

HEALTH QUALITY ONTARIO  
SPECIALIZED REPORT

# Quality Surgery

Improving surgical care  
in Ontario

Health Quality  
Ontario

*Let's make our health system healthier*



Ontario

Health Quality Ontario

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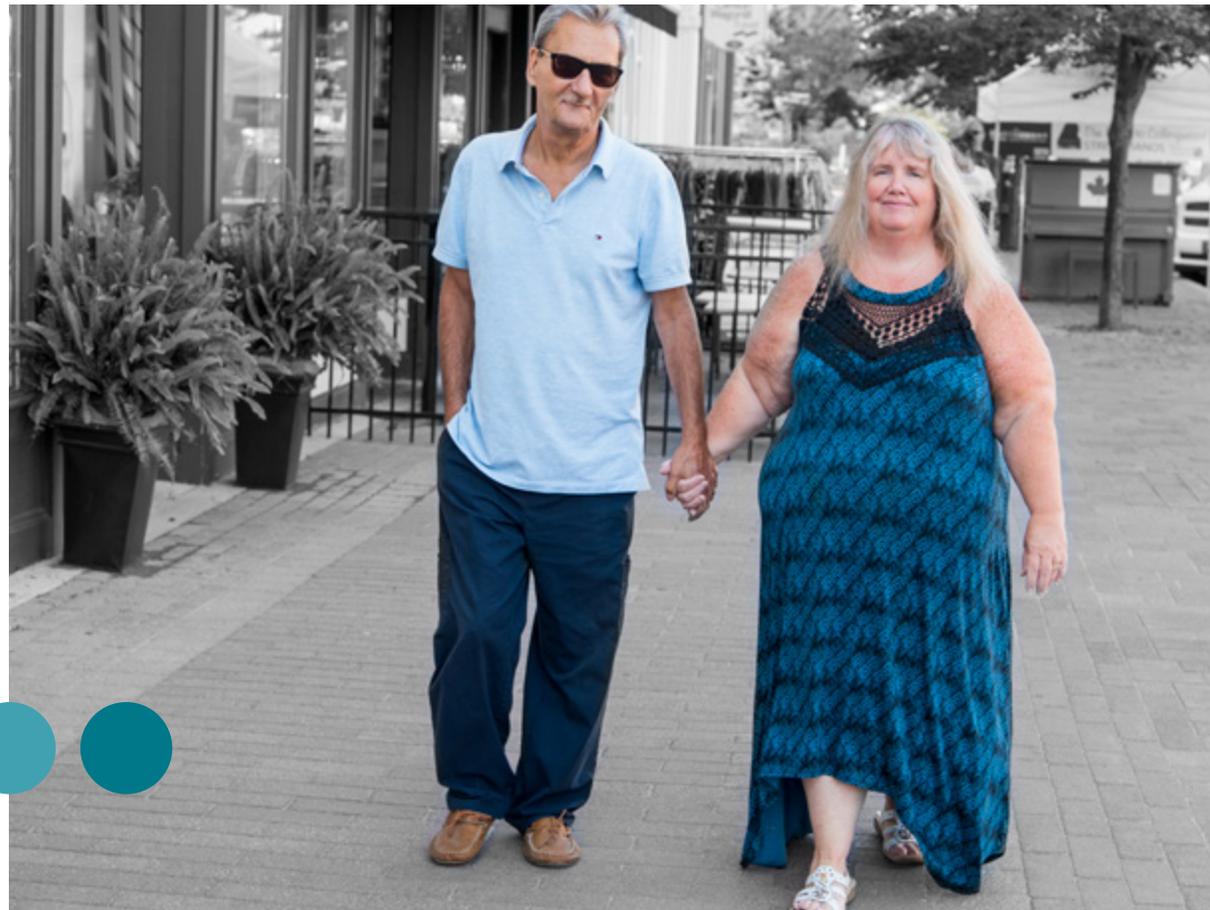
On the cover: Dr. Singh, outside of an office in Toronto. See page 12 for some of his quotes. We thank Dr. Singh and the other people who shared their experiences in Ontario's health system. (Cover photo by Roger Yip)

## Patients want a smooth recovery

**With six surgeries behind her,** Linda was already a hospital veteran when she found herself in the emergency department last year. This time was different, though. Her most recent operation had fixed a major problem — a bowel obstruction — but new pain and vomiting brought her back to the local hospital weeks later. The diagnosis? *Clostridium difficile*, a hospital-acquired infection.

Surgery solves many health problems and often saves lives. But even successful operations have the risk — however small — of infection, bleeding or other complications that prompt patients like Linda to return to the hospital. Every patient is different, and that makes every surgery different, too. But patients have one thing in common: they want to know that their chances of a full recovery are high, and that the risk of complications is low.

Surgeons and hospital leaders want that as well, for Linda and for all patients. They take different approaches to ensure patient safety: one way involves studying how well patients recover from surgery, gathering the results and comparing them to other facilities. That's what a group of Ontario surgeons and hospitals are doing as part of an international effort to improve patient care before, during and after an operation.





