways of comparing quality data as it pertains to an institution or a program; between institutions or within an institution
over time. Trending of data over time ensures individual institutions are improving and maintaining the gains made in quality.\(^{12}\)

**Risk adjusted for population treated:** risk adjustment allows meaningful comparison between sites by taking into account differences in patient populations cared for at each site. From a clinical perspective, risk adjustment of patient populations prevents inappropriate comparisons.

**Clearly defined terms and data elements:** in order to collect meaningful data, it is necessary to have clearly defined data elements.

**Demonstrated ability to improve surgical care:** ideally, a system should have a proven track record in improving the quality of clinical care.

**Acceptability to surgeons and anaesthetists:** a program accepted by clinicians as credible and provides good information will be more easily implemented and the results will be more effective in changing practise.

**Ability to interface with Cerner or Meditech:** BC uses two main suppliers of hospital-based software for clinical information systems and it will be important to determine which surgical measurement tools can link with them to minimize duplicate data entry and minimize operational costs.

**Report generation:** availability of up to date reports of clinical outcomes or process indicators will make the surgical measurement tool more useful. Access to the database for investigating specific questions would also be beneficial.

**Ease of implementation:** implementing a surgical measurement tool into the ongoing operations of a surgical program in a hospital is variable – simpler and sooner is better than complex and drawn out.

### Review of measurement tools

The literature review identified six potential options for a surgical quality improvement measurement tool. These are:

1. The Surgical Audit and Peer Review system from the Royal Australasian College of Surgeons (RACS),
2. The National Surgical Quality Improvement Program (NSQIP) from the American College of Surgeons,
3. The Scottish Audit of Surgical Mortality (SASM) program from the National Health Services (NHS) in Scotland,

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\(^{12}\) This discussion is not meant to imply the data would be openly available between sites without their control. That is a policy decision that must be made in designing the surgical quality improvement program for BC. Given BC’s healthcare system is largely managed by health authorities however, they may wish to have a knowledge of the data for the institutions within their boundaries so areas of need and of excellence can be identified and more effective cross regional collaborations can be created.
4. The Surgical Care Improvement Project (SCIP) from a consortium of 9 USA based agencies with leadership from The Joint Commission for Accreditation of Healthcare Organizations (Joint Commission),

5. The Surgical Care and Outcomes Assessment Program (SCOAP) from the Foundation for Health Care Quality of the State of Washington, and

6. The Global Trigger Tool (GTT) sponsored by the Institute for Health Improvement (IHI).

Each program will be described in some detail followed by a table comparing high-level characteristics.

**Surgical Audit and Peer Review System from the Royal Australasian College of Surgeons**

The name indicates the main elements of the system – it is based on surgical audits, the results of which are reviewed by a group of peers. An audit can focus on a hospital, a specialty, or a specific group of surgeons. It can address all surgical cases, selected types of cases, such as colon repairs, or it can focus on specific issues or outcomes, such as mortality or complications like surgical infections. The data collected in the audit are guided by evidence of best practise as established by a peer group who assess the current literature. Surgeons who participate find the audit credible and educational; consequently, the RACS via its continuing professional development program requires all surgeons to participate in some form of audit annually which must be submitted to the RACS for peer review.¹³

The RACS guidebook¹⁴ offers many insights into audits in general: audits are becoming common in many disciplines and countries. Many times, the data elements to be collected are published and freely available. If an area of concern is selected, there may be audit systems available for use. Most local authorities review the collection tools for relevance in their own practise prior to use. The implication of time and costs may not seem high; however, surgeons are required at the outset and in a recent study from Australia, most institutions did not have adequate resources to collect and verify the data. Further, the peer review strategy is critical to provide feedback to practising surgeons and integral to closing the loop.

**The National Surgical Quality Improvement Program (NSQIP)**

The American College of Surgeons built on a surgical quality improvement program initiated by Veterans’ Affairs to create NSQIP. The ACS-NSQIP system is a nationally validated, risk-adjusted, outcomes-based program to measure and improve the quality of surgical care. It allows for valid comparison of outcomes among all hospitals in the program. It facilitates identifying “best practises” and dissemination of shared learning across the sector.

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¹³ A guide by the Royal Australasian College of Surgeons: Surgical Audit and Peer Review
¹⁴ A guide by the Royal Australasian College of Surgeons: Surgical Audit and Peer Review
Data is collected into a structured database by a Surgical Clinical Nurse Reviewer (SCNR) using software provided to the enrollees. The database contains approximately 136 data elements spanning patient demographics and risk factors, procedures and numerous outcome and process measures (see Appendix F for a list of data fields). NSQIP has a process to validate the data collection to ensure reliability. Selection of charts is randomized within the area of interest and institutions target to have 20% of the charts reviewed. The nurse reviewer typically can process 1680 charts annually.

Data is risk adjusted according to the patient factors, and statistical analysis of observed vs. expected outcomes are determined. The risk adjustment provides additional security to surgeons that the comparisons are valid.

Patient identification is removed prior to submission to the central database which contained over 200,000 cases in 2007. This provides a critically important basis for risk adjusted comparisons. Furthermore, members of NSQIP have access to the database and can analyze various factors of interest for clinical research. Participating institutions have access to online reporting and receive risk adjusted outcomes data semi-annually.

NSQIP provides access to institutions identified as having best practise and will assist with site visits to provide advice and problem solving in specific areas of concern identified by member agencies. Regular meetings of surgical clinical nurse reviewers and the surgeon champions allow for a better spread of optimal practise. Some states or multi-site organizations have established collaborative arrangements for sharing data. In Michigan, the improvement in quality has been noticed by the insurer Blue Cross Blue Shield Michigan who supports the cost of data gathering. This group has begun to modify the NSQIP information gathering process to include some areas of special interest, such as colectomy procedures.

A study of the hospitals with the longest standing in NSQIP demonstrates significant improvement does take place. Poor performing hospitals tend to improve more but high performing ones also show improvement. Improvement occurs in academic, regional and rural hospital settings.

The NHS of Scotland Surgical Quality Improvement Program

The National Health Services (NHS) in Scotland has created two strategies to address surgical care – the Surgical Profile and the Scottish Audit of Surgical Mortality. The Surgical Profile tracks clinical indicators of complications and outcomes in general, vascular and orthopaedic surgery. Much of the data for the Surgical Profile comes from existing initiatives and databases pertaining to morbidity, mortality, hip fractures, arthroplasty, and breast cancer. Data is analyzed using case mix adjustments –

15 It should be noted that two Canadian hospitals use NSQIP, Surrey Memorial and Royal Columbian, and two more (Burnaby and the Montreal General) are in the process of joining. The data confidentiality rules pertaining to storage of personal data outside Canada have been met.

16 Long-Term Surgical Quality Improvement in the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP): An Evaluation of the 12 Longest Participating Hospitals. Bruce L Hall1, Barton H Hamilton, Karen Richards, Karl Y Bilmoria, Mark E Cohen, Clifford Y Ko.
adjusting for sex, age and social class – but there is no risk adjustment for diagnosis, co-morbidity, severity of illness, etc.. Data is typically presented comparatively and anonymously, identifying only the data pertinent to each Board. NHS Scotland expects the Boards to use the data and requires each Board to respond to the Surgical Profiles within 16 weeks indicating who has seen the data, what aspects of data quality exist and what actions have been taken to respond to the clinical concerns derived from the data. Responses are reviewed by an NHS Quality Improvement Advisory Committee which may recommend further actions by the NHS. NHS publishes a Scotland-wide review for public and health service staff indicating how the data are being used. Hospital- and surgeon-specific performance measures are not published. The Surgical Profile is used as a flag or pointer to identify areas where further investigation is required.

The Scottish Audit of Surgical Mortality is a process to review each hospital patient death under the care of a surgeon irrespective of whether the patient has had surgery. All surgeons and anaesthetists participate in the reviews. On notification of a death, surgeons and anaesthetists are asked to fill in a form pertaining to the case. Charts are reviewed by a consultant from a different health authority and if areas of concern are identified the review may become more in depth. (According to a 2007 report, areas of concern were detected in 16% of the cases.17) When areas of concern are found, they are sent back to the surgeon or anaesthetist for educational purposes. More recently, the local medical director is notified to ensure there is appropriate follow up to the findings.

There is strong support from surgeons and anaesthetists for SASM. Of note, the focus of attention continues to be on surgical infections and on palliative care services. One issue that previously concerned NHS Scotland was whether their intensive care units were being used appropriately. Their studies have demonstrated that use of critical care is appropriate for the acutely ill surgical patient.

The Surgical Care Improvement Project (SCIP)

A partnership of national organizations in the USA initiated a project in 2005 to reduce surgical complications by 25%. The project focuses on four high risk areas of complications: infection, blood clots, adverse cardiac and respiratory events; within the following surgical procedures: CABG and other cardiac surgery; hip, knee, colon surgery, hysterectomy, and vascular surgery; and other major surgery. These target areas are chosen by an expert advisory panel. Data elements are collected through a software package available free of charge and aligned with the accreditation standards of the Joint Commission. Data is submitted in an encrypted format to a data warehouse; a data validation process has been established to ensure ongoing collection of good quality data.

The Joint Commission and SCIP are supportive of risk adjustment although rolling out risk adjustment strategies has not gone beyond AMI, VBAC, 3rd and 4th degree tears after vaginal delivery and inpatient neonatal mortality (as of July 2008).

Besides data gathering, the supportive techniques offered through SCIP include a listserv for participants, tools (e.g., SCIP antibiotic selection pocket card), change ideas, stories, and links to supporting sites, resources and presentations.

Members of SCIP are expected to register 10% of their surgical cases.

**The Surgical Care and Outcomes Assessment Program (SCOAP)**

Washington State has created a voluntary physician led state-wide surgical quality improvement program to improve care and outcomes of people undergoing general surgery. SCOAP claims it is a QI program, not a data registry or accreditation program. It is the backbone for tracking many state-wide major surgical procedures and is less driven by concerns for any one particular surgical procedure. SCOAP is the outgrowth of COAP, the Clinical Outcomes Assessment Program for cardiac care.

