



Ottawa Hospital  
**Research Institute**  
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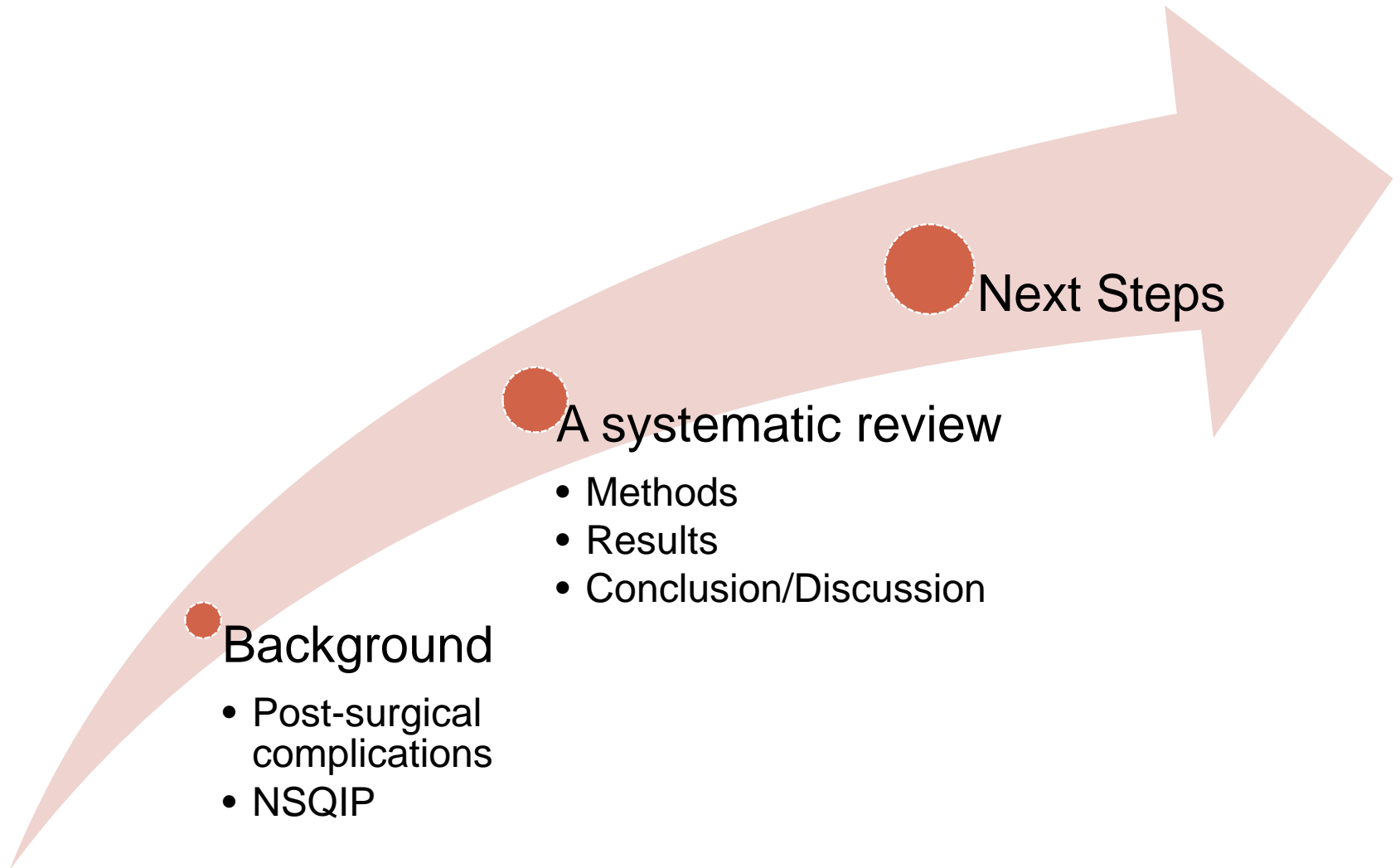
# **Is the National Surgical Quality Improvement Program (NSQIP) Cost-effective: A Systematic Review**

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**Ottawa Hospital Research Institute**  
**The Ottawa Hospital**

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# Outline of the Presentation





