

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

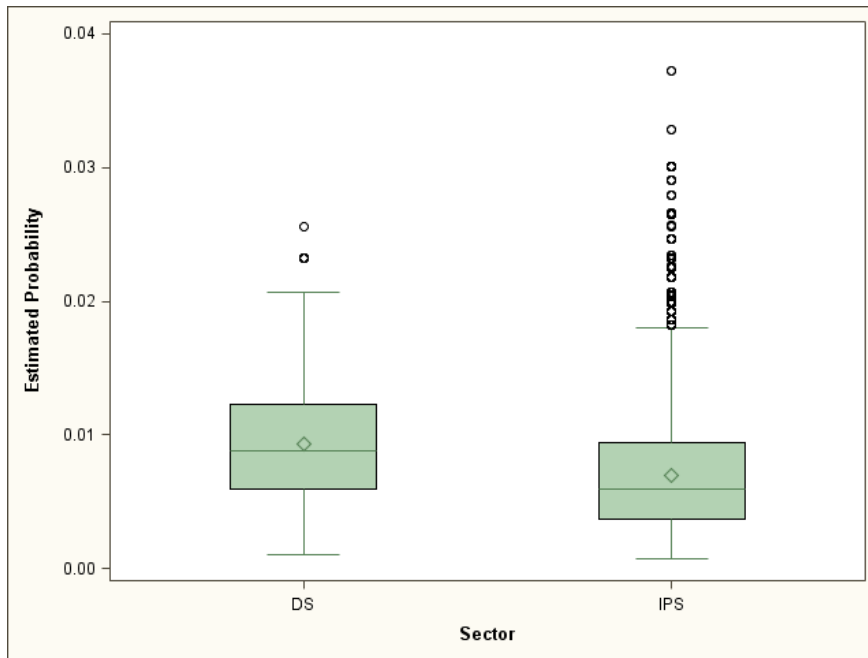
- Propensity score matching: DS versus IPS
- Matched cases on:
 - age, sex, Charlson comorbidity index
 - previous inpatient and ER admission within 365 days (proxy for complexity),
 - case mix (hip versus knee)
 - year based on Ontario FY2009-2013 data
- Paired t-tests to compare:
 - Costs of initial 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

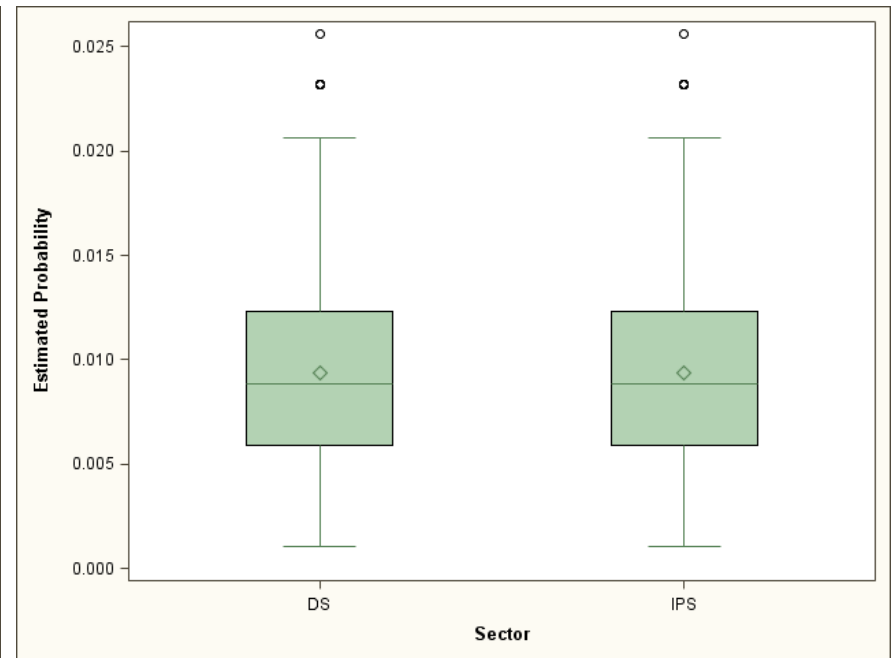
| Patient characteristics, before matching | | | | | | |
|--|----------------|-------|-------|--------------|-------|-------|
| | IPS | | | DS | | |
| | Mean/Pct | LCL | UCL | Mean/Pct | LCL | UCL |
| Age | 67.3 | 67.3 | 67.4 | 63.0 | 62.5 | 63.6 |
| Sex (Female) | 59.7% | 59.4% | 59.9% | 52.6% | 49.7% | 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

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