SCOAP focuses on specific procedures including colon, bariatric (weight loss) and proctectomy procedures and other general surgical interventions. The data definitions are standard between SCOAP, SCIP and NSQIP. The Foundation for Healthcare Quality provides a neutral safe haven for housing the data. Being separate, the Foundation can respond flexibly to issues arising in surgical care and change focus quickly. The Foundation is guided by an advisory board that plans strategic and policy decisions.

An example of an audit form is shown in Appendix C.

The goal is to decrease the amount of variation occurring across the State in surgical care. SCOAP actively develops and deploys checklists and standardized order sets for various surgical conditions. Standards are developed through a collaborative process. There are opportunities for surgeon leaders and data abstractors to meet to share information. Some of the standards include antibiotic delivery time, use of anticoagulants, testing lymph nodes for cancer, re-operation, and misdiagnosis of appendicitis.

An underlying desire of SCOAP is not to use punitive mechanisms. The Foundation and participants are actively exploring public reporting to engage patients and the public in achieving safe surgical care. All members have agreed public reporting would be beneficial. The extent, timing and content remain under discussion.

**The Global Trigger Tool (GTT)**

The Global Trigger Tool\textsuperscript{18} was developed in 2000 by the Institute for Health Improvement (IHI). Trigger tools exist for global assessment, perinatal, neonatal, perioperative, and outpatient. The tool is designed to find “triggers” associated with an adverse event (see Appendix B). The tool only identifies adverse events caused by an action within the healthcare system as opposed to events caused by inaction or actions of commission vs. actions of omission.\textsuperscript{19} The process involves reviewing 10 charts

\begin{itemize}
  \item \textsuperscript{18} IHI Global Trigger Tool for Measuring Adverse Events 2009, Second Edition.
  \item \textsuperscript{19} In the Baker and Norton Canadian adverse event study, it was estimated that the errors of omission for surgical patients were about equal to the errors of commission.
\end{itemize}
randomly selected from all relevant discharges of an institution every two weeks (or 20 charts every 4 weeks). The purpose is to follow trends over time to determine whether changes in the system are leading to or maintaining improvements in care. It is recommended 12 data points be collected before any attempts at trending begin.

The charts are independently reviewed first by two clinicians, usually nurses, and then by a physician who authenticates the nurse reviewers’ findings of the adverse event and its severity, and when necessary, answers questions posed by the nurse reviewers. The nurse review takes a maximum of 20 minutes per chart, a time limit established during early experience with the trigger tool to ensure there is no bias against pulling larger complex charts in the random selection process but long enough to find evidence of adverse events.

Some data systems can identify triggers automatically which can reduce the time taken for reviews; although, manual reviews will not be completely replaced by the data systems analysis. Data collected in the trigger tool are not useful to compare between organizations but are meant for internal trending.

Some clinicians have difficulty with the validity of the trigger tool. Another strategy of event reporting (analogous to BC’s PLSL) surfaces only about 10-20% of errors and of those, 90-95% do not cause an adverse event or patient harm. Most importantly, the trigger tool is not a quality improvement program. Specific actions must occur outside of the trigger tool data; however, the trigger tool can give an unbiased estimate of the most common, or the most severe adverse events and can guide an organization’s responses.

Create a made-in-BC solution

BC has created clinically relevant databases in the past that have impacted positively on the care of patients across the province. Examples include the provincial cardiac registry, provincial renal registry, and registries in the BC Cancer Agency (BCCA) designed for specific types of cancer. Others, like the perinatal registry, were imported from elsewhere and modified for the BC environment. All have provided excellent data to create quality improvement opportunities.

These made-in-BC databases were championed by specific clinicians and often evolved over many years. Once some acknowledgement of success was noted, the registries were supported and incorporated into the larger IT systems where they currently reside.

That said, creation of each database took considerable time and patience – long-term start up costs and a significant commitment were needed. Whereas it is reasonable to suggest BC has the capability to create a surgical measurement tool, the upfront costs and the inability to compare data outside of BC—it is probable no other institution or region would use the same tool—forces the authors of this report to recommend against this strategy at this time as a permanent solution. However, there are many elements or

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20 Additional charts can be reviewed with some improvement in statistical significance up to 40 charts per month but there is minimal improvement in information beyond 40 charts.
characteristics from other surgical quality improvement programs which should be incorporated into the BC solution.

**Some cautions about audits**

The references reviewed from the Royal Australasian College of Surgery provided some important guiding thoughts on how audits can and should be supported.\(^\text{21}\)

“**What Makes for Effective Audit?**

**Promotion of a culture of audit**

Some of your colleagues may regard surgical audit as unnecessary or threatening, so it is essential that audit is undertaken in an atmosphere that highlights educational aspects, is regarded as non-threatening or ‘safe’, and is carried out in a culture of ‘no-blame’. This atmosphere enables open discussion of findings, and participants will be able to discuss their feelings concerning audit reviews. Creating such an environment depends on physical and social aspects and the culture of the practice or hospital in which you work. The importance of assuring quality outcomes through improved risk management is now accepted as a necessary element of clinical practice.

**Allocate time and resources**

Audit should not be allowed to become a burden, as this will make participation difficult. It should be considered as part of normal clinical practice. In a survey of 88 surgical units from 74 Australian hospitals with more than 70 beds in 1998, Eno & Spigelman found that hospitals had insufficient resources to conduct audit to RACS requirements. Getting help with data collection is important. Resources should be made available by your hospital, as clinical audit and peer review are requirements for maintaining CPD and credentialling. Critical incident monitoring is also a component of VMO contracts in some jurisdictions – this may be a potential source of funds.

**Oversee and verify data collection**

It is important to collect the essential data only, and keep it simple. You should allocate responsibility for who collects which data. The data should be accurate and complete, with clinical details provided by clinicians. Review the data regularly and frequently, and troubleshoot immediately. Don’t forget to look for:

- the complication that didn’t occur;
- the death that was missed;
- the house surgeon’s diagnosis that was misconceived;
- the misinterpreted pathology report; and
- the reason for the misdiagnosis.

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\(^\text{21}\) A guide by the Royal Australasian College of Surgeons: Surgical Audit and Peer Review.
Productive peer review

Audit is only effective if we ‘close the feedback loop’ by following through on findings and outcomes. Good follow up and implementation of change requires the surgeons to work closely with management and putting in place systems for quality improvement and risk management. Hospital administrators may need reminding of the safety and risk management aspects of recommendations arising from audit activities and morbidity and mortality meetings.”

The rationale for risk adjustment

Process audits can be compared – for instance, the percentage of patients who receive antibiotics on schedule before surgery – whereas comparing outcomes are more difficult. Process audits can be used effectively to compare processes between institutions at any given time, and even to compare individual surgical groups or institutions over time because generally the type of patient does not change that much from year to year.

In order to compare outcomes the status of the patient before surgery becomes very important; factors such as age, co-morbidities and presentation for surgery become relevant and influence the outcome. This implies the status of all patients, individual institutions, or surgeons care must be assessed to address the risk of their outcome, based in part on the patient characteristics before surgery. This process is known as risk adjustment.

Risk adjustment requires a fairly large database to estimate risks based on patient factors. The NSQIP has a risk adjustment strategy22 while other audit programs refer to techniques to provide risk adjustment if required. For instance, the NHS Scotland surgical quality improvement program refers users to the risk adjustment provided by POSSUM (the Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity).23 The POSSUM website describes several risk scoring systems; however, one interesting paragraph deserves mention:

The Veterans Affairs (VA) Surgical Risk Study is probably the largest and most contemporary risk adjustment programme which has been implemented in the US. The study was conducted in 44 Veterans Affairs Medical Centres and included 87,078 major non-cardiac operations performed under general, spinal or epidural anaesthesia between 1991 and 1993. The main outcome measures were 30-day operative mortality and operative morbidity. The investigators used logistic regression analysis to provide risk-adjustment models for all operations for eight surgical specialities and compared surgical performance using observed to expected mortality and morbidity ratios.

This is the risk adjustment technique used as the basis of the ACS NSQIP database.

22 Personal communication with Kathy Rowell, May 2009.
23 http://www.riskprediction.org.uk/sss.php
Table 5 provides a high level comparison of the major design features of surgical quality improvement programs and the means by which they tend to gather data.

**Table 5: Comparison of major design elements**

<table>
<thead>
<tr>
<th>Sponsor</th>
<th>Austral-Asian</th>
<th>NHS Scotland</th>
<th>NSQIP</th>
<th>SCIP</th>
<th>SCOAP</th>
<th>Trigger Tool</th>
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<tbody>
<tr>
<td>Sponsor</td>
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<td>NHS Scotland</td>
<td>American College of Surgeons</td>
<td>The Joint Commission</td>
<td>Foundation for Healthcare Quality in Washington State</td>
<td>IHI</td>
</tr>
<tr>
<td>Main traits</td>
<td>Audits and clinical indicator sets</td>
<td>General surgery, vascular, joint, breast plus surgical mortality for all specialties</td>
<td>Outcome and process indicator database</td>
<td>Procedure and process data gathering</td>
<td>Procedure and outcome data gathering</td>
<td>Chart review to detect adverse events</td>
</tr>
</tbody>
</table>

**Surgical specialties**

<table>
<thead>
<tr>
<th>Sponsor</th>
<th>Austral-Asian</th>
<th>NHS Scotland</th>
<th>NSQIP</th>
<th>SCIP</th>
<th>SCOAP</th>
<th>Trigger Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical specialties</td>
<td>Audits in cardiac, breast and colon cancer, vascular, joint and a rural surgical craft group</td>
<td>General surgery, vascular, joint, breast plus surgical mortality for all specialties</td>
<td>General, vascular, OB/GYN, neuro, ortho, ENT, plastic, cardiac, thoracic, urologic – covers all procedures within each specialty</td>
<td>Procedures such as CABG, other cardiac, hip, knee, Colon surgery, hysterectomy, vascular surgery and other major surgery</td>
<td>General surgery – appendectomy (false positives), bariatric procedures, colectomy and proctectomy</td>
<td>Can be targeted depending on how the random process for pulling charts is designed</td>
</tr>
<tr>
<td>Strengths</td>
<td>Austral-asian</td>
<td>NHS Scotland</td>
<td>NSQIP</td>
<td>SCIP</td>
<td>SCOAP</td>
<td>Trigger Tool</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>-------</td>
<td>------</td>
<td>-------</td>
<td>--------------</td>
</tr>
<tr>
<td>Peer review. Compulsory involvement of surgeons.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Trust (HA) data and compulsory follow up reports on improvement. Public reporting.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linked with Medicare and Medicaid. Many variables in common with NSQIP.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple, chart based, looks for trends over time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reports created</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes</th>
<th>Yes - ??</th>
<th>Yes</th>
<th>Minimal automatically</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Local/central review</th>
<th>Central review then disperse locally</th>
<th>Local but responses sent centrally</th>
<th>Local but groups are collaborating and reviewing</th>
<th>Local</th>
<th>Central review and then disperse locally</th>
<th>Local</th>
</tr>
</thead>
</table>
4. Evaluation of surgical quality improvement programs and surgical measurement tools

Based on the complete background material for each surgical quality improvement program, the surgical measurement tool can be assessed as to its strengths and weaknesses for each of the identified criteria. In Table 6, each program was given a 0, 1, 2 or 3 plus signs (+) depending on how well the program met the criterion. Following the table is a discussion outlining in more detail how the scoring system was allocated.