# Background (1)

- Post-surgical complication

*“any deviation from the ideal postoperative course that is not inherent in the procedure and does not comprise a failure to cure”* (Dindo & Clavien, 2008)

- Post-surgical complication occurs frequently
  - Incidence: 17 to 71% (Longo WE et al. 2000; Atchley KD et al. 2014)
  - the most common adverse events in Canadian hospitals in 2004 (Baker R et al. 2004)
- Post-surgical complications increase mortality, length of stay and healthcare costs
  - 5-fold increase in hospital costs compared to without complications (Saint et al., 1998)
- Various quality improvement efforts, such as the WHO Surgical Safety Checklist initiative and the NSQIP, have been implemented

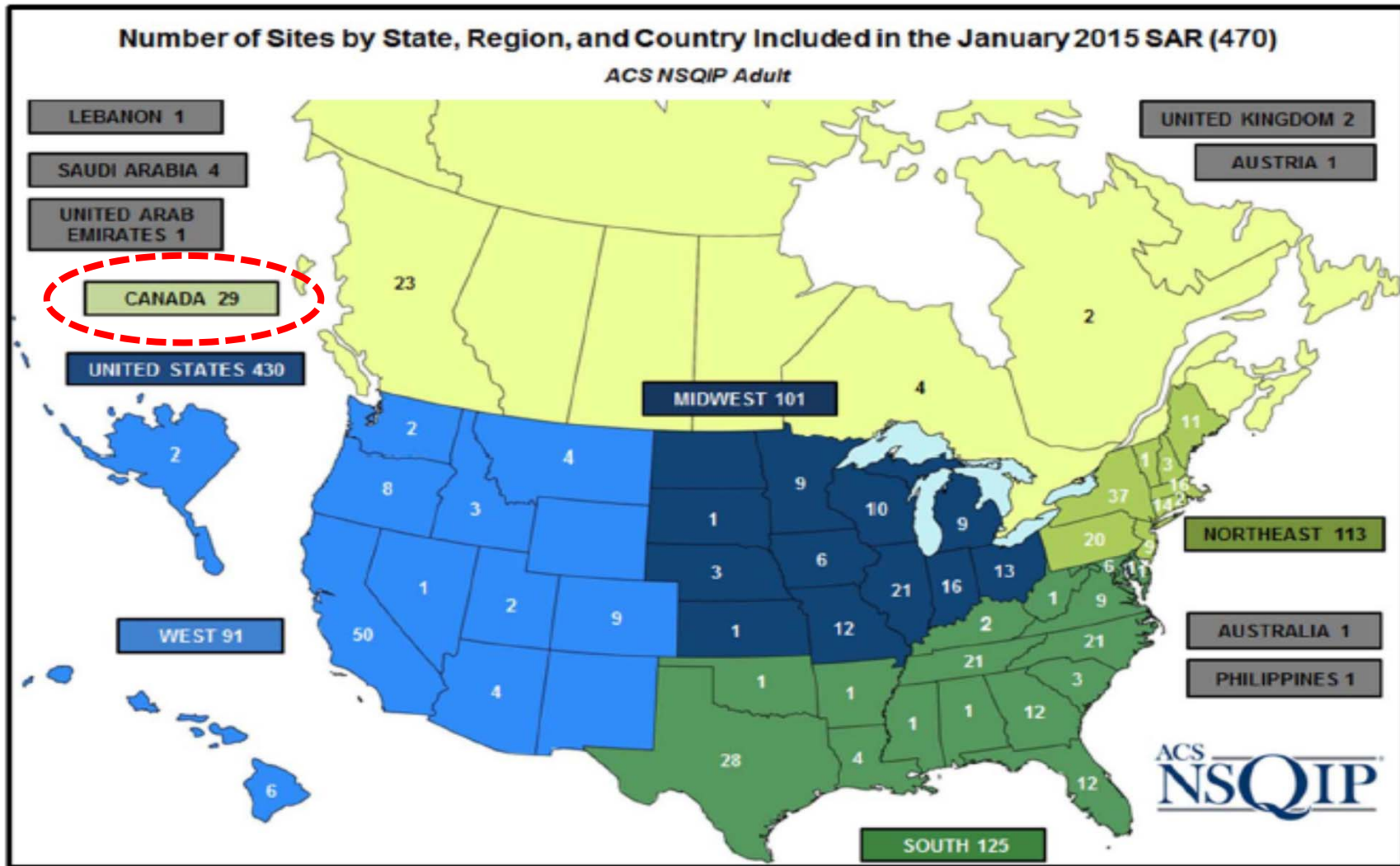


## Background (2)

- NSQIP is well-known for measuring and reporting surgical outcomes
  - found to significantly decrease hospital related complications
  - originated in the 1980s in Veterans Affairs Hospitals, modified and adopted by the American College of Surgeons