### **On the power of change**

*“It may be only a 0.1% change here, [and] a 0.1% change there, but the total effect of all those small changes adds up to lower surgical complications.”*

### **On quality improvement outcomes at the hospital**

*“After six months, our surgical site infection rate dropped by half [when] we were expecting maybe a 25% improvement.”*

### **On the value of comparisons**

*“American hospitals are ahead of us [in tracking] these outcomes partly because they’re innovators, but also their financial model drives it ... As rates improve in the U.S., it pushes everyone to do better here in Ontario.”*

### **On the power of partnerships**

*“If you want to make things better, you have to measure them. Sometimes, you need a protocol and a program and a group behind you to make real change.”*

### **Dr. Duncan Rozario**

General Surgeon, Halton Healthcare,  
Oakville Trafalgar Memorial Hospital

*Find the full story online.*



Photo of Dr. Rozario taken by Roger Yip.



## How does collecting new data help?

**Ontario's operating rooms are busy:** surgeons performed over 600,000 scheduled operations [1] in the province in 2016-2017, with C-sections, knee and hip replacements, bone surgery and heart-related surgery among the most common inpatient procedures.[2]

All surgical teams routinely track efforts to protect patient safety, including those that prevent complications. For example, recent data[3] show high uptake on steps to avoid surgical site infections: Ontario's hospitals report 98% compliance in giving hip and knee replacement patients antibiotics before surgery to avert infection (range: 80-100%).

How can more data support better outcomes for patients? Tracking detailed surgical data before, during and after each operation can show hospitals and surgical teams exactly where they can improve patient outcomes.

An international program developed by the American College of Surgeons in 1994 — known as the National Surgical Quality Improvement Program — takes this approach. It collects and compares detailed clinical information from all stages of patient surgery. It looks at 14 specific outcomes — ranging from whether a patient developed an infection or breathing problems to severe outcomes, like death. The program is designed to improve the quality of care before,

during and after an operation. It includes outcomes even after a patient leaves the hospital, which is when some complications may develop.

The program's data do not identify patients to protect their privacy, but are adjusted by age and pre-existing illnesses to make sure that comparisons are relevant. That means that comparisons account for differences in how sick patients are, such that hospitals that treat sicker patients are not unfairly compared to those with healthier patients.

Though the program began in the U.S., it has expanded internationally and now includes 31 Ontario hospitals as members: The Ottawa Hospital was the first to sign on in 2010, followed by Sunnybrook Health Sciences Centre, the University Health Network and Hamilton Health Sciences.

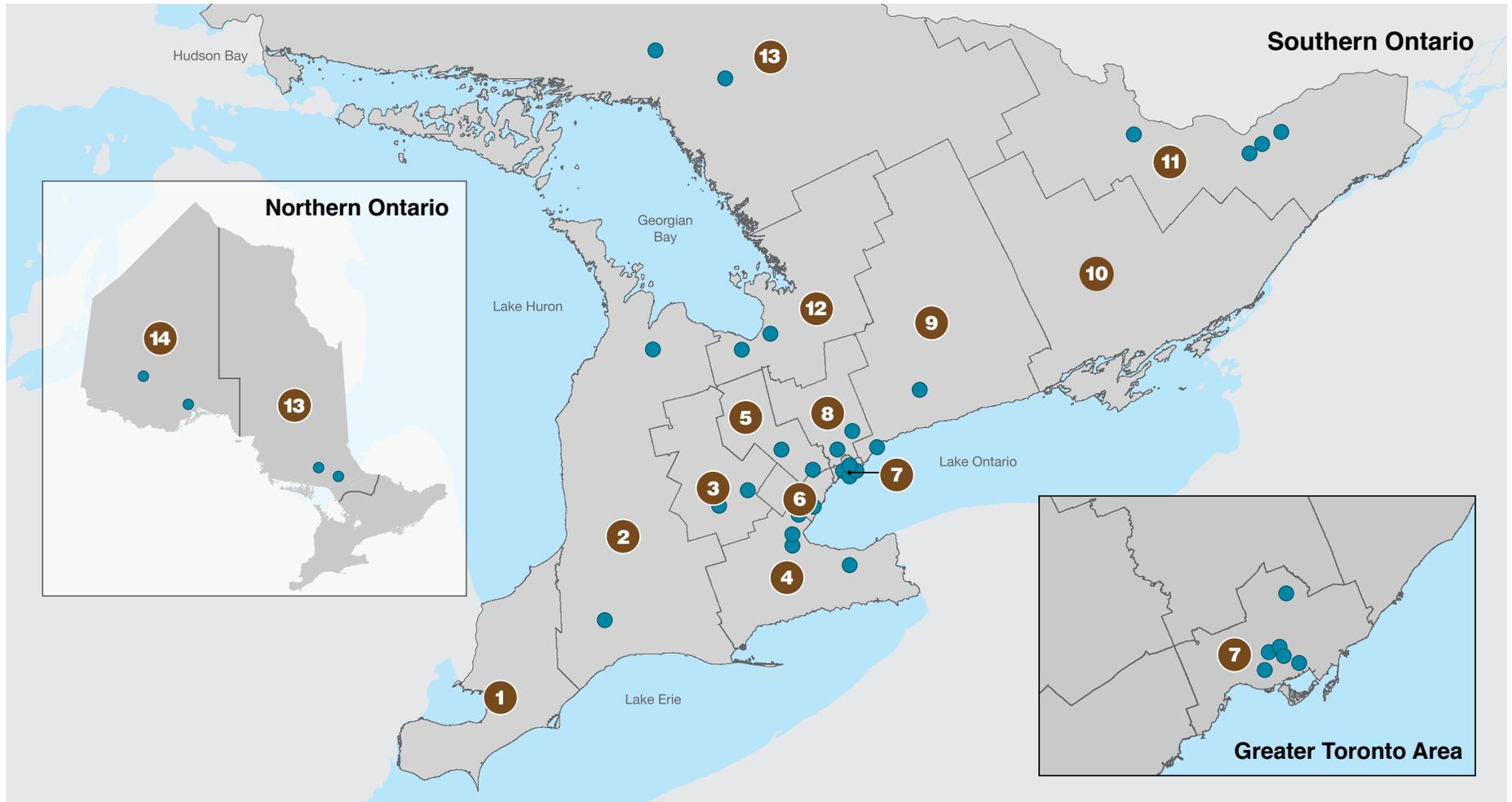
In 2015, the province officially launched a surgical quality improvement initiative. These hospitals voluntarily participate in the Ontario Surgical Quality Improvement Network, which connects hospitals as they collectively work to