Table 6: Evaluation of surgical measurement tools compared to criteria**

<table>
<thead>
<tr>
<th>Designed to:</th>
<th>Australasian</th>
<th>NHS Scotland</th>
<th>NSQIP</th>
<th>SCIP</th>
<th>SCOAP</th>
<th>Trigger Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criterion</td>
<td>Audit</td>
<td>Audit, surgical mortality</td>
<td>Outcome and process database</td>
<td>Outcome and process clinical indicators</td>
<td>Audit</td>
<td>Chart review to identify adverse events</td>
</tr>
<tr>
<td>Measures outcomes as well as process</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Crosses many specialties</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>++</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Data can be compared</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>+</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Risk adjusted for population treated</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>++</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Clearly defined definitions of terms, data elements</td>
<td>++</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Demonstrated ability to improve surgical care</td>
<td>++</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Acceptability to surgeons and anaesthetists</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Ability to interface with Cerner or Meditech</td>
<td>-</td>
<td>-</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Report generation and access to data</td>
<td>++</td>
<td>++</td>
<td>+++</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Ease of implementation</td>
<td>++</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>16</td>
<td>28</td>
<td>13</td>
<td>14</td>
<td>13</td>
</tr>
</tbody>
</table>

**The rankings are applied subjectively based on the information available and there is no weighting of the criteria.

Measures outcomes as well as process: All surgical measurement tools reviewed are or can be adapted to address outcomes as well as processes. Some actively look longer for some complications – e.g., 30 day mortality rather than in hospital mortality.

Crosses many specialties: Most of the surgical measurement tools focus on general and vascular surgery. NSQIP is clearly the most comprehensive with respect to the various disciplines of surgery.

Data can be compared: all surgical measurement tools create data that can be compared within institutions over time. Comparison between sites must be performed with caution as risk adjustment is required.
Risk adjusted for population treated: NSQIP is the only tool to offer built in risk adjustment strategies. Reference to other risk adjustment techniques are considered in some of the NHS Scotland program but the technique called POSSUM appears to be less comprehensive than NSQIP.

Clearly defined definition of terms and data elements: Data elements are defined for each surgical measurement tool but differences exist. NSQIP has the most comprehensive definition set and there are weekly conference calls to allow the SCNR to ask questions and raise issues. NSQIP provides annual analysis of the data quality coming from each site. The NSQIP software and data validation process assists in making valid comparisons. The others do define the data but definitions have to be developed as each new audit proceeds. Further, given audits are defined to be looking for local, often more detailed information, the definitions do get altered to suit the audit goals which not only takes further time but increases the likelihood the audit information cannot be compared to institutions outside the group, or to other similarly audited groups.

Demonstrated ability to improve surgical care: Each surgical quality improvement measurement tool can produce annual reports and other publications demonstrating how its program has been successful in improving the quality of care. NSQIP has a very large reference list of impacts which implies a large number of institutions have been able to find solutions to problems and hence can be useful sources of good information to improve specific problems that might arise in BC facilities.

Acceptability to surgeons and anaesthetists: From a general perspective, surgeons find risk adjusted data more acceptable as it alleviates comparison of “apples to oranges”. From a BC specific perspective, some surgical groups are already using NSQIP (Surrey Memorial Hospital and Royal Columbian Hospital) and another is planning on enrolling (Burnaby General Hospital). In personal conversations with others,24 it is clear many surgeons in the province are aware of NSQIP and would be very supportive of its introduction in BC.

Ability to interface with Cerner or Meditech: Integration with the two clinical information systems is not well understood at this time as the references and people we spoke to were unable to provide the answers. NSQIP can interface with Meditech but other integration issues have not been identified.

Report generation: All surgical quality improvement programs distribute reports to individual sites and often to “larger” groups analogous to BC’s health authorities, boards or provincial surgical advisory committees. SCOAP and NHS Scotland provide, or intend to provide, public information regarding surgical outcomes. Some of this data is de-identified to prevent the identity of specific hospitals. All surgical quality improvement programs have Steering Committees

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24 Personal communication with Dr. David Butcher, Vice President Medical, NHA and Dr. Garth Warnock, Head, Department of Surgery, UBC and VCHA, Dr. Bill Simpson, Department Head Surgery Prince George Regional Hospital.
that take ideas and suggestions about other analyses that might be done with the data; NSQIP allows researchers from enrolled groups to access their full de-identified database to do analysis of interest to them.

**Ease of implementation:** NSQIP's surgical measurement tool requires an upfront commitment of resources and nurse reviewers. The other tools typically require more up front work to determine which audits are going to be done and how the data is going to be defined and collected. This requires a commitment of relevant personnel—e.g., data collection staff—identification of the resources to support them, and identification and resolution of the interface issues arising between the audit tool and the clinical information system. It is quite likely the initiation and implementation phases of almost all programs would be longer than that required for NSQIP.

Of the six tools evaluated, NSQIP emerged as the best surgical quality improvement measurement tool. The others five tools group between 13 and 16 points, this clustering possibly in part due to: their design orientation as audit tools; that they have minimal or completely lack risk adjustment; that they do not cross multiple surgical specialties; or that they are less experienced in demonstrating improvement. It appears NSQIP is the only surgical database tool specifically designed to collect patient specific risk adjusted data for all specialties. It is designed to be well suited for ongoing surveillance of surgical care.

**Surgical Quality Improvement Measurement System Costs**

Costing a surgical quality improvement measurement system is challenging—there are several aspects to consider. Often the easiest costs to attribute to the system are those directly attributed to the measurement system itself. This includes the purchase of materials, software, and intellectual property. There are also indirect costs to consider, such as those incurred by the program or organization to implement, educate, and manage change, as well as long-term cost savings associated with improvements in quality of care and those associated with offsetting other costs in the surgical quality improvement measurement system.

Making direct cost comparisons between various surgical quality improvement measurement systems is a second challenge: there are no common costing assumptions or principles. In programs such as the NSQIP, costs are clearly identified up front, as are the expectations for what is needed to run a successful program. Other programs are less explicit. For programs focused on audits, the tools are downloaded free of charge, however the user organizations may need to assume significant costs to implement the tools.

This section provides an overview and quantifies, where possible, the costs of implementing a surgical quality improvement measurement system, including identifying indirect costs where appropriate, and providing a sense of the cost savings achievable by improving the quality of surgical care in BC.
ACS - NSQIP

The American College of Surgeon’s (ACS) National Surgical Quality Improvement Program has some of the most explicit costing information available. Registration in the program costs $35,000 USD per facility and $35,000 USD annually per facility thereafter to participate in the program. For the annual fee the ACS provides a number of online tools including QCMitt and the Nurse Workstation. The QCMitt is an XML data schema allowing participating sites to automatically transmit any data residing in its existing hospital systems automatically to the NSQIP program, reducing the need to re-enter data. The Nurse Workstation is a software tool to help the Surgical Clinical Nurse Reviewer (SCNR) manage work flow. Because the data sent to the NSQIP program is stripped of all patient identifiers, a site cannot easily follow its patients for 30 days without creating a parallel manual system or an additional freestanding database. The Nurse Workstation solves this problem.

The cost of educating and testing the Surgical Clinical Nurse Reviewer (SCNR) to ensure quality of data collected is acceptable is included in the annual fee. Additionally, participating hospitals have access to a number of online tools including ACS NSQIP data, facility specific data and online reporting. All data is available to be viewed in online reports and may be compared to all other sites submitting data. There is a “descriptive statistics” section in the annual report that characterizes the dataset, including surgical procedure volumes and types, cases excluded from the observed/expected (O/E) ratio calculation with accompanying reasons, and a detailed analysis of 30 day follow-up rates. Other types of reports available online include occurrences, mortality reports, surgical site infections, database statistics, and customized reports (participants are entitled to 4 hrs/month of data analysis to create ad hoc reports for the participating site). There is also access to institutions demonstrating leadership in various surgical performance measures, providing opportunities for rapid improvement of care processes.

The major costs not included in the $35,000 USD annual fee are costs associated with change management (which, depending on organizational capacity, may be significant), the salary and benefits for the SCNRs, the surgeon champion, and possible IT costs. A participating facility or group of facilities will need to secure funding to hire one or more SCNRs to meet the hospital’s data collection/submission needs. The NSQIP program’s experience is one full-time SCNR is capable of capturing 1,680 cases annually. The costs for the SCNR are estimated at $100,000 Cdn including benefits. The American College is aware of the high costs associated with a SCNR and are currently looking at alternate models to help reduce this cost while still maintaining high data integrity.25

A surgeon champion is key to the program’s success. A surgeon champion is a well respected individual who has decision-making capabilities within the organization. The surgeon champion provides support for the SCNR, promotes the program within the

25 Personal Communication Kathy Rowell, Chief Operating Officer & Executive Vice President QC Metrix, May 2009.
facility, participates in conference calls, attends the annual conference and champions QI initiatives and change strategies to achieve surgical improvement.