# Geographic Distribution of ACS NSQIP Participating Sites



Source: ACS NSQIP Semiannual report, 2015



## Background (2)

- NSQIP is well-known for measuring and reporting surgical outcomes
  - found to significantly decrease hospital related complications
  - originated in the 1980s in Veterans Affairs Hospitals, modified and adopted by the American College of Surgeons
  - prospectively collects detailed clinical data using standardized data definitions
  - provides 30-day risk-adjusted surgical outcome information for participating hospitals
  - allows comparison of surgical outcomes across participating hospitals

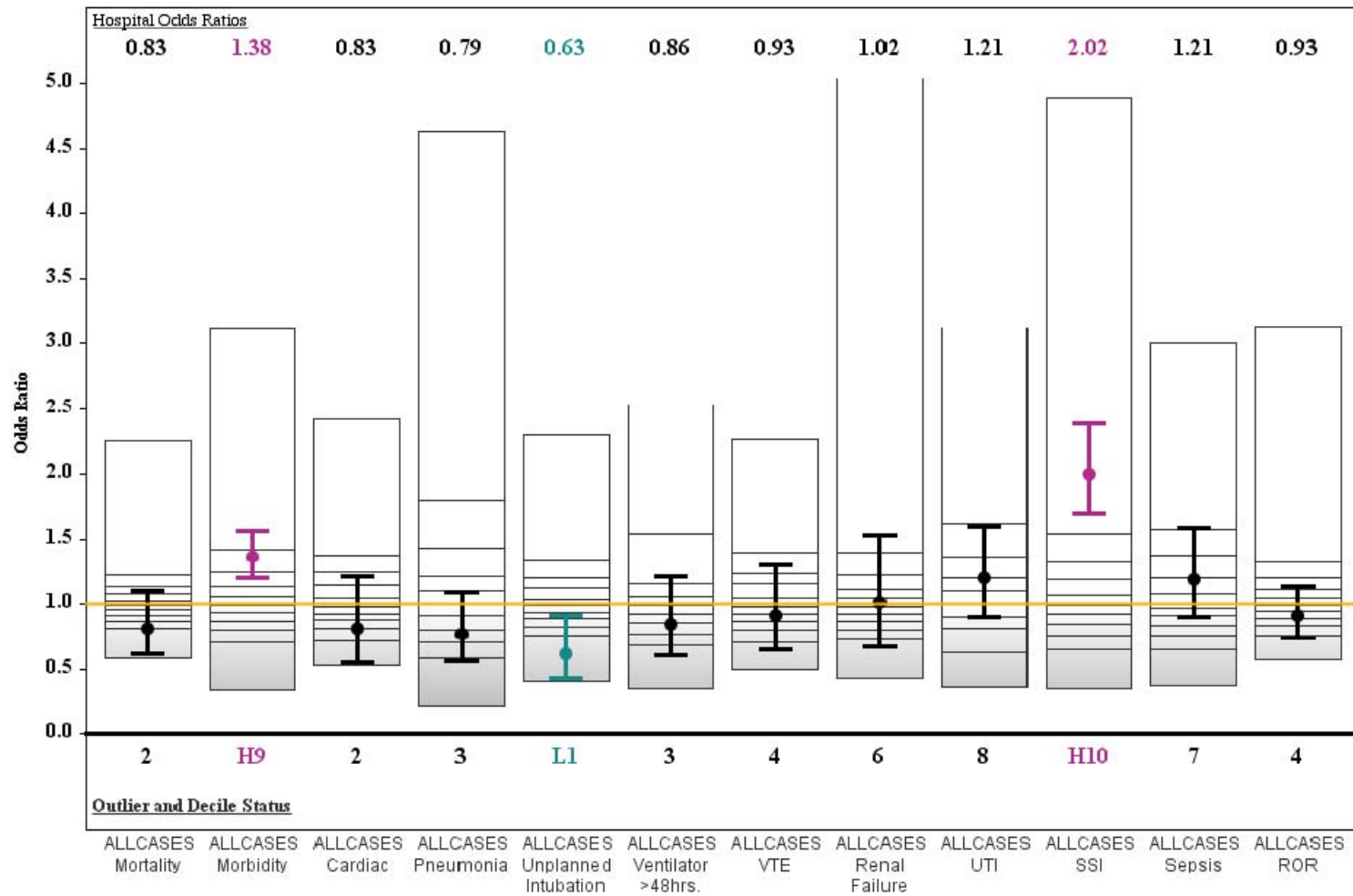


# NSQIP Report

All Cases

10/01/13 - 09/30/14

Site: 0297





## Background (4)

- There has been growing interest in NSQIP participation among Canadian hospitals
  - has been implemented in BC, Alberta, Quebec and Ontario
  - for Ontario,
    - successfully implemented in 5 hospitals, including The Ottawa Hospital, Toronto General Hospital, Toronto Western Hospital, Hamilton Health Sciences, and Sunnybrook Health Sciences Center
    - the Ontario NSQIP Collaborative (NSQIP-ON) (16 hospitals) has been established with the financial support from Health Quality Ontario
- Annual cost of participating NSQIP is about USD135,000
  - include data collection system, salary of a clinical reviewer, optional bonus payments to the surgical champion or quality improvement team
  - total cost of NSQIP participation would be \$22.5 million Canadian dollars per year if all Ontario public hospitals participate in NSQIP
- Systematic evaluation of the impact of this program is imperative to ensure that the benefits of NSQIP justify its costs





## Objective

- To review studies assessing costs or cost-effectiveness of participating in NSQIP compared to no intervention or usual care

