

# **Hospital readmissions after primary unilateral hip or knee replacements: A comparison of inpatient and day surgery**

Health Analytics Branch  
Ontario Ministry of Health and Long-Term Care

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# Introduction

- Quality-Based Procedures (QBPs) in Ontario include primary unilateral hip and knee replacements
- Day surgery (DS) could be a safe and cost-efficient alternative to inpatient surgery (IPS) in many situations
- We examined all-cause non-elective readmissions within 30 days and the related inflation-adjusted incremental costs of DS vs IPS
  - Readmission rates - objective quality outcome

# Methods

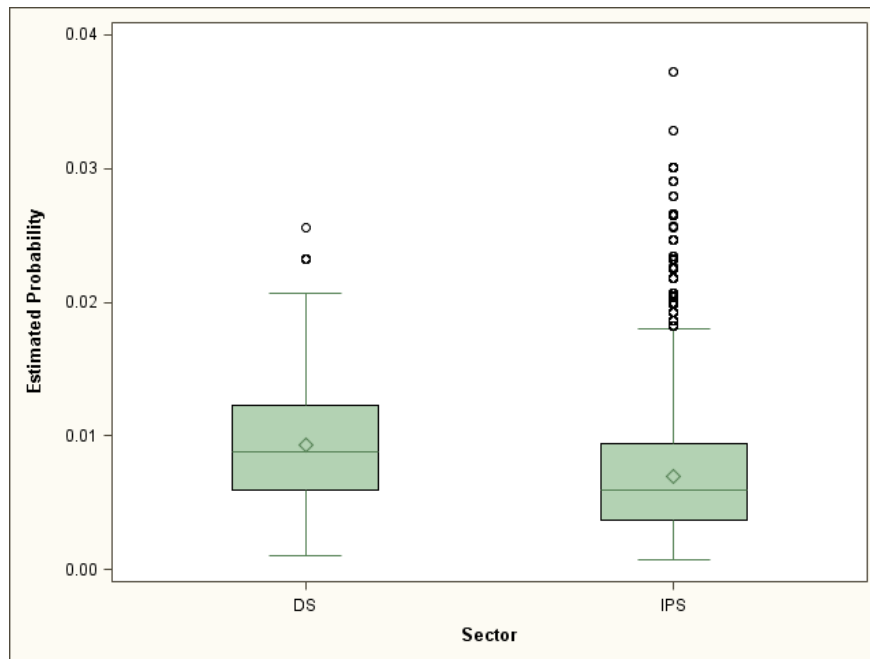
- Propensity score matching: DS versus IPS
- Matched cases on:
  - age, sex, Charlson comorbidity index
  - previous inpatient and ER admission within 365 days (proxy for complexity),
  - case mix (hip versus knee)
  - year based on Ontario FY2009-2013 data
- Paired t-tests to compare:
  - Costs of initial treatment and costs including readmissions
- Conditional logistic regression for matched pairs
  - estimate odds of readmission
- Found no effect modification by location of surgery