Depending on the organization, there may be IT costs including interface costs. The NSQIP program is compatible with Meditech and a large number of other administrative and clinical database IT providers. Change management costs—which will be applicable regardless of the program the BCPSQC decides on—will need close scrutiny to ensure adequate and appropriate funds are in place to maximize the opportunity for success.

American payers have begun to recognize how important managing quality is in keeping down costs. In August 2005, the ACS partnered with Blue Cross Blue Shield of Michigan (BCBSM) and its HMO affiliate Blue Care Network to study outcomes in Vascular and General Surgery at the fifteen largest hospitals in Michigan, USA. The program was to evaluate the results of the general and vascular surgery procedures performed in the institutions. Participating hospitals submitted surgical patients' outcomes data to the ACS’s National Surgical Quality Improvement Program (ACS NSQIP), making use of its data collection and analysis instruments, which have a proven track record in the Veteran's Affairs (VA) surgical care system. This collaboration represented a pioneering effort between a national medical organization and a health plan to evaluate and improve the quality of surgical care, while ultimately reducing health care delivery costs.

In the 'pay for participation' arrangement, a large proportion of the data collection costs were distributed equally to the participating hospitals in recognition of their commitment to surgical quality. Individual hospital results are not disclosed to BCBSM, but overall results are monitored carefully and are expected to show a significant improvement over time. "In contrast to the 'pay for performance' model, the 'pay for participation' approach produces no winners or losers among hospitals. The winners are the patients," according to Darrell A. Campbell, Jr. MD, FACS, Professor of Surgery and Chief of Staff at the University of Michigan Health System, Ann Arbor, and Chair of the ACS NSQIP Advisory Committee.

Due to the success of the program, over the next three years Blue Cross Blue Shield of Massachusetts and of Tennessee provided grant money to further their states' patient safety program. Funding in these states was used to support use of the ACS NSQIP. The pay for participation in the state-wide approach resulted in benchmarking activities, collaborative data sharing, greater detailed analysis of results, focus on regional problem areas, and the identification of best practices. This commitment was undertaken by Blue Cross Blue Shield because it saw by supporting the NSQIP program, patients were making fewer claims, resulting, in the long-term, in increased savings for Blue Cross Blue Shield. Similarly, IBM, Pepsi Co, Verizon, Xerox, and Boeing have had significant Blue Cross Blue Shield co-pay reductions when using hospitals using the NSQIP program.
Cost of other surgical quality improvement programs

The associated costs for the remaining programs are very similar and will be described together: for the Australian, SCIP, and Scottish programs there is little in the way of program attributable costs. Any differences between programs will be highlighted separately.

In most cases, the necessary materials such as the audit forms are available within the public domain or from the sponsoring organizations. The SCOAP program does charge participating hospitals fees to participate in the program. The SCOAP program has a number of “supporting partnership organizations” who offer various support services, some for a fee—for example, Premier is widely used by organizations to assist with the data collection—however, the actual fees charged by the organizations could not be verified.

With the four programs, and to some extent with NSQIP, most of the costs are internal to the organization and depend on the organization’s capacity in the areas of:

- surgeon champions;
- operations leadership;
- auditors;
- database development;
- interfacing the database with the institution's clinical information system;
- audit tool modification;
- data collection & analysis;
- reporting; and
- change management/quality improvement.

In addition and depending on which program is implemented, there may be a need for expertise in methodology development or oversight, screening of clinical cases, case finding, and assuring that appropriate practices and procedures are in place to screen for events, collect, enter and analyze data, and collect infection control practices.

The final set of costs to consider is surgeon and anaesthetist associated costs. It is important to engage physicians in ways to maximize their contributions while being cognizant of the “cost” the time taken to provide the input has on their clinical practice.

The surgeons’ costs can be separated into short-term and medium-term costs. During program start up, surgeons and anaesthesiologists should be involved in the development and implementation of the quality improvement program, both as champions and in providing input as a frontline provider. The surgeon champions will be required to participate in meetings, conference calls, process development, validation of audit tools and determining which measures or indicators to collect. The physicians will have an important role in determining how to best report results to other physicians and surgeons. There will be a need to educate and inform the structural leaders about the proposed measurement tool, how it will positively and negatively impact their in-hospital practice and what key activities will require physician involvement.
Once the surgical quality improvement measurement tool has been initiated and the early implementation phase is completed, the surgeons and anaesthesiologists will play important roles in modifying clinical processes and audit tools (i.e., using the results to make positive changes in clinical practice that improves care to the surgical patient). Physicians will need to participate in ongoing communication within their departments and within the organization as a whole.

We were unable to quantify the actual physician-related costs. Given this uncertainty, it will be important to develop a set of principles or criteria describing which physician-activities will be paid for and which will not. In addition, the rate of compensation will need to be established. This will help form a basis for compensation for quality improvement activities by physicians and may help provide consistency in the payment structure. It is important not to underestimate these costs.

There will be additional costs that we are unable to identify. As with any project, unexpected costs arise as the project becomes further defined. An appropriate contingency fund should be established to mitigate these costs.

**Cost of a made-in-BC solution**

Although developing a made-in-BC surgical quality improvement measurement tool initial may be appealing, it is not without its own challenges, including surgeon and anaesthesiologist acceptance of the data and the results arising from such a system. This is especially true when physicians believe there are better, clinically validated measurement systems in the market place. Another challenge would be the availability of expertise and time to develop the system.

Considering the associated development and maintenance costs, a “made-in-BC” solution may be more expensive in the long-term and therefore is not recommended.

**Summary of costs**

Assessing costs to begin, implement and operate a surgical quality improvement measurement tool are complex and multifaceted, both in the short- and long-term. NSQIP costs will be higher up front but not necessarily over the duration of the program. Costs must also be balanced against benefits.

Table 7 compares the costs of each program.
Table 7: Comparative Costs of the Various Quality Improvement Programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Cost Attributed to Program</th>
<th>Cost Attributed to Hospital</th>
<th>Short-Term Cost Attributed to Physicians</th>
<th>Long-Term Costs Attributed to Physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSQIP</td>
<td>+++</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>SCOAP</td>
<td>+</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>SCIP</td>
<td>+</td>
<td>++</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>AUSTRALIAN</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>SCOTLAND</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>++</td>
</tr>
</tbody>
</table>

++ Low Cost  
++ Medium Cost  
+++ High Cost

Short-term physician costs are costs (financial and/or time commitment) physicians would incur at program start up related to program planning, education, and development/revision of audit tools, etc.

Long-term physician costs are costs physicians would incur over the length of the program related to data evaluation, practice changes which could vary if there are, or are not, examples of leaders in quality.

**Observations from other surgical quality improvement programs for BC to consider**

Reviewing other surgical quality improvement programs identified several strategies for BC to consider when implementing a surgical quality improvement program. The following list is included to generate further discussion: These are not recommendations but suggestions with merit that bear further scrutiny.

1. The Royal Australasian College of Surgery website referenced a superb set of clinical indicators covering numerous aspects of clinical care. This background set of information should be available to BCPSQC for future reference as it may provide important quick reference to measures in future data systems.

2. Surgeons in the Royal Australasian College of Surgery take part in an audit each year in order to receive credits in continuing medical education.

3. The Scottish audit process required regions to respond to their own hospital data to demonstrate how the data were used to improve processes, or how the data could be improved.
4. NHS Scotland collects a comprehensive assessment of each patient who dies while under the care of a surgeon, asking for detailed information from the surgeon and anaesthetist involved.

5. Public reporting was done by NHS Scotland in a manner that maintained confidentiality for the hospitals involved. SCOAP is considering moving to a more public reporting of the results for each hospital. Public reporting is gathering favour.

6. Many surgical quality improvement programs used listserv strategies or websites to provide access to information, including clinical protocols for enrollees.

7. The SCOAP program put considerable effort into checklists and protocols to decrease variability across the State of Washington.

8. The Scottish system, and others, use very clear accountabilities for Boards and others to ensure data are used and that improvement occurs.

9. SCIP is linked to accreditation for hospitals providing Medicare and Medicaid.

10. The Trigger Tool is quite simple to start and not terribly expensive. There have been suggestions that a focused trigger tool application could assist in ensuring gains achieved through a quality improvement initiative are maintained.
5. Recommendation

Based on formal evaluation, interviews with end users, and costing, it is our recommendation that BCPSQC use the American College of Surgeons’ National Surgical Quality Improvement Program (NSQIP) measurement system.

Developing and implementing a provincial surgical quality improvement program is a necessity for British Columbia. It will require an iterative process. There is no perfect place to start; however, establishing a credible, clinically validated, outcome orientated, risk adjusted measurement system is a good starting point.

Measurement systems are an important starting point for a program because it provides the opportunity to have clinically meaningful data for health care providers to improve patient care. Without credible data, meaningful decisions are difficult to make.

The NSQIP system is a nationally validated, risk-adjusted, outcomes-based program to measure and improve the quality of surgical care. It allows for valid comparison of outcomes among all hospitals in the program. It facilitates identifying “best practises” and dissemination of shared learning across the sector. It currently is the only surgical database--most of the others are audit tools.

NSQIP is currently being used in two facilities in British Columbia – Surrey Memorial Hospital and Royal Columbian Hospital. It is well accepted at both sites and improvements in clinical outcomes are being seen at Surrey Memorial. (Surrey Memorial has experienced an increase in the recruitment of Operating Room staff based in part on the hospital’s commitment to quality improvement.) Additionally, there are plans to implement NSQIP at Burnaby General Hospital and at a site in Quebec. There is a general desire by the surgeons in British Columbia to use NSQIP and surgeon champions currently exist within the province, which could significantly assist with the implementation of quality improvement recommendations and associated change management. The biggest challenge with adopting the program is cost.
6. Next Steps

Assuming that there is a decision to proceed with the recommendation to use NSQIP as the surgical quality improvement measurement tool for BC, the following preparatory steps should be considered. There should also be negotiations with ACS to adjust the costing model currently in use for NSQIP. Once costs are known for certain, consider various strategies as to how the NSQIP could be applied to learning about BC surgical care in a manner that might vary from complete coverage of all surgical sites and services to some sort of sampling technique.