improve care. The current 31 members span hospitals that treat both adults and children and represent organizations of all sizes — from urban to community and rural hospitals — as well as all regions of the province.

Other provinces in Canada participating in the broader program include British Columbia, Alberta, Saskatchewan, Quebec and Newfoundland. All participating provinces share their data in an international database.

The data sharing allows each of the nearly 700 member hospitals around the world to see how they are doing relative to their peers and where they have room to improve.

**FIGURE 1** Ontario Surgical Quality Improvement Network Hospitals by Local Health Integration Network (LHIN) regions.



**Ontario LHINs**

- |                                    |                      |                         |               |
|------------------------------------|----------------------|-------------------------|---------------|
| 1 Erie St. Clair                   | 5 Central West       | 9 Central East          | 13 North East |
| 2 South West                       | 6 Mississauga Halton | 10 South East           | 14 North West |
| 3 Waterloo Wellington              | 7 Toronto Central    | 11 Champlain            | ● Hospitals   |
| 4 Hamilton Niagara Haldimand Brant | 8 Central            | 12 North Simcoe Muskoka |               |

The number of Ontario hospitals (**Figure 1**) in the Ontario Surgical Quality Improvement Network has grown to 31 members, including three pediatric hospitals.

## Current Ontario Surgical Quality Improvement Network Hospitals

### South West

Grey Bruce Health Services	Owen Sound
London Health Sciences Centre, University Hospital	London

### Waterloo Wellington

Grand River Hospital, Kitchener Waterloo Campus	Kitchener
Guelph General Hospital	Guelph

### Hamilton Niagara Haldimand Brant

Hamilton Health Sciences, Hamilton General Hospital	Hamilton
Hamilton Health Sciences, Juravinski Hospital	Hamilton
McMaster Children's Hospital	Hamilton
Niagara Health System, St. Catharines Site	St. Catharines

### Central West

William Osler Health Centre, Brampton Civic Hospital	Brampton
William Osler Health Centre, Etobicoke General Hospital	Etobicoke

### Mississauga Halton

Halton Healthcare, Oakville Trafalgar Memorial Hospital	Oakville
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### Toronto Central

The Hospital for Sick Children	Toronto
St. Michael's Hospital	Toronto
Sunnybrook Health Sciences Centre	Toronto
University Health Network, Princess Margaret Hospital	Toronto
University Health Network, Toronto General Hospital	Toronto
University Health Network, Toronto Western Hospital	Toronto

### Central

Markham Stouffville Hospital Corporation, Markham Stouffville Hospital	Markham
North York General Hospital	North York

### Central East

Peterborough Regional Health Centre	Peterborough
The Scarborough Hospital	Scarborough

### Champlain

The Children's Hospital of Eastern Ontario	Ottawa
The Ottawa Hospital	Ottawa
Queensway Carleton Hospital	Ottawa
Renfrew Victoria Hospital	Renfrew

### North Simcoe Muskoka

Collingwood General and Marine Hospital	Collingwood
Orillia Soldiers' Memorial Hospital	Orillia

### North East

Health Sciences North, Ramsey Lake Health Centre	Sudbury
North Bay Regional Health Centre	North Bay

### North West

Sioux Lookout Meno Ya Win Health Care	Sioux Lookout
Thunder Bay Regional Health Sciences Centre	Thunder Bay

### Tracking quality: surgeries included in this report

Network hospitals may track different surgeries through the program. Depending on their priorities, they can opt for an overview of all eligible surgeries or choose specific procedures. Health Quality Ontario included the following surgeries in this report: orthopedic surgery (excluding podiatry), oncology procedures, general and abdominal surgery, gynaecologic surgery, neurosurgery, plastic and reconstructive surgery, head and neck surgery and vascular surgery.



Photo of Linda taken by Roger Yip.