# Patient characteristics before and after propensity score matching

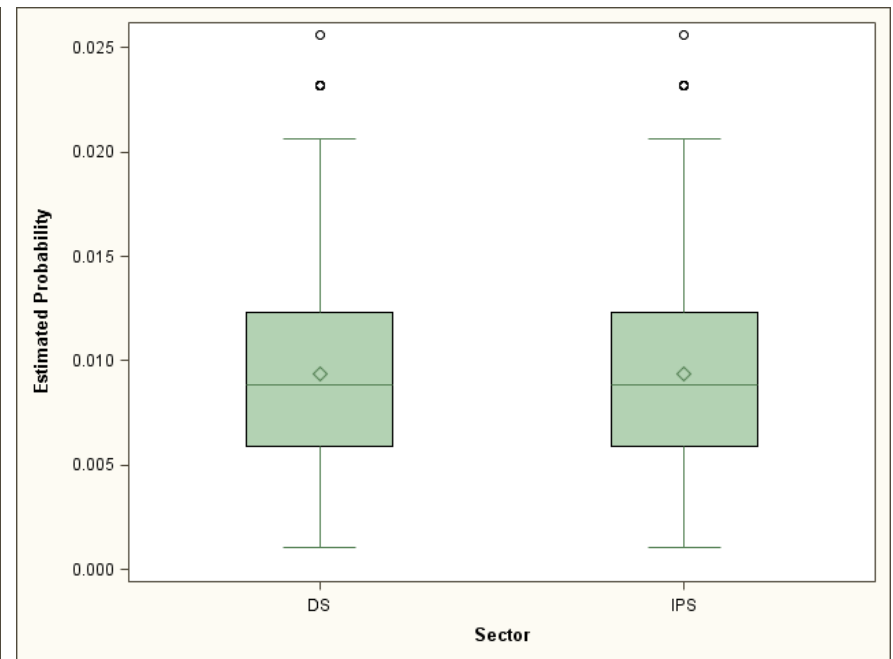
Patient characteristics, before matching						
	IPS			DS		
	Mean/Pct	LCL	UCL	Mean/Pct	LCL	UCL
Age	67.3	67.3	67.4	63.0	62.5	63.6
Sex (Female)	59.7%	59.4%	59.9%	52.6%	49.7%	55.5%
Prev. hospitalization	17.7%	17.5%	17.9%	8.3%	6.7%	9.9%
Prev. ER visit	30.0%	29.8%	30.2%	25.3%	22.7%	27.8%
Comorbidity >=1	1.2%	1.1%	1.3%	1.6%	0.9%	2.3%
Hip replacement	35.6%	35.4%	35.9%	26.8%	24.2%	29.4%
Number of cases	161,519			1,128		
Patient characteristics, after matching						
	IPS			DS		
	Mean/Pct	LCL	UCL	Mean/Pct	LCL	UCL
Age	62.3	61.7	62.9	63.0	62.5	63.6
Sex (Female)	54.4%	51.5%	57.3%	52.6%	49.7%	55.5%
Prev. hospitalization	14.5%	12.4%	16.5%	8.3%	6.7%	9.9%
Prev. ER visit	27.0%	24.4%	29.5%	25.3%	22.7%	27.8%
Comorbidity >=1	9.3%	7.6%	11.0%	1.6%	0.9%	2.3%
Hip replacement	30.5%	27.8%	33.2%	26.8%	24.2%	29.4%
Number of cases	1,128			1,128		

# Propensity scores distribution in the samples before and after matching

## Sample before matching



## Sample after matching



# Readmission rates before and after propensity score matching

## Readmission rates, before matching

Sector	Number of cases	Readmission rate	LCL	UCL
IPS	161,539	3.2%	3.1%	3.2%
DS	1,128	6.1%	4.7%	7.5%

## Readmission rates, after matching

Sector	Number of cases	Readmission rate	LCL	UCL
IPS	1,128	2.4%	1.5%	3.3%
DS	1,128	6.1%	4.7%	7.5%

Risk-adjusted readmission rates on the matched sample  
**2.5 times higher in DS than in IPS**

# Results (1)

- Costs of initial treatment differed by:
  - $-\$1,273$  ( $p < 0.001$ )
    - DS:  $\$7,657$  (7,604-7,710)
    - IPS:  $\$8,930$  (8,760-9,101)
- The difference in costs including readmissions:
  - $-\$1,181$  ( $p < 0.001$ )
  - Suggests that higher readmission rates in DS offset some savings in initial cost of DS treatment

## Results (2)

- Odds of readmission for DS compared to IPS:
  - **odds ratio 2.58 (1.59-4.21)** \*statistically significant
- Readmission rate - objective quality outcome:
  - Results Suggest: Potential lack of quality in DS compared to IPS for this type of surgery
  - IPS patients appear slightly more complex than DS patients even after matching: results conservative



# Conclusion

- Hip and knee replacements in Ontario are performed predominantly in IPS settings (99%)
- Careful considerations should be given before further expansion into DS settings for this type of surgery
  - DS is slightly cheaper than IPS based on inflation-adjusted incremental costs analysis (risk-adjusted)
  - Some of the initial cost savings in DS are offset by lost costs due to higher readmission rates in DS
  - Quality outcomes as measured by readmission rates are substantially worse in DS than in IPS for this type of surgery
- The QBP funding definition may need to be limited to IPS only (exclude DS)

# Thank You

## **Project members:**

Yuriy Chechulin, Senior Methodologist, Health Analytics Branch

Maja Stupar, Health Analyst, Health Analytics Branch

Kamil Malikov, Manager, Health Analytics Branch

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