1. Create a finalized design for the BC Surgical Quality Improvement Program by deciding:
   a. who will help lead the design,
   b. who will manage the program - BCPSQC, the Health Authorities, or an independent organization analogous to the BC Renal Agency,
   c. who will manage the budget of the BC Surgical Quality Improvement Program both at the design and implementation phase and for the ongoing operations of the program,
   d. how will accountability be managed at provincial, regional, committee, medical leadership, surgery group and individuals.

2. Create a detailed budget based on the NSQIP design taking into account direct and indirect costs, as well as the ongoing operating costs of the BC Surgical Quality Improvement Program. The budget should provide for unanticipated costs that may not be easily identified and could jeopardize the success of the program.

3. Create a comprehensive plan to roll out the BC Surgical Quality Improvement Program that addresses both the Program complexities and multiple stakeholder involvement. Ideally, it should use innovation theory to increase the probability of acceptance and successful functioning.

4. Create an evaluation program addressing both the formative and summative evaluation of the program during its initial design, implementation and ongoing operations. The innovation model can be used for creating a strategy for evaluation and structures such as those found in the European Foundation for Quality Management\textsuperscript{26}.

\textsuperscript{26} www.efqm.org
Appendix A: Principles for Designing a Clinical QI Program

For organizations to successfully deliver high quality patient care, organizations need to establish an appropriate quality improvement system. This framework, the BC Patient Safety and Quality Council (BCPSQC) Surgical Quality Improvement Program, is a practical tool to assist organizations to accomplish improved surgical care by measuring where they are on the path to quality excellence; helping them understand the gaps; and then stimulating improvements. Successful programs emphasize performance and clinical outcomes. In many successful programs there is an ability to do this in part by implementing clinical standards, guidelines and care paths through the efficient and effective use of quality improvement methodologies.

Quality as defined by the Institute of Medicine\(^\text{27}\) is the degree to which services and treatment increase the likelihood of desired outcomes and is consistent with current professional knowledge.

The relevant literature demonstrates a strong and unwavering commitment to safety and quality results in demonstrable benefits, not only for the patients but for the organization, including improved clinical outcomes, less complications and deaths, greater efficiency and lower costs. A surgical quality improvement framework should encompass staff and patient values, identify clear priorities, allocate resources, provide education, address risk, illustrate the QI methodology and outline the supporting committees, reporting structures, accountabilities and resource support.

Quality Improvement programs take time to implement – results can be achieved in a staged approach. The programs are iterative; require constant development by the organization to meet changing internal and external contexts, expectations, and needs. This Framework provides a starting point for the organizations involved with surgical care and surgical quality improvement to develop a coherent and consistent approach to monitoring, reviewing, evaluating and adapting its services to meet the needs of all patients undergoing surgical procedures.

**Purpose of a Surgical Quality Improvement Framework**

The proposed Surgical Quality Improvement Program Framework aims to develop a coherent, sustained and sustainable approach to surgical quality improvement by working with key stakeholders including but not limited to health authorities, Ministry of Health Services, physicians, nurses and other key health care providers, to raise the quality of surgical care across the province of BC. The Framework is designed to promote the necessary consistency and coherence of quality improvement within surgical services.

The Framework describes the intersection of the BC Patient Safety and Quality Council matrix and the BCPSQC Surgical Quality Improvement Program processes that are essential for quality improvement to occur within a defined surgical mandate.

Principles of Quality Improvement\textsuperscript{28, 29}

Quality is the accumulation of the entire process from the initial concept to end product.

1. Create consistency of purpose for improvement
2. Adopt a new philosophy
3. Improve constantly
4. Institute training
5. Adopt and institute leadership
6. Drive out fear
7. Break down barriers between operational areas
8. Remove barriers
9. Encourage education and self-improvement for everyone
10. Take action to accomplish the transformation

Principles of a quality oriented health care system

1. Patients are the primary focus
2. Board, CEO, Executive and Senior leadership take responsibility for creating and maintaining structure, culture and policies for managing the safety and quality of health care
3. Open honest culture (Just & Trusting culture)
4. Emphasis on preventing adverse outcomes through simplifying and improving the processes of care
5. Care providers are responsible for the standard of their own practices
6. Patients have ready access to effective systems of complaints and compliments
7. Treatment based on best available evidence
8. Measure systematically with a focus on minimization of inappropriate variability
9. Health care providers have access to outcomes of care

**Governance Elements**\(^{30, 31}\)

**Leadership**

Clinical governance emphasizes the importance of Boards to govern clinical safety and quality with the same rigor it applies to corporate governance. Boards and Executives should regularly audit its knowledge, performance against well defined patient safety, and quality targets, identify gaps and develop appropriate strategies to improve on areas of opportunity.

Boards should work with the CEO, clinicians and management team to develop a quality plan and monitor it on a regular basis. Staff and physicians should be equipped and supported to be involved in a meaningful way to improving the safety and quality of patient care.

Strong leadership is the foundation of an effective quality improvement and safety program. The behaviour of the program’s leaders creates a clarity and unity of purpose within the program, with its stakeholders and an environment in which the program and its people can excel. How leaders develop and facilitate the achievement of the mission and vision, develop values required for long-term success and implement these via appropriate actions and behaviours, and are personally involved in ensuring the program’s quality improvement system is developed and implemented contributes or hinders the success of the program. Strong leaders are personally involved in the activities of the program and motivate, support and recognize the program's people.

The program’s leadership should empower and resource the clinical and non-clinical personnel. This could include tangible assistance with funding, administrative support, backfilling staff, increasing incentives, and removing barriers including perverse incentives. In this way, the people involved in the program will better able to participate in the QI program and feel supported doing so.

It will be critical for program leaders to develop a Surgical Quality Improvement Program quality improvement plan, which maps out the why, what, who and how of the QI program. It should be developed in collaboration with the clinical and non-clinical staff and within a broader strategic context. It should clearly state the program’s priorities. The plan is able to facilitate the reporting of results without blame or shame and outline the process for moving forward. A key to continuous improvement is strong communication, commitment, where data and information is collected, analyzed, acted upon, and improved clinical outcomes are achieved.

“Quality improvement is often perceived by staff (and physicians) as the top telling the middle what to do at the bottom”.\(^4\) To be effective the program relies on a number of


different leaders, both clinical and non-clinical, to work together with frontline staff and physicians.

Finally, accountability for improvement in surgical services begins and ends with the individuals of the profession. It is the physicians’ responsibility to provide appropriate surgical care in a way that minimizes the potential for harm and adverse outcomes. This accountability is shared and may include the Ministry of Health Services, BCPSQC, other health care providers and professionals, administrators and support staff of the health authorities.

The risks to success of clinical governance and to successful leadership includes: managerial takeover, bureaucratization, loss of trust, active clinicians excluded or distant from coal face, default to traditional medical administration models, failure to educate, failure to feedback, failure to prevent errors and poor performance, reliance on voluntary incident reporting, and secrecy.

Culture
Culture is often referred to, as “this is how we do business here”. Quality improvement frameworks, principles and practices should be applied in a way that is acceptable and appropriate to each organization involved. The culture of health care is complex in part due to health care itself, the types of organizations where health care is delivered and the broad range of professionals involved. There is a widely held belief in health: “the desire to help people by offering a high standard of service in a timely and courteous manner.” 4 It will be important for the BC Surgical Quality Improvement Program and the organizations involved with the program to make it easier for staff and physicians to do the right thing at the individual, team and program levels. This will lead to a culture where safety and quality improvement are not only encouraged, but rewarded. Only by achieving this, will the program be able to develop a Just and Trusting culture, that is non-punitive and where staff and physicians are willing to report and learn from adverse events.

The degree to which this culture exists can be measured by a number of well validated culture surveys. Organizations should be encouraged to regularly evaluate the state of its culture. In part, a visible way to demonstrate the culture is by how patient safety reviews are undertaken and through leadership participation in safety walkabouts, safety huddles and the use of safety checklists. The adage of its what you do and not what you say is very true in this circumstance.

People
The full potential of the program’s people is best released through shared values and a culture of trust and empowerment, which encourages the involvement of everyone. How the program manages, develops and releases the knowledge of its people at an individual and team based level will be a significant determinant to the success of the program. It is important people’s knowledge and competencies are identified, developed and sustained. Ensuring people are rewarded in a way which aligns with the program’s goals will further drive individual and team based performance.
It is not enough to have good people in the program. For it to be successful, there needs to be effective education and training programs. Education and training in quality improvement methodology for the personnel involved in the program should be a high priority. The quality improvement methodology chosen should be relevant to the program and the participating hospitals and organizations. It should facilitate strong communication. The quality improvement methodology chosen should have a number of improvement tools and techniques to diagnose, monitor, and assist with priority setting of activities. It should be able to collect quantitative and qualitative data, analyze and present the results in a meaningful and understandable fashion. Common improvement methodologies include: Plan, Do, Study, Act; Monitoring, Assessment, Action, Evaluation; Breakthrough Collaboratives; Assess, Diagnose, Review, Implement and Six-Sigma. The improvements gained should be embedded in the organization by developing and implementing new standards, policies and procedures; changing clinical processes and practices; system redesign and education and training. Regardless of the methodology chosen, clear explicit change management approaches supported by committed leadership will be essential for success.

Programs

The actual clinical quality improvement programs undertaken within the Surgical Quality Improvement Program will be critical to its success. Each of the initiatives will need to be clearly seen as having immediate and sustainable impact on patient care. It will be important the initiatives are able to be initiated and maintained with minimal disruption to patient care, including the time required by frontline staff and physicians.

Supporting the programs will require an infrastructure, which includes research, surveillance, measurement and program evaluation. Each of these components is discussed in further detail later in the paper.

Organizational Capacity

The ability for an organization to prioritize its scarce resources towards improving patient care is key to establishing and sustaining a culture of quality. The Surgical Quality Improvement Program should establish clear requirements for HR, finance and capital resources, which can be leveraged with the health authorities to establish appropriate components of the Surgical Quality Improvement Program.

Key policies to support the Council and participating organizations include: disclosure, reporting, informing and Just & Trusting Culture policies.
**Key Program Elements for the Surgical QI Program**

**Surveillance**
Surveillance is a key component to any quality improvement program. It is often one of the more difficult aspects to put in place and maintain. There are a number of approaches to assist with the surveillance aspect of the program but the main element is the ongoing routine data collection that guides the program in making decisions. But other data input could come from focused audits, clinically relevant trigger tools, complaints and compliments processes, critical incident reviews (aka patient safety reviews), Coroner’s cases and Inquest recommendations.