 REAL-WORLD EXPERIENCES

## Focus on prevention: Linda's story

### **Linda was hoping for a smooth recovery.**

After having emergency surgery to fix a bowel obstruction in 2016, she arranged for a home care nurse to help out. She'd had multiple hernia and bowel operations over the past 14 years and wanted to avoid complications, like infection, this time.

The nurse monitored the surgical incision and changed the dressing, but complications developed and the wound reopened. Linda also developed *Clostridium difficile*, a common infection.

With her medical history, Linda had a higher risk of common complications, notes Dr. Michael Lisi, chief of staff at Collingwood General and Marine Hospital. Because of this, she represented exactly the kind of patient a surgical quality improvement program aimed to help. Repeat visits and complications are hard on patients like Linda, he adds. "She's been in and out of hospitals," he says. "These are the individuals [who] require our attention for prevention."

When Linda first became Lisi's patient a few years ago, the hospital had not yet joined the program. At that time, the hospital didn't have as clear a picture of post-surgical

complications, says Lisi, "we just knew that complications happened."

By the time she needed emergency surgery in 2016, the hospital had adopted some of the program's best practices to improve recovery and minimize surgical site infections. Since Linda's surgery was an emergency procedure, she couldn't be part of the full Enhanced Recovery After Surgery process, which includes specific pre-op education and diet steps for patients to follow. However, she benefited from the hospital's surgical site infection practices. "She's a good example of [the patient experience] before the program," he says. "Now that it's underway, we're now able to identify areas to focus improvement initiatives."

After joining the program in 2015, Collingwood General and Marine has reduced its surgical site infection rates from 3.4% to 2.4% between January and July 2017. Lisi notes that the hospital continues to expand its quality improvement strategies. "We're also working on length of stay and readmission, and have been identifying our pneumonia rates — those are slightly high — and we're exploring why this is the case."

Linda didn't know that the hospital was part of a quality improvement program until later. "I thought it was great," she says. After a nine-day hospital stay to treat the *Clostridium difficile* infection, she returned to the wound clinic each week, where specialists took pictures of her incision to track her progress. As she healed, she returned monthly and then less frequently.

Now, she's fully recovered, and recalls charting her progress by the length of walks she took. First, she and her husband would walk down the street until they reached a small bench a short distance away. Gradually, they went further, eventually making it up and down their town's main street, and along the waterfront.

How is she feeling now? "Really good. I'm back at work full time. I'm feeling great." She looks back on her surgical journey with relief that the complications — and the hospital trips — are behind her. "I spent too much time there."

# How are participating Ontario hospitals performing?

**The Ontario Surgical Quality Improvement Network** focuses on common outcomes, ranging from whether a patient developed an infection or breathing problems to severe outcomes, like death.

## Surgical Outcomes Tracked

1. ***Clostridium difficile colitis***: A common hospital-acquired infection that affects the colon
2. **Extended ventilation (over 48 hours)**: Most patients need a ventilator during general surgery, but needing one longer than 48 hours after surgery can increase their risk of pneumonia
3. **Unplanned intubations**: When patients have trouble breathing, they may need intubation—a tube inserted into their throat—to help
4. **Pneumonia**: An infection in the lungs that can develop post-surgery
5. **Returning to the operating room**: Patients may need another surgery to address a complication
6. **Blood clots (venous thromboembolism)**: Patients who have major surgery are often at higher risk for blood clots because they aren't active, and their blood flows more slowly
7. **Hospital readmissions**: Depending on the type of surgery, complications like infection or blood clots may mean that patients are readmitted to hospital
8. **Heart complications**: Major surgery can be stressful on a patient's heart and can lead to heart attacks or cardiac arrest, depending on their underlying conditions
9. **Kidney failure**: Kidney injury during surgery can affect its function, or even lead to kidney failure
10. **Sepsis**: Surgery puts patients at higher risk of infection, which can develop into a widespread blood infection
11. **Urinary tract infections**: Catheters can increase the risk of infection in the bladder and urinary tract
12. **Surgical site infections**: These infections can affect the incision or the body part involved in the surgery