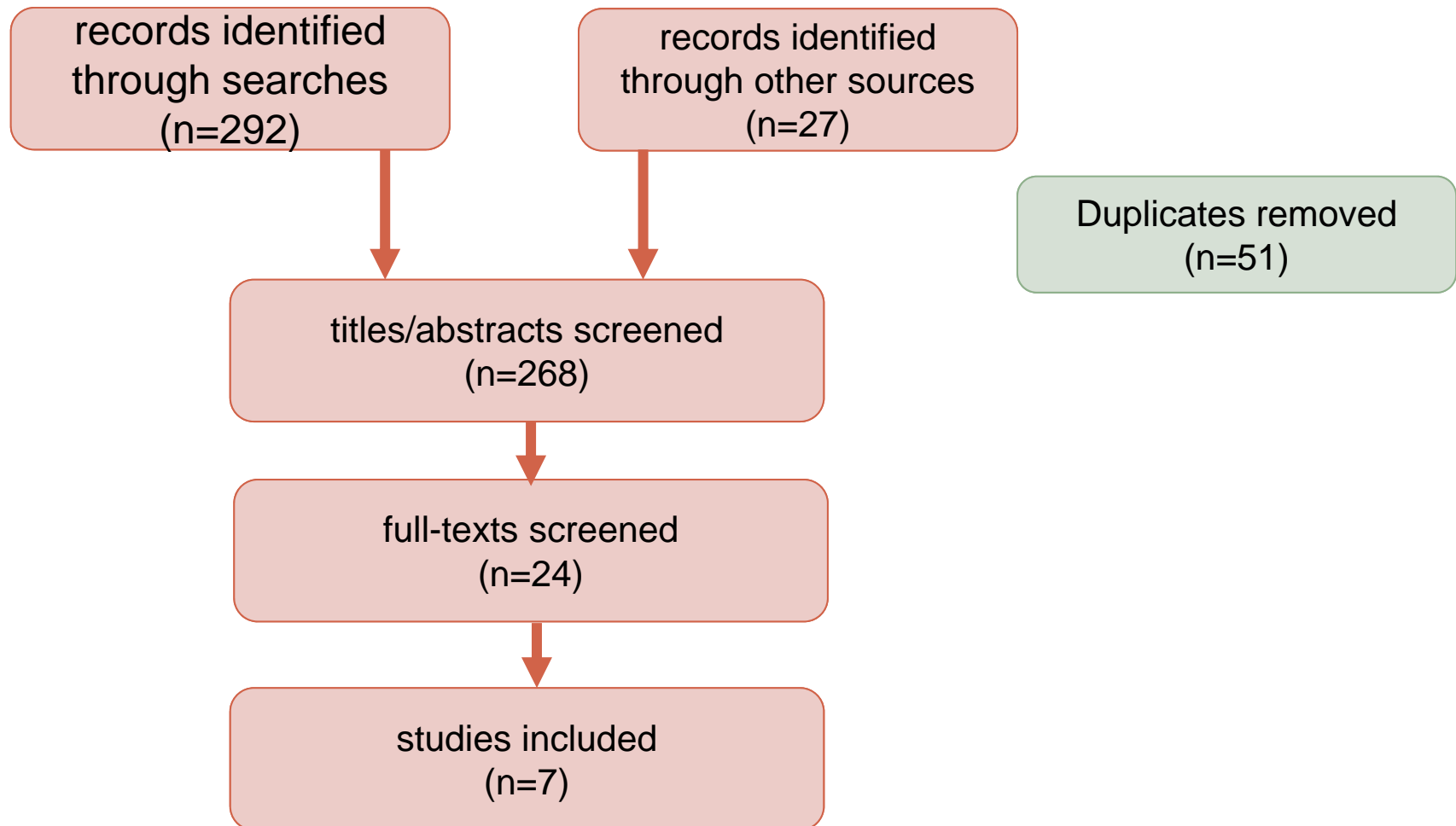


# Methods

- Electronic databases from inception to March 31, 2015
  - MEDLINE, EMBASE, Cochrane Database of Systematic Reviews, and EconLit
  - websites of related organizations, abstracts/proceedings from conferences, and reference lists
  - Medical subject headings and text words: post-surgical complications, NSQIP, costs
  - The electronic searching strategies was peer-reviewed by CADTH staff
- Inclusion criteria
  - Studies assess the economic impacts of NSQIP
    - cost description/cost of illness, cost-outcome description, cost analysis, full economic evaluation (cost-minimization analysis, cost-benefit analysis, cost-effectiveness analysis, and cost-utility analysis)
- Studies were screened, abstracted, and assessed independently by two reviewers
- Any conflicts were resolved through team discussion



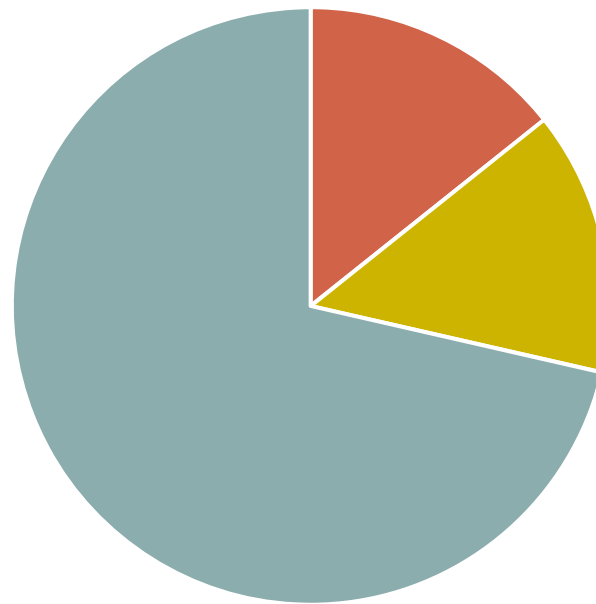
# Results – PRISMA Diagram





# Results – Included Studies

Type of Studies



■ Full economic evaluation ■ Cost analysis ■ Cost of illness

Participating NSQIP is cost-effective or cost-savings



# Results – Included Studies (1)

Author/ Year/ Country	Setting/ Perspective	Condition	Type of Study	Intervention/ Control	Result
Hollenbeak et al.,2011; US	academic medical center;  hospital	any post- operative complications	cost- effectiveness	initial vs. after NSQIP implementation	\$25,471 and \$7,316 per event avoided, after the 1 <sup>st</sup> and 2 <sup>nd</sup> of implementation
Ceppa et al., 2012;  US	Indiana University Hospital;  NR	SSI following hepatopan- creatobiliary	cost of illness	initial vs. after feedback from NSQIP and standardization of patient management	a savings of \$11,462 per event avoided  (a total savings of 370,223 in 2009)
Guillaondeg ui et al., 2012;  US	10 hospitals within Tennessee Surgical Quality Collaborative (TSQC); NR	any post- operative complications	cost of illness	1-yr vs. 2-yrs after forming the TSQC and using NSQIP	a net savings of \$23,723 per event avoided