**Measures/Indicators**
Measures and indicators can be divided between those providing an ongoing assessment of outcomes and processes and those providing episodic measures. The ongoing measures are more reflective of a broad based trend and are system orientated by nature. Episodic measures are based on needs of the program or organization. Episodic measures typically take a more in-depth focus and often result from the ongoing measures used by the program or organization. Episodic measures include the use of audits, complaints, adverse events, and Coroner’s cases as examples. The measures should be by and large outcome focused, but some will measure process. With the latter, the measure should provide organizations and the BCPSQC with at least
part of the answer to whether outcomes are being achieved, in the absence of robust outcome measures.

The use of measurement systems and the subsequent data arising from such a system must be credible and be seen to be credible. It is critically important the data is believable and the clinicians are able to use it in a manner, which allows them to improve patient care. It should provide a challenging, but manageable set of measures, which will help improve surgical care across the province of British Columbia.

Results are what a program achieves. Excellent programs have results, which show positive trends and/or sustained good performance, targets will be appropriate and be met or exceeded, performance will compare positively with others and will be achieved by the activities of the program. Finally, the scope of the results will address the relevant areas of the program or organization and ideally be linked to the strategic priorities of the facilities using the Surgical Quality Improvement Program.

**Monitoring and Accountabilities**

For the Surgical Quality Improvement Program to be successful within a given organization, a number of key accountabilities are required. The Quality Committees, both at the Board and organization level, are one of the most important committees responsible for overseeing the quality activities of an organization. The committee should take an active safety and quality, planning, monitoring and evaluation role on behalf of the organization.

The Committee should be involved in analyzes and discussion of safety and quality information and taking action in response to the information. There should be prioritization of key safety and quality issues.

The Medical Advisory Committee is another important body used to monitor the quality of care provided within an organization. The Medical Staff Bylaws supported by the Medical Staff Rules describe the relationship and responsibilities between the Board of Directors and the individual medical staff members especially as it pertains to the provision of patient care. Strong leadership from the Medical Advisory will be critical to the successful implementation and sustainment of the Surgical Quality Improvement Program.

The BCPSQC matrix is an excellent starting point for organizations to plan its quality activities. Other compliance monitoring tools include those from Safer Healthcare Now! surgical initiatives, surgical checklist compliance and the consistent use of a surgical registry.

**Reporting**

Once the data is collected and results are obtained it is critical to feed back the information to those who provided it and to those who will benefit from knowing and using the information. This forms the basis for how the information is used to improve patient care. There will be a need to allocate resources (financial, people and possibly capital) to the collection, analysis and reporting of the data.
British Columbia is moving to a provincial model for capturing incident and near incident data. The Patient Safety Learning System holds significant potential for facilitating the learning from such events without having to experience the actual event. The reporting and trending capabilities will be valuable tools to help further the understanding of safety events within the province.

The issue of public reporting is a growing tendency for high performing organizations. It is topical, but organizations are being encouraged to report results publicly in an appropriate manner. A couple of examples of indicators for public reporting could be risk adjusted 30-day readmissions rates and risk adjusted 30-day mortality rates.

Where the outcomes are not being achieved, it will be necessary to set improvement objectives with clear actionable plans with timelines on how the targets will be met. Establishing improvement objectives or goals within the BCPSQC Surgical Improvement Program and in participating organizations will require clear and common understandings about standards of quality, how improvements can be worked towards and success measured.

Setting standards are important. It should be remembered the standard is often a minimum criterion or a starting point for achievement. Once the standard is achieved, the program should look at further revision of the standard.

**Sustainability**

The first challenge for programs and organizations is to get the right people leading the activities. Having appropriate data translated to knowledge that clinicians can understand is critical. These activities alone can generate a significant degree of momentum. The challenge becomes in sustaining the gains for the long term. It is the ongoing improvement in outcomes where the greatest benefits arise. The use of trigger tools is one example of a tool to help the program and organizations sustain the gains.

**Conclusion**

This framework describes the components of both a high quality health care organization and how a BC Surgical Quality Improvement Program would provide a surgical quality improvement program to help organizations move towards becoming a high quality health care organization. The framework outlines methods for clinicians to collaborate to produce high quality safe patient care. The need for strong committed leaders cannot be overstated. The framework helps to improve systems of care and to identify better ways of working and learning for the purpose of improving patient care.
Appendix B: IHI Global Trigger Tool for Measuring Adverse Events

Transfusion or use of blood products
Code/arrest/rapid response team
Acute dialysis
Positive blood culture
X-ray or Doppler studies for emboli or DVT
Decrease of greater than 25% in hemoglobin or hematocrit
Patient fall
Pressure ulcers
Readmission within 30 days
Restraint use
Healthcare-associated infection
In-hospital stroke
Transfer to higher level of care
Any procedure complication
Other

Return to surgery
Change in procedure
Admission to intensive care post-op
Intubation/reintubation/BiPap in Post Anesthesia Care Unit (PACU)
X-ray intra-op or in PACU
Intra-op or post-op death
Mechanical ventilation greater than 24 hours post-op
Intra-op epinephrine, norepinephrine, naloxone, or romazicon
Post-op troponin level greater than 1.5 ng/ml
Injury, repair, or removal of organ
Any operative complication

*Clostridium difficile* positive stool
Partial thromboplastin time greater than 100 seconds
International Normalized Ratio (INR) greater than 6
Glucose less than 50 mg/dl
Rising BUN or serum creatinine greater than 2 times baseline
Vitamin K administration
Benadryl (Diphenhydramine) use
Romazicon (Flumazenil) use
Naloxone (Narcan) use
Anti-emetic use
Over-sedation/hypotension
Abrupt medication stop
Other

Pneumonia onset
Readmission to intensive care
In-unit procedure
Intubation/reintubation
Terbutaline use
3rd- or 4th-degree lacerations
Platelet count less than 50,000
Estimated blood loss > 500 ml (vaginal)
or > 1,000 ml (C-section)
Specialty consult
Oxytocic agents
Instrumented delivery
General anesthesia

Readmission to ED within 48 hours
Time in ED greater than 6 hours
Appendix C: SCOAP Data Collection Form

SCOAP Data Collection Form For Adults (effective for discharges starting October 1, 2008)

Note: Complete one form for each procedure: Appendectomy, Bariatric operation, or Colon surgery. A new record online should contain patient and procedure information for only one procedure.

1) First 2 initials of Last Name/First Name: _____ / _____ 2) Hospital Code: ______

3) Date of Birth: _____ / _____ / _____ 4) Medical record # (optional): __________________

5) Admit Date: _____ / _____ / _____ 6) Discharge Date: _____ / _____ / _____

7) Gender:  Male  Female  Age at Admit _____ (years)

8) Units of Measure  English  Metric  NA

9) Patient Height: _____ (in) OR _____ (cm) 10) Weight: _____ (lbs) OR _____ (kg)

11) Insurance: (Check all that apply)

11.1 Private:  No  Yes  11.2 If private, choose one:  Regence  Premera  First Choice  Group Health

Aetna  Cigna  Uniform Medical

United Healthcare  Kaiser  Other Private

11.3 Medicare:  No  Yes  11.4 Medicaid:  No  Yes

11.5 TriCare:  No  Yes  11.6 Indian Health Svcs:  No  Yes

11.7 VA benefic.:  No  Yes  11.8 Uninsured:  No  Yes

11.9 Self pay:  No  Yes

12) Admission is a transfer from another hospital:  No  Yes

13) ZIP Code Collected:  No  Yes  13a) Residence ZIP Code: ____________

14) Current cigarette smoker:  (within the past year)  No  Yes

15) Most recent laboratory values within 30 days of or upon admission:

15.1 Collected:  No  Yes  Albumin: _____ Gm/dl  NA

15.2 Collected:  No  Yes  Pre-albumin _____ mg/dL  NA

15.3 Collected:  No  Yes  Creatinine: _____ mg/dl  NA

15.4 Collected:  No  Yes  HGB: _____ g/dl  NA

15.5 Collected:  No  Yes  WBC: _____ 10^3  NA

16) Current / recent medications used:

16.1 No  Yes  Immunosuppressant

16.2 No  Yes  Statin

16.3 No  Yes  Beta Blockers

16.4 No  Yes  ACE or ARB Inhibitors

16.5 No  Yes  Therapeutic anticoagulation within 1 week of surgery

17) Home O2 use:  No  Yes

18) Home mobility device use:  No  Yes

Patient Initials: ___________ Date of Birth: ___________ Admit Date: _______________

Comorbidities: If yes, check the best response

19) Hypertension:  No  Yes  No meds  Single med  Multiple meds

20) Diabetes:  No  Yes  No meds  Insulin

Single non-insulin  Insulin + Other

Multiple non-insulin

21) Asthma:  No  Yes  No  Yes  Steroid use

No  Yes  Inhalants

No  Yes  None

22) Sleep Apnea:  No  Yes  CPAP  None

23) Coronary Artery Disease:  No  Yes  History MI  Both
24) History of VTE: No Yes
25) HIV / AIDS: No Yes
26) Primary Surgeon: ____________________________ (Optional; use physician ID # only – NO names)
26a Indicate surgeon specialty General/colorectal surgeon OB/GYN

Indication for operation: Check all that apply within each category

27) For appendectomy: 28 For bariatric surgery: 29 For colon:
27.1 Appendicitis 28.1 Morbid obesity 29.1 Cancer of colon 29.10 GI bleeding
27.2 Appendiceal mass or Cancer
28.2 Other
29.2 Diverticulitis 29.11 Perforation Cancer of rectum
29.3 Other 29.12 Cancer of rectum
29.3a (specify): ____________________
29.3b penetrating 
29.13 Bowel obstruction
29.14 Colostomy
29.15 Radiation colitis 29.16 Ulcerative colitis
29.17 Crohn’s disease
29.18 Arteriovenous malformation 29.19 Stricture
29.20 Ischemic colon 29.21 Other:
29.22 Polyps 29.23(specify):____________________
29.24 Rectal prolapse