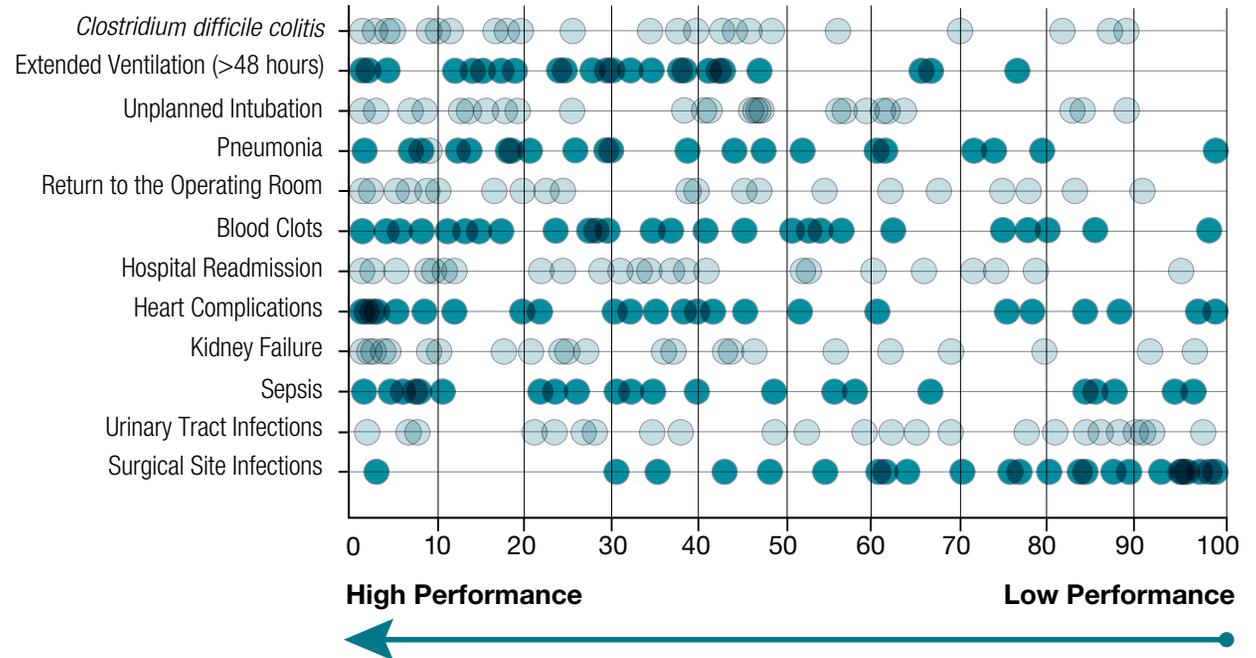
## Overall Outcomes Tracked

13. **Morbidity**: Measures the rate at which patients experience the above complications during the 30 days following surgery
14. **Mortality**: Measures the overall rate of death in the patient population during the 30 days following surgery

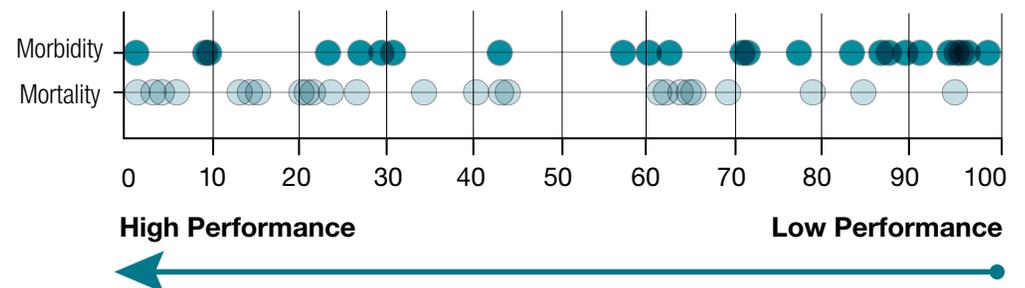
## Understanding the data

- The Ontario Surgical Quality Improvement Network has 31 members, but this report reflects data from the 29 adult hospital members. On the graph (Figure 2), a single blue dot represents one of the Ontario adult hospitals participating in the program, so each organization can see how they rank relative to others on each of the patient outcomes tracked. The further to the left a hospital falls, the better the performance. There is wide variation among participating Ontario hospitals across each patient outcome. On certain outcomes, we can see a cluster of hospitals on the higher-performing end of the spectrum, such as for extended ventilation (over 48 hours). On others, we see several hospitals clustered on the lower-performing end, such as for surgical site infections.
- Two additional comparisons, (Figure 3) mortality and morbidity, provide a summary view of each hospital's surgical performance. Mortality measures deaths related to complications following surgery, and morbidity is a summary of multiple complications, such as infection, kidney failure or sepsis.

**FIGURE 2** Percentile rank of the participating Ontario hospitals among all hospitals in the program. Each hospital is represented by a blue dot for each indicator.



**FIGURE 3** Percentile rank of the participating Ontario hospitals among all hospitals in the program for roll-up indicators. Each hospital is represented by a blue dot for each indicator.



To date, the tracking of outcomes serves as a learning tool for participating hospitals to focus improvement efforts, so the results for individual hospitals are not identified in this report. However, as the program evolves, and more Ontario hospitals have the opportunity to participate, the aim is to publicly report these results by hospital.

To make sense of all of these data, the Ontario surgical quality improvement initiative monitors the outcomes of participating Ontario hospitals as a group compared to all other participating hospitals internationally.

Within the program, hospitals are benchmarked along a spectrum that shows whether they fall into the ‘room for improvement,’ ‘as expected’ or ‘better than expected’ categories based on two things: their ranking among all hospitals in the program and the statistical difference in their performance compared to the larger group of international hospitals.

While **Figures 2** and **3** show how individual hospitals rank against all network hospitals, **Figure 4** shows how the group of hospitals compare using both the ranking method and the statistical significance.

Looking at the bigger picture, **Figure 4** shows performance for Ontario member hospitals across all 14 outcomes. It identifies those outcomes that have all hospitals performing ‘better than expected’ or ‘as expected.’ For example, *Clostridium difficile* is one of the Ontario group’s best outcomes because all hospitals show ‘better than expected’ or

‘as expected’ performance. If a large proportion of hospitals show ‘room for improvement’ for an outcome, the group performance indicates that this outcome has ‘room for improvement.’