## Results – Included Studies (2)

Author/ Year/ Country	Setting/ Perspective	Condition	Type of Study	Intervention/ Control	Result
Grand-Clément et al., 2013;  US	7 hospitals participating NSQIP;  NR	Colorectal SSIs	cost of illness	initial vs. 10-months after adopting the Robust Process Improvement	a savings of \$27,407 per event avoided
Tepas et al., 2014;  US	54 hospitals participating NSQIP and the Florida Surgical Care Initiative;  NR	UTI, SSI, adverse events for pts undergoing colorectal procedures, procedures for pts 65+	cost of illness	initial vs. 17 months after NSQIP participation	a savings of \$40,403 per event avoided  (a total savings of \$6,666,431)



## Results – Included Studies (3)

Author/ Year/ Country	Setting/ Perspective	Condition	Type of Study	Intervention/ Control	Result
McNelis et al., 2014;  US	Suburban university teaching;  hospital	ventilator associated complications	cost of illness	1-yr, 1.5-yrs, and 2-yrs after NSQIP implementation	a savings \$707,104/year for avoided pneumonia, \$4,424,640/year for decreased ventilator days
Osborne et al., 2015;  US	US Medicare;  hospital	any post- operative complications	cost analysis	NSQIP vs. no NSQIP	30-day mean total payments: \$40 (95% CI -\$268 to \$348)



# Results – Summary of the Findings (1)

- 1 full economic evaluation (Hollenbeak et al., 2011)
  - **cost-effectiveness analysis** - participation in NSQIP is cost-effective
  - **poor quality**- derived the effectiveness of NSQIP from the pre-post study; no control group; no adjustment for the time trend and other co-interventions
- 1 cost analysis (Osborne et al., 2015)
  - **regression analysis** - participating in NSQIP did not significantly reduce Medicare payments
- 5 cost of illness studies
  - **NSQIP return on investment tool**-using NSQIP with/without quality improvement activities led to cost-savings to hospitals
    - easy and simple
      - savings = no. cases avoided x unit cost of post-surgical complication
    - overestimate the financial benefits of NSQIP
      - not include cost of NSQIP implementation
    - unit costs of post-surgical complication were obtained from various studies which employed different costing strategies and perspective of analyses





## Results – Summary of the Findings (2)

	H et al., 2011	C et al., 2012	G et al., 2012	G et al., 2013	T et al., 2014	M et al., 2014	O et al., 2015
NSQIP	✓	✓	✓	✓	✓	✓	✓
QI activities*		✓	✓				
QI collaborative**			✓	✓	✓		

\***Quality improvement activities:** discussion among surgeons and changes in patient management

\*\* **Quality improvement collaborative:** benchmark and compare surgical outcomes, identify areas for improvement, and share best practices and improvement strategies



## Results – Summary of the Findings (2)

- Two studies only assessed the impact of participating NSQIP and did not include or adjust for other quality improvement efforts
- Components of quality improvement activities
  - NSQIP – collect, monitor, provide risk-adjusted post-surgical outcomes, and identify areas of improvement (7 studies)
  - establishment of teams and implementation of quality improvement activities, such as preoperative antibiotics, early mobilization, and early nutrition (3 studies)
  - establishment of a quality improvement collaborative across the hospitals to share surgical process and outcome data (3 studies)



# Conclusion

- Is NSQIP participation cost-effective?





## Conclusion/Discussion

- NSQIP serves as the foundation for quality improvement initiatives that are shared and disseminated through the program
  - does not make changes to health care delivery but provides data to identify areas for targeted quality improvement
- Evidence regarding the value for money of NSQIP is inconclusive
  - population, quality improvement activities, effectiveness measures
- Rigorous and well-designed cost-effectiveness studies are needed before the nation-wide implementation of NSQIP in Canada



## Next Steps

- Conduct a cost-effectiveness analysis of NSQIP and subsequent quality improvement initiatives within the Ottawa Hospital



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**Thank You**

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