Single-Payer Health Insurance May Not Mitigate Income-Based Differences in Total Hip Arthroplasty Utilization: A Transnational Analysis

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INTRODUCTION:

Access to care varies across health systems. Countries with universal health insurance are thought to have less wealth-based health disparities, but it is unclear if this applies to total hip arthroplasty (THA) utilization and outcomes. The purpose of this study was to determine whether a single-payer healthcare system would mitigate income-based disparities in THA utilization and outcomes.

METHODS: We retrospectively compared all patients undergoing THA from 1/2012 to 9/2018 in Ontario (ON), Canada and Pennsylvania (PA), United States. We obtained PA patient data from Pennsylvania Health Care Cost Containment Council and ON patient data from Ontario's Institute for Clinical Evaluative Sciences. Patient-level data were linked to Census data of median household income of the ZIP code or postal code of patients' residence. We then analyzed whether community income-based differences in THA utilization were reduced in Ontario compared to Pennsylvania due to Canada's single-payer healthcare system. We used logistic regression to examine the relative risks for lowest community income of outcomes such as rates of 1-year revision, 90-day mortality, and 90-day readmission in the two regions.

RESULTS:

Among all THAs, 13,280 patients (15.8%) and 16,850 patients (16.0%) lived in communities within the lowest income quintile in Ontario and Pennsylvania, respectively (**Table 1).** Overall THA utilization was lower in Ontario compared to Pennsylvania across income groups **(Figure 1)**. In Ontario, patients in the highest income quintile utilized THA 43.2% more than those in the lowest income quintile (12.6 vs. 8.8); this difference in utilization was slightly greater than the difference in Pennsylvania, where patients in the highest income quintile utilized THA 41.7% more than patients in the lowest income quintile (21.4 vs. 15.1) ($p < 0.001$). Patients in the lowest community income quintile in Pennsylvania had a greater rate of 1-year revision, 90-day mortality, and 90-day readmission compared to patients in the lowest income quintile of Ontario. However, after adjusting for age, sex, hospital volume, and rural vs. urban hospital, the odds for patients in the lower-income group compared to the higher-income group of 1-year revision (ON: OR 1.70, 95% CI: [1.34, 2.15]. PA: 1.30 [1.12, 1.52]), 90-day mortality (ON: 1.92 [1.24, 2.98]. PA: 1.66 [1.18, 2.33]), and 90-day readmission (ON: 1.48 [1.34, 1.62]. PA: 1.43 [1.34, 1.54] were greater in Ontario compared to Pennsylvania **(Figure 2)**.

DISCUSSION AND CONCLUSION:

Income-based differences in THA utilization were greater in Ontario than in Pennsylvania. Additionally, patients in low-income communities in Ontario were at greater risk relative to higher community income patients for adverse outcomes. These findings suggest that a single-payer insurance system may not be sufficient to eliminate income-based differences in utilization and complications of THA.

Figure 1: Utilization rate of total hip arthroplasty for patients in Ontario and Pennsylvania by community income level

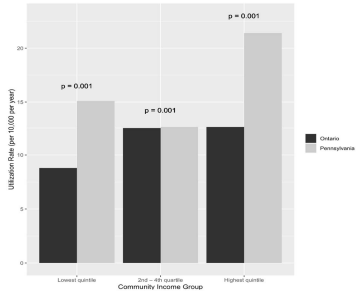
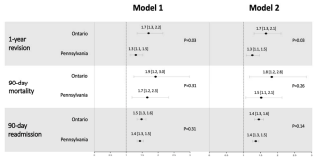


Figure 2: Adjusted odds ratios and 95% confidence intervals for risk of adverse outcomes in community lowest income compared to highest community income group



Note: Model 1 adjusts for income group, age, sex, hospital volume, rural / urban hospital. Model 2 adjusts for income group, age, sex, hospital volume, rural / urban hospital, and Elixhauser index.

Table 1: Characteristics of patients who underwent total hip arthroplasty in Ontario and Pennsylvania by community income level

	Lowest quintile community Income			Highest quintile community Income		
Variable, n (%)	**Ontario N = 13,280**	**Pennsylvania N = 16,850**	**P**	**Ontario N = 18,110**	**Pennsylvania N = 53,836**	**P**
Age, mean (SD)	68.22 ± 11.43	63.9 (11.7)	<0.001	66.05 ± 10.72	65.7 (11.0)	<0.001
Age group:						
Age <50	708 (5.3%)	1716 (10.2%)	<0.001	1,078 (6.0%)	2231 (6.59%)	0.004
Age 50-64	4,019 (30.3%)	6994 (41.5%)	<0.001	6,852 (37.8%)	13073 (38.6%)	0.074
Age >=65	8,553 (64.4%)	8140 (48.3%)	<0.001	10,180 (56.2%)	18532 (54.8%)	0.002
Sex: Female	8,160 (61.4%)	9290 (55.1%)	<0.001	9,296 (51.3%)	18100 (53.5%)	<0.001
Elixhauser index:						
0	8,048 (60.6%)	2373 (14.1%)	<0.001	12,079 (66.7%)	6309 (18.6%)	<0.001
1-4	5,204 (39.2%)	13306 (79.0%)	<0.001	6,013 (33.2%)	25918 (76.6%)	<0.001
>= 5	28 (0.2%)	1171 (6.95%)	<0.001	18 (0.1%)	1609 (4.76%)	<0.001
Volume of cases (by facility and year):						
< 25 procedures	35 (0.3%)	1042 (6.18%)	<0.001	8 (0.0%)	545 (1.61%)	<0.001
25-99 procedures	1,645 (12.4%)	4462 (26.5%)	<0.001	893 (4.9%)	4131 (12.2%)	<0.001
100-199 procedures	3,731 (28.1%)	4876 (28.9%)	0.11	4,121 (22.8%)	9003 (26.6%)	<0.001
200-299 procedures	3,899 (29.4%)	2431 (14.4%)	<0.001	5,482 (30.3%)	9769 (28.9%)	0.001
>= 300 procedures	3,970 (29.9%)	4039 (24.0%)	<0.001	7,606 (42.0%)	10388 (30.7%)	<0.001
Urban / rural (based on patient ZIP codes): urban	11,381 (85.7%)	12369 (73.4%)	<0.001	17,407 (96.1%)	33761 (99.8%)	<0.001