The two summary outcomes, morbidity and mortality, show that the majority of Ontario members are doing ‘better than expected’ or ‘as expected’ for mortality and a high proportion show ‘room for improvement’ for morbidity.

It’s important to acknowledge that international performance isn’t necessarily the absolute or only reference for ‘better.’ There may be room for hospitals to improve even if they’ve achieved ‘better than expected’ or ‘as expected’ performance.



## Local leadership

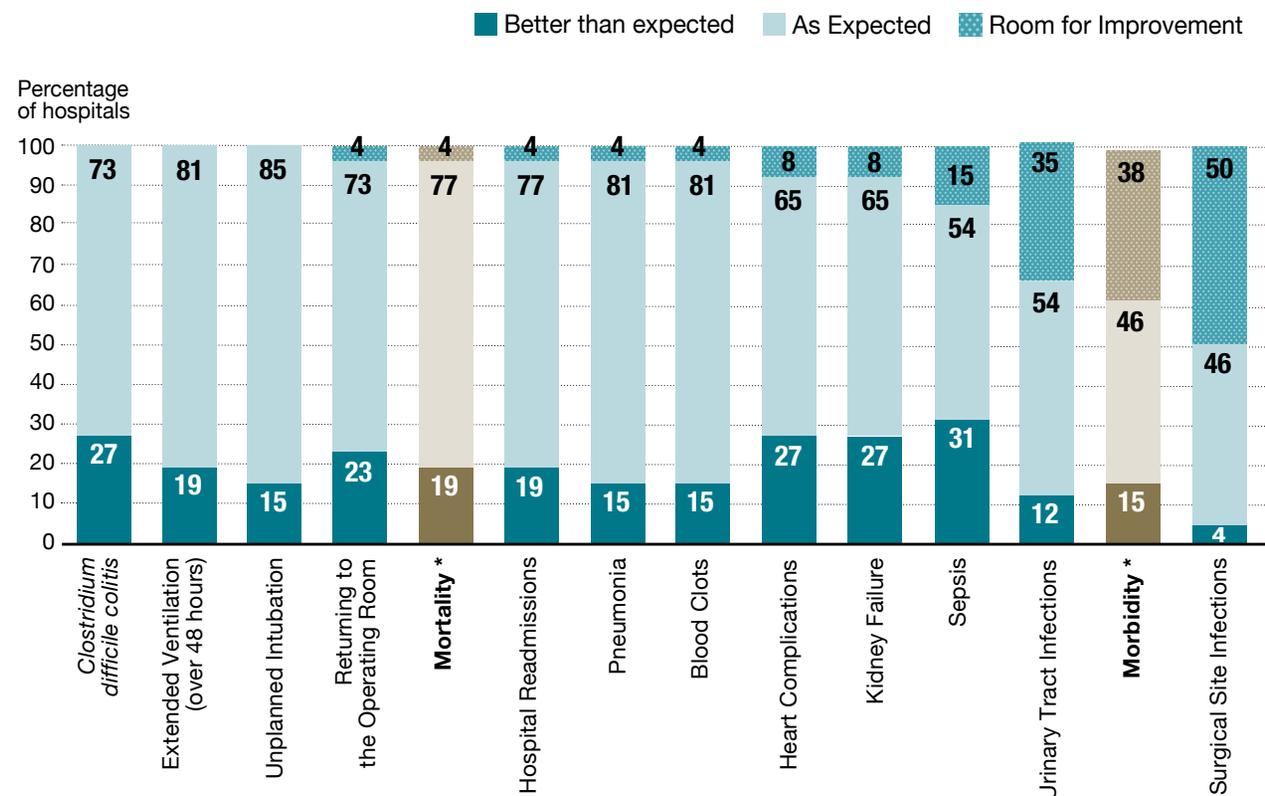
While the American College of Surgeons developed the international quality improvement program, Health Quality Ontario plays a critical role in supporting the program here in Ontario.

In establishing the Ontario Surgical Quality Improvement Network, Health Quality Ontario is working to foster even more collaboration between members of the provincial network. In bringing the individual members together to share data and best practices, the network promotes cooperation and teamwork within the alliance. And, by building on their work—through conferences, workshops, digital tools and mentorship—the hope is that members of the provincial network will see quality improvement results even faster.

Health Quality Ontario also supports complementary programs: Improving and Driving Excellence Across Sectors lays the foundation for better care in partnership with medical schools, while the Institute for Healthcare Improvement Open School shares quality improvement methodology via online learning.

The collective approach means that surgical teams aren’t just working toward better care for their own patients, but for patients across Ontario.

**FIGURE 4** Participating Ontario hospital group performance based on percentile rank and statistical significance compared to all participating hospitals, 2016.



Notes: All adult cases. Data from 29 participating hospitals from January 1 to December 31, 2016. Percentages may not add up to 100%, as they are rounded to the nearest percent. \*Summary measures.