30) Time of first Incision Collected: No Yes 30a Time: _____:_____ (24-hr clock)
31) In-room Close Time Collected: No Yes 31a Time: _____:_____ (24-hr clock)
32) Date of surgery: _____ / _____ / _____ 33 In-room close date: _____ / _____ / _____

34) Surgical Approach: Laparoscopic Lap converted to open Lap, hand-assisted Open (no lap ports)

35) ASA Class: I II III IV V Already intubated

36) Highest perioperative blood glucose: No Yes 36a ___mg
37a) Insulin used in perioperative time period: No Yes
37b) Highest Blood Glucose on Post Op Day 1 No Yes 37c) Highest Blood Glucose on Post Op Day 2
(Only applicable if patient is a diabetic)

Patient Initials: ___________ Date of Birth: ___________ Admit Date: _______________

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If procedure is appendectomy, skip questions 38 and 40

38) Lowest intra-op temperature: No Yes 38a ___°C
39) Death in the OR: No Yes

40) First temp on arrival to recovery: No Yes 40a ___°C (Not applicable if death in the OR)

Perioperative interventions: (Check all that apply. Skip all DVT prophylaxis questions if procedure is appendectomy)

DVT Prophylaxis: Heparin or low molecular weight heparin or synthetic factor Xa administered: (Not applicable if appy)

41) Within 24 hours of incision: No Yes Contraindicated
If yes; 41a Heparin No Yes ______ units Frequency: I only OR q ____ hrs
41b Enoxaparin (Lovenox) No Yes ________ mg Frequency: I only OR q ____ hrs
41c Dalteparin (Fragmin) No Yes ______ IU Frequency: I only OR q ____ hrs
41d Tinzaparin (Innohep) No Yes ______ Units Frequency: I only OR q ____ hrs
41e Fondaparinux (Arixtra) No Yes ______ mg Frequency: I only OR q ____ hrs

42) Ordered post-op for in-hospital use after the first 24 hrs: (Not applicable if death in O.R.)
No  Yes  Contraindicated
If yes; 42a Heparin  No  Yes _____ units Frequency: I only OR q _____ hrs ___ days
42b Enoxaparin (Lovenox)  No  Yes ______ mg Frequency: I only OR q _____ hrs ___ days
42c Dalteparin (Fragmin)  No  Yes ______ IU Frequency: I only OR q _____ hrs ___ days
42d Tinzaparin (Innohep)  No  Yes _____ Units Frequency: I only OR q _____ hrs ___ days
42e Fondaparinux (Arixtra) No  Yes _______ mg Frequency: I only OR q _____ hrs ___ days
42f Coumadin  No  Yes _______ mg Frequency: I only OR q _____ hrs ___ days
43Ordered on discharge: (Not applicable if discharge disposition is death)
No  Yes  Contraindicated
If yes; 43a Heparin  No  Yes _____ units Frequency: I only OR q _____ hrs ___ days
43b Enoxaparin (Lovenox)  No  Yes _______ mg Frequency: I only OR q _____ hrs ___ days
43c Dalteparin (Fragmin)  No  Yes ________ IU Frequency: I only OR q _____ hrs ___ days
43d Tinzaparin (Innohep)  No  Yes _____ Units Frequency: I only OR q _____ hrs ___ days
43e Fondaparinux (Arixtra) No  Yes _______ mg Frequency: I only OR q _____ hrs ___ days
43f Coumadin  No  Yes _______ mg Frequency: I only OR q _____ hrs ___ days
44) Intermittent pneumatic compression in O.R.: (not applicable if appy)
No  Yes
Beta-blocker: (Not applicable if appy)
45) Administered within 24hrs pre-op  No  Yes  Contraindicated
46) Ordered within 24 hrs post-op:  No  Yes  Contraindicated (Not applicable if death in O.R.)
Patient Initials: ___________ Date of Birth: ___________ Admit Date: _______________
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Antibiotics: (Not applicable if appy)
47) On antibiotics for the treatment of infection:  No  Yes
If yes: 47a At this hospital/upon admission  No  Yes
47b At transferring hospital:  No  Yes
48) Were prophylactic antibiotics indicated:  No  Yes
If yes: 48a Administered within 60 min of incision:  No  Yes
48b Discontinued within 24 hrs after closure:  No  Yes (Not applicable if death in O.R.)
Pain management: (Not applicable if appy or death in the O.R.)
49) Epidural ordered within 24 hrs post-op:  No  Yes  Contraindicated
49a If epidural, was the epidural a PCEA (Patient Controlled Epidural Analgesia)  No  Yes
50) PCA ordered within 24 hrs post-op:  No  Yes  Contraindicated
51) NSAID ordered within 24 hrs post-op:  No  Yes  Contraindicated
52) Narcotic drip:  No  Yes  Contraindicated
53) Other:  No  Yes If yes, specify modality:______________________________

Entereg: (Not applicable if appy)
54) Was Entereg (generic is alvimopan) administered after surgery:
   No  Yes (Applicable only to non-lap band bariatric and colorectal surgeries.)

Nasogastric tube: (Not applicable if death in the O.R.)
55) Left O.R. with NG tube in place:  No  Yes
56) Left O.R. with G tube to drainage in place:  No  Yes
Red blood cell transfusion: (Not applicable if appy)
57) In O.R. or within 24 hrs post-op:  No  Yes 57a If yes, how many units? ______
58) Mechanical ventilation: (Not applicable-chronic ventilator)  No  Yes 58a If yes, total hours? ______
Post-operative events: If the patient had any of these events during this hospitalization and following the procedure within 30 days, check all that apply: (not applicable if death in the OR)
59) Post-operative events:  No  Yes
If yes: 59a Myocardial infarction  No  Yes
59b CVA/stroke  No  Yes
60 Unplanned ICU stay/readmit to ICU  No  Yes
61 Fall with injury requiring surgery  No  Yes
62) Discharge disposition:  Home  Other location
Rehab facility Other acute care hospital
SNF Death: If yes, specify: Death in the O.R.
Death within 24hrs post-op
Death after 24 hrs post-op

Patient Initials: Date of Birth: Admit Date:

If the patient had any of the surgical operations or therapies listed below during this hospitalization and following the abdominal procedure within 30 days, select all that apply and note the date first performed after surgery. (Not applicable if death in the O.R.)

63) Reinervention: No Yes
64) Abdominal re-operation: No Yes
If yes, specify procedure:
64a Colostomy or ileostomy No Yes Date: mm/dd/yyyy
64b Abscess drainage No Yes Date: mm/dd/yyyy
64c Operative drain placement No Yes Date: mm/dd/yyyy
64d Gastrostomy No Yes Date: mm/dd/yyyy
64e Gastrostomy revision No Yes Date: mm/dd/yyyy
64f Re-exploration/washout No Yes Date: mm/dd/yyyy
64g Anastomotic revision No Yes Date: mm/dd/yyyy
64h Band replacement No Yes Date: mm/dd/yyyy
64i Band/port revision No Yes Date: mm/dd/yyyy
64j Wound revision / evisceration No Yes Date: mm/dd/yyyy
64k Negative re-exploration No Yes Date: mm/dd/yyyy
64l Other No Yes Date: mm/dd/yyyy
(Specify: ________________)

65) Tracheal reintubation: No Yes Date: mm/dd/yyyy
66) NG tube replacement (non-routine): No Yes Date: mm/dd/yyyy
67) Tracheostomy: No Yes Date: mm/dd/yyyy
68) Placement of percutaneous drain: No Yes Date: mm/dd/yyyy
69) Anticoagulation therapy for presumed/confirmed DVT: No Yes
70) Anticoagulation therapy for presumed/confirmed PE: No Yes
71) Antibiotic for presumed/confirmed infection: No Yes
72) Wound reopened: No Yes
73) Radiologically demonstrated anastomotic leak: No Yes
74) Radiologically demonstrated enterocutaneous fistula: No Yes
75) Other: No Yes
75a (Specify: ________________)

Bariatric (Complete only for the appropriate operation. Complete one form for each separate admission.)
76) Prior foregut surgery: No Yes
77) Procedure of record: Gastric bypass (proximal)
   Gastric bypass (distal)
   Biliopancreatic bypass
   Biliopancreatic bypass with duodenal switch
   Adjustable Lap Band
Specify size: 9.5 cm AP Large
   10 cm Other cm
   11 cm NA
   AP Standard
78) Stomach divided: No Yes Not applicable for lap band operations
79) Anastomosis tested: No Yes Not applicable for lap band operations
If yes, indicate how tested:
79a Scope No Yes
Methylene blue No Yes
Air/saline injected No Yes
Palpation/inspection No Yes
Other No Yes (Specify: ______________________)

Non-elective Appendectomy (Complete only for the appropriate operation. Complete one form for each separate admission.)

80) Concurrent abdominal or pelvic procedure performed (e.g. colectomy, ovarian cystectomy): No Yes
80a If yes, specify: Gynecologic Colon Gall bladder Other
81) Pre-op imaging within 24 hrs: No Yes
81a If yes, specify: CT scan Ultrasound
81b If yes, results were: Consistent with appendicitis Not consistent with appendicitis Indeterminate
82) ER/urgent care visit within one week prior to operation: No Yes
83) Pathology results: appendiceal pathology No Yes
84) Perforated appendix: No Yes

Colon Operation:

85) Prior colon or pelvic surgery: No Yes
85a Is this colon surgery the primary or secondary surgery: Primary Secondary
85b If secondary, indicate category of the primary surgery: Gyn Gall bladder Vascular Other
86) Prior colon resection within 30 days? No Yes
86a If yes, indicate at which hospital performed: ______________________

90) Anastomosis: No Yes (Specify: Colocolon (colon to colon) Coloanal (colon to anal)
Ileocolon (ileum to colon) Cannot be determined
Ileoanal (ileum to anal)
90a If ileoanal or coloanal anastomosis, pouch created: No Yes
91) Anastomosis tested: No Yes
91a If yes, specify: Scope Methylene blue Air/saline injected Palpation/inspection Other No Yes (Specify: ______________________)

Pathology results confirm diagnosis: No Yes
Number of lymph nodes removed and studied: ___________
Number of lymph nodes positive for cancer: ___________
Metastatic disease beyond lymph nodes: No Yes (e.g. liver, diaphragm, peritoneum)
Margins free of cancer: Yes
If yes, specify:
96a cm to distal margin: <1 cm 1-2 cm >2 cm NA
96b cm to proximal margin: <1 cm 1-2 cm >2 cm NA
T stage: Tis T1 T2 T3 T4 NA
For rectal cancer:
Total mesorectal excision done No Yes NA
<table>
<thead>
<tr>
<th>98a cm to radial margin:</th>
<th>&lt;1 cm</th>
<th>1-2 cm</th>
<th>&gt;2 cm</th>
<th>NA</th>
</tr>
</thead>
</table>

Appendix D: NSQIP Data Collection Form

Apologies are made for losing the formatting of the document during the copy process.