## How are participating Ontario hospitals doing?

Outcomes where all 29 hospitals are performing 'as expected' or 'better than expected':

- Unplanned intubations
- Extended ventilation (over 48 hours)
- *Clostridium difficile colitis*

Outcomes where the majority of the 29 hospitals are performing 'as expected' or 'better than expected':

- Return to the operating room
- Mortality
- Blood clots (venous thromboembolism)
- Heart complications
- Hospital readmissions
- Kidney failure
- Pneumonia
- Sepsis

Outcomes where the 29 hospitals have the most 'room for improvement':

- Surgical site infections
- Urinary tract infections
- Morbidity



Photo of Dr. R. Singh taken by Roger Yip.



### **On the power of change**

*“I’m always thinking, ‘what can we do to make patients feel better, get home faster and stay home.’”*

### **On quality improvement outcomes at the hospital**

*“The overall length of stay for general surgery patients admitted through emergency has dropped by two days. For appendicitis, it’s down more than half a day, [and] for gallbladder surgery via emergency, it’s a full day shorter.”*

### **On sharing quality improvement successes and resources**

*“Big or small, academic or non-academic hospital, we’re all trying to reach the same goals, so why shouldn’t all patients be treated the same?”*

### **On challenging the status quo**

*“[The program] was developed to question the dogma around how we treat surgical patients.”*

### **Dr. Ravinder Singh**

Head of Surgery, North Bay  
Regional Health Centre

*Find the full story online.*



## How can better data become better care?

**Once hospitals have their results**, what does that mean for patients like Linda? Better, more detailed surgical data is often the starting point for efforts to improve care and establish goals for improvement. For instance, if the data showed a need for improvement in surgical site infections, surgical teams could rethink how they design and deliver care to address that complication.

The program and other health care organizations have developed specific steps surgeons, nurses, other care providers and patients can take to improve care and outcomes. These steps may seem small, but they represent two things: a marked effort to improve care; and to increase the knowledge and skills needed to undertake and sustain quality improvement.

One set of steps aimed at reducing patients' risk of pneumonia after surgery includes special deep breathing exercises before and after surgery and coughing after surgery to clear the lungs and help distribute oxygen. It also calls for specific oral care — brushing teeth and using mouthwash to get rid of mouth bacteria, sitting upright in bed rather than lying flat and encouraging them to get up and stay active.

Another set of care steps aimed at reducing urinary tract infections advises surgical teams to restrict urinary catheter use, if it's appropriate, and to ensure that catheters are inserted using the proper technique.

Ontario's member hospitals are expanding their surgical safety efforts in different ways, and building on existing quality improvement measures. For instance, 24 members are now taking part in the Enhanced Recovery After Surgery process, which focuses on best practices for procedures like colon surgery that tend to have more complications. And, some members have already started sharing some of their successes with a broader group of health care organizations.

What are the opportunities for improvement? While some studies have shown that the program can prevent up to 500 complications per year [4], cut down on health care costs and save lives, others have pointed out that data alone won't ensure gains[5] — only changes in hospital processes and culture will.



Photo of Dr. van Heest taken by Roger Yip.



### **On having patients involved in their own care**

*“[We] have a true discussion of the risks and benefits of each surgery, we want to be sure they understand what to expect.”*

### **On going beyond program tracking**

*“I want to get a barometer of how we’re doing right away. I don’t see a lot of research on how patients think their surgeries went.”*

### **On patient reaction to post-surgery surveys**

*“Most patients are surprised that we’re asking about their personal experience. They’re happy, they feel we really care as an institution.”*

### **On patient satisfaction**

*“If a patient isn’t happy, regardless of what the documented outcome is, then we haven’t done our job.”*

### **Dr. Rardi van Heest**

Corporate Chief, General Surgery,  
William Osler Health System

*Find the full story online.*



## The road ahead

**At present,** about half of all adult surgeries in Ontario are performed in Ontario Surgical Quality Improvement Network hospitals.<sup>[6]</sup> These hospitals review a representative number of surgeries for the program, yet all patients — regardless of their type of surgery — benefit from the data comparisons, new processes and overall quality improvement efforts.

There are early signs that care is improving: for example, the largest hospitals report progress in their work to reduce surgical site infections, and all of the Ontario members have made reducing all surgery-related infections — pneumonia, urinary tract infections and surgical incision infections — a priority.

Linda is fully recovered now, but other patients like her face complications during or after surgery every day. Ontario's hospitals need to continue to improve surgical care just as they work to improve patient care in all parts of the health care system.

The participating hospitals' efforts — and their cooperation with other organizations outside the network — show commitment to making surgery and recovery as safe as possible.

Moving forward, hospitals participating in the Ontario surgical quality improvement initiative will continue to collect and learn from these data, and address important opportunities for improvement. Health Quality Ontario is actively working to increase hospital participation in the program so that even more surgeries will be covered. In the future, as more hospitals have the opportunity to join the program, Health Quality Ontario aims to move towards routine public reporting of individual hospital performance on surgical outcomes.