Revision: March 12, 2007 1 ACS NSQIP

AMERICAN COLLEGE OF SURGEONS
NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM

*IDN _______________________ Case Number __________ Cycle __________

DEMOGRAPHICS: (information in the grey box is for hospital use only & is not submitted to the ACS NSQIP database)

Last Name: ____________________________________________ First: __________________ MI: __________
Street Address: ________________________________________ H. Phone (_____)_______________ W. Phone (_____)_______________
Town: ________________________________________________ State: _______ Zip: __________

DOB: ___/___/______ (only the year will be entered in the ACS NSQIP)
Gender: Male Female Race: __________

SURGICAL PROFILE:

PRINCIPAL PROCEDURE

______________________________________________________________________ CPT Code

Status: Inpatient Outpatient Transfer? No Yes If yes, tx from where?

Hosp Admit Date/Time ____/____/____ ____:____
Surg Admit Date/Time ____/____/____ ____:____

Operation Date ____/____/____ Epidural MAC

Anesthesia Technique: General Regional Other

Spinal Local None

Level of Residency Attending Alone Attending in OR Suite *Subspecialty: __________

Supervision Attending in OR Attending Not Present, but Available

PREOPERATIVE RISK ASSESSMENT (time frames for variables are in parentheses. If no time frame is listed, time frame is ‘current’ or at the time of surgery):

GENERAL RENAL

Height (most recent) _______ Inches CM Acute Renal Failure YES NO
Weight (most recent) _______ Pounds KG Currently requiring or on Dialysis YES NO
Diabetes Mellitus Oral Insulin NO CENTRAL NERVOUS SYSTEM

Current Smoker (w/in 1 year) YES NO Impaired Sensorium (w/in 48 hrs) YES NO
Pack Year Cigarette History _______ Coma YES NO

ETOH>2 drinks/day (w/in 2 wks) YES NO Hemiplegia/Hemiparesis YES NO

Dyspnea Mod.

Exertion At Rest NONE TIA’s (history) YES NO

DNR Status YES NO CVA/residual neurologic deficit (history) YES NO

Functional Health Status CVA/no neurologic deficit (history) YES NO

a) prior to current illness I ____ PD ____ TD ____ Unk ____ Tumor Involving CNS YES NO

b) prior to surgery I ____ PD ____ TD ____ Paraplegia/Paraparesis YES NO

PULMONARY Quadraplegia/Quadraparesis YES NO

Vent. Dependent (w/in 48 hrs) YES NO NUTRITIONAL/IMMUNE/OTHER

Severe COPD (history) YES NO Disseminated Cancer YES NO

Current Pneumonia YES NO Open Wound w/ or w/out infection YES NO

HEPATOBILIARY Steroid use for chronic condition YES NO

Ascites (w/in 30 days) YES NO >10% loss of body wt. (last 6 months) YES NO

GASTROINTESTINAL Bleeding disorders YES NO

Esoph. Varices (w/in 6 months) YES NO Transfusions >4 RBC Units (w/in 72 hrs) YES NO

CARDIAC Chemotherapy (w/in 30 days) YES NO

CHF (w/in 30 days) YES NO Radiotherapy (w/in 90 days) YES NO

Myocardial Infarction (w/in 6 months) YES NO Systemic Sepsis (w/in 48 hours) SIRS NO

PCI (previous procedure) YES NO Sepsis

Cardiac Surgery (previous op) YES NO Sep Shock

History Angina (w/in 30 days) YES NO Pregnancy YES NO

Hypertension req. meds. YES NO Prior Operation (w/in 30 days) YES NO

VASCULAR

Revasc/Amp for PVD (history) YES NO

Rest Pain/Gangrene YES NO

Revision: March 12, 2007 2 ACS NSQIP
### Patient Name: ____________________________ IDN: _____________________________

#### LABORATORY DATA: (postop labs not mandatory for Program)

**Preop Labs** - report the most recent lab values (most recent to the Patient In OR time) within 90 days.

PREOPERATIVE LABS (90 days) Date POSTOPERATIVE LABS (30days) Date

<table>
<thead>
<tr>
<th>Na</th>
<th>Na</th>
<th>BUN</th>
<th>Na</th>
<th>Creatinine</th>
<th>K</th>
<th>ALB</th>
<th>K</th>
<th>Total Bili</th>
<th>Creatinine</th>
<th>Hct</th>
<th>WBC</th>
<th>Hct</th>
<th>PTT</th>
<th>Troponin I</th>
<th>Highest</th>
</tr>
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#### OPERATIVE INFORMATION:

Other Procedures CPT Concurrent Procedures CPT

| 1.  | 1.  |
| 2.  | 2.  |
| 3.  | 3.  |
| 4.  | 4.  |
| 5.  | 5.  |
| 6.  | 6.  |
| 7.  | 7.  |
| 8.  | 8.  |

Attending/Staff Surgeon IDN: _______ Highest Level of Resident Surgeon: PGY ______

Emergency Case: YES NO

Wound Class:

1- Clean 2- Clean/Contaminated
3- Contaminated 4- Dirty/Infected

ASA Class:

1 2 3 4 5

Airway Trauma: None

Tongue laceration or hematoma

Tooth chipped, loosened or lost

Mallampati Scale:

1-Class I 2-Class II Tongue laceration or hematoma
3-Class III 4-Class IV Pharyngeal laceration

Laryngeal laceration

Intra-op RBC’s transfused: ______ Failure to intubate

#### OPERATIVE TIMES:

<table>
<thead>
<tr>
<th>Patient in Room</th>
<th>Surgery Finish</th>
<th>Anesthesia Start</th>
<th>Patient Out Room</th>
<th>Surgery Start</th>
<th>Anesthesia Finish</th>
<th>D/C from PACU</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Intraoperative Occurrence? No Yes If yes, select from the following: Cardiac Arrest

Myocardial Infarction

Unplanned Intubation

Other - please list: ________________________________

Revision: March 12, 2007 3 ACS NSQIP

### Patient Name: ____________________________ IDN: _____________________________

#### POSTOPERATIVE OCCURRENCES (within 30 days): Circle and note the date the occurrence was first noted. Although not required for this program, you may wish to document ‘outcome to date’, and ‘treatment’ of the occurrence for internal quality assurance monitoring.

(Outcome: I - improved; U - unresolved; W - worse; D - death)

<table>
<thead>
<tr>
<th>Date</th>
<th>Outcome</th>
<th>Treatment</th>
</tr>
</thead>
</table>

Date Outcome Treatment

Wound Occurrences

Superficial Incisional SSI ______/_____/_______ I U W D

Deep Incisional SSI ______/_____/_______ I U W D

Organ/Space SSI ______/_____/_______ I U W D

Wound Disruption ______/_____/_______ I U W D

Other (ICD-9) ______/_____/_______ I U W D
### Respiratory Occurrences

<table>
<thead>
<tr>
<th>Condition</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td></td>
</tr>
<tr>
<td>Unplanned Intubation</td>
<td></td>
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<tr>
<td>Pulmonary Embolism</td>
<td></td>
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<tr>
<td>On Ventilator &gt; 48 hours</td>
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<tr>
<td>Other (ICD-9)</td>
<td></td>
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</tbody>
</table>

### Urinary Tract Occurrences

<table>
<thead>
<tr>
<th>Condition</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progressive Renal Insufficiency</td>
<td></td>
</tr>
<tr>
<td>Acute Renal Failure</td>
<td></td>
</tr>
<tr>
<td>Urinary Tract Infection</td>
<td></td>
</tr>
<tr>
<td>Other (ICD-9)</td>
<td></td>
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</tbody>
</table>

### CNS Occurrences

<table>
<thead>
<tr>
<th>Condition</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke/CVA</td>
<td></td>
</tr>
<tr>
<td>Coma &gt; 24 hours</td>
<td></td>
</tr>
<tr>
<td>Peripheral Nerve Injury</td>
<td></td>
</tr>
<tr>
<td>Other (ICD-9)</td>
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</tbody>
</table>

### Cardiac Occurrences

<table>
<thead>
<tr>
<th>Condition</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac Arrest req. CPR</td>
<td></td>
</tr>
<tr>
<td>Myocardial Infarction</td>
<td></td>
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<tr>
<td>Other (ICD-9)</td>
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### Other Occurrences

<table>
<thead>
<tr>
<th>Condition</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>Bleeding &gt; 4 u. RBCs (1st 72 hrs only)</td>
<td></td>
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<tr>
<td>Graft/Prosthesis/Flap Failure</td>
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<tr>
<td>DVT/Thrombophlebitis</td>
<td></td>
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<tr>
<td>Systemic Sepsis</td>
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<tr>
<td>Septic Shock</td>
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</tr>
<tr>
<td>Other (ICD-9)</td>
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</tbody>
</table>

### Other Occurrences

<table>
<thead>
<tr>
<th>Condition</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-op ICD-9 Code</td>
<td></td>
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</tbody>
</table>

### Diagnosis:

________________________________________________________________________

### Acute Care D/C Date/Time:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
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</table>

### Hospital D/C Date/Time:

<table>
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<th>Date</th>
<th>Time</th>
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</table>

### Return to the OR within 30 days:

Yes No

### Intraop Death:

Yes No

### Postop Death w/in 30 days:

Yes No

### Postop Death > 30 days:

Yes No

(if pt remained in acute care)

### Date:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
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### Notes:

________________________________________________________________________

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