# Method Notes

**The Methods Notes** provide a brief description of the data and methods used in this report. For more details, please see the American College of Surgeons National Surgical Quality Improvement Program website: <https://www.facs.org/quality-programs/acs-nsqip>

## Data sources

The data presented in this report were provided by the American College of Surgeons National Surgical Quality Improvement Program, a program that builds a community of practice for surgical teams interested in surgical quality improvement. The program is based in the United States, and has an international membership that currently includes nearly 700 hospitals. A community of 31 hospitals at present across Ontario form the Ontario Surgical Quality Improvement Network.[7,8] Data are presented in this report for the 29 adult hospitals.

Hospitals that participate in the program collect clinical data on randomly selected surgical patients from the pre-operative period through to 30-days post-surgery.[7] Hospitals submit data to the program, which conducts risk-adjusted analysis on a defined set of post-surgical complications for all hospitals and the local network, and reports the data back to the hospitals by means of Semi-Annual Reports. Hospitals can view their data and see comparisons of their performance with other hospitals in their collaborative and to the larger network.[7]

The data used in this report were extracted from the July 2017 National Surgical Quality Improvement Program Ontario Collaborative Semi-annual report.[9]

## List of Surgeries

**The following is a list of surgical groups included in this report:**

- Orthopaedic Surgery (excluding podiatry)
- Oncology Procedures
- General and Abdominal Surgery
- Gynaecologic Surgery
- Neurosurgery
- Plastic and Reconstructive Surgery
- Head and Neck Surgery
- Urologic Surgery
- Vascular Surgery

## Analysis

### Methodology [8,9]

The program provided hospital performance data for a number of patient complications within 30 days post-surgery: *Clostridium difficile colitis*, ventilation for over 48 hours, unplanned intubation, pneumonia, return to operating room, venous thromboembolism, readmission, heart complications, renal failure, sepsis, urinary tract infection, and surgical site infection, as well as data for two summary measures, morbidity and mortality. For more detailed definitions on the complications, please see the American College of Surgeons National Surgical Quality Improvement Program website: <https://www.facs.org/quality-programs/acs-nsqip>.

The program fits the data for each post-surgical complication to hierarchical logistic regression models that are weighted and risk-adjusted across all hospitals in the full collaborative to produce an odds ratio for each hospital.

### Ontario's performance

This report uses the program methodology that identifies the percentage of hospitals within the Ontario collaborative that fall into each of three program performance categories ('better than expected,' 'as expected,' 'needs improvement') for each post-surgical complication for **Figure 4**. For each hospital within each indicator, a performance categorization was assigned based on whether the hospital odds ratio a) fell into an extreme decile or b) was an outlier.

- **Extreme decile ranking.** All odds ratios of the program hospitals in the international collaborative (including the Ontario collaborative hospitals) are ordered from smallest to largest and assigned to 10 equally sized sequential groups (deciles) representing 10% of all program hospitals. In this manner, we can see how the Ontario hospitals compare to hospitals in the program's international collaborative. A hospital with an odds ratio in the first decile is within the 10% of hospitals that are the highest performers and a hospital with an odds ratio in the 10th decile is within the 10% of hospitals that are the lowest performers.

- **Outlier.** A hospital is determined to be an outlier based on the confidence intervals for the odds ratio. If the confidence interval for a hospital is entirely above the value of 1.0, then the hospital is considered to be a high outlier (a hospital has a higher likelihood of a post-surgical complication). Conversely, if the confidence interval for a hospital is entirely below the value of 1.0, then the hospital is a low outlier (a hospital has a lower likelihood of a post-surgical complication). If the confidence interval contains 1.0, then the hospital is not an outlier (a hospital is doing as expected).

'Better than expected' performance is attributed to hospitals that are doing very well in comparison to other program hospitals for a post-surgical complication. This status is assigned to hospitals that had a decile rank of 1 or were low outliers. 'Room for improvement' status is assigned to hospitals that are not doing as well as other program hospitals for a post-surgical complication. This status is assigned to hospitals that had a decile rank of 10 or were high outliers.

'As expected' status is attributed to hospitals that are doing similarly in comparison to other program hospitals with regard to a post-surgical complication. This status is assigned to hospitals that had a decile rank of 2-9 and were not outliers.

Building off of the NSQIP methodology, we have highlighted the specific post-surgical

complications where Ontario hospitals show higher performance or where there is room for improvement. Higher performance post-surgical complications are those that the program identified as having all hospitals performing ‘better than expected’ or ‘as expected’ for those complications. Post-surgical complications with ‘room for improvement’ are those that the program identified as having the largest percentage of hospitals that were in the ‘room for improvement’ category. For other post-surgical complications, the majority of hospitals performed ‘better than expected’ or ‘as expected.’

This report uses the program methodology that reports solely on decile ranking of hospital odds ratios across all hospitals for **Figures 2** and **3**. Please see the section above for decile ranking methodology. **Figures 2** and **3** only display the ranks of Ontario collaborative hospitals, however all program hospitals were used to produce the decile ranking.

For more information on the methodology please see the American College of Surgeons National Surgical Quality Improvement Program website: <https://www.facs.org/quality-programs/acs-nsqip>.



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# Acknowledgments

## Surgical Leadership

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Dr. Robin McLeod, Dr. Avery Nathens,  
Dr. Duncan Rozario, Dr. Claude LaFlamme  
and Dr. Kyle Kirkham.

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# Quality Surgery

Improving surgical care in Ontario

## Report development

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