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Hospital Readmissions among Total Hip Replacement Patients in 2009 and 2014

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Abstract

Objective—To document changes in 30-day hospital readmission rates and causes for returning to the hospital for care among THR patients in US hospitals in 2009 and 2014.

Design—Cross-sectional, retrospective descriptive. We used data from the Nationwide Readmissions Database (NRD) which is drawn from the Healthcare Cost and Utilization Project (HCUP) net – sponsored by the Agency for Healthcare Research and Quality (AHRQ).

Setting—The AHRQ database, known as NRD, is based on a 20% sample of all hospital discharges in the nation.

Participants—THR patients (identified as ICD-9-CM procedure code 81.51) in 2009 (N=31,232) and (N = 32,863) in 2014.

Interventions—Not applicable.

Main outcome measure—30-day hospital readmission.

Results—Compared to 2009, overall rates of 30-day readmissions after THR decreased by 1.3% in 2014. The decrease in readmission rates varied by groups with lesser improvements seen among THR patients who were younger, with private insurance, residing in lower-income and rural communities. Device complications were the leading cause for readmission among THR patients, increasing from 19.8% in 2009 to 23.9% in 2014.

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Conflicts of Interest

The Author(s) declare(s) that there is no conflict of interest.

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Keywords

Hospital readmissions; Total Hip Replacement; Quality Improvement; 30-Day Readmission

Total Hip Replacement (THR) is a surgical procedure commonly performed in US hospitals to reduce pain and improve mobility for patients who suffer from inflammatory and degenerative hip arthritis. Trends show THR procedures performed in the US have more than doubled over the past 20 years.¹ Despite the growing popularity of THR surgery, complications still occur resulting in increased costs and hospital readmission.² Under the Hospital Readmission Reduction Program (HRRP), the Centers for Medicare and Medicaid Services (CMS) began imposing financial penalties on hospitals readmitting THR patients³; hospitals with readmission rates above the national average can be penalized up to 3% of their Medicare reimbursement.⁴ A trend analysis of hospital readmissions and their causes can be used to improve healthcare quality and patient safety.

Past studies examining THR readmission trends have focused on Medicare fee-for-service beneficiaries^{5–6} while only one study⁷ examining THR patients (enrolled in a single private health plan – Medicare Advantage) has been conducted since the implementation of the HRRP. In this study, using data from OptumLabs™ Data Warehouse, which includes claims from a large private health insurance carrier, Purvis et al.⁷ examined the rates and causes of unplanned hospital readmissions within 30 days among patients undergoing THR surgery in 2009 and 2013 by age group (adults ages 50–64 and 65–84). These researchers found hospital readmission among THR patients fell considerably faster among those 65 to 84 years of age compared to adults ages 50 to 64 (38% vs. 3%, respectively). It is also noteworthy that, among the 65- to 84-year-old age group, *device* and *surgical complications* were the two most common causes of hospital readmission in 2009 and 2013. Similarly, *device* and *surgical complications* were leading causes of hospital readmission among THR patients (belonging to the 50- to 64- year-old group) in 2009. However, in 2013, the leading cause of readmission changed to *other aftercare* for THR patients. While this study has many strengths including a large sample size (N=142,022) and patients under 65 years of age (50- to 64- year-old group), several limitations were noted. First, study findings may not be generalizable because the data included patients enrolled in a single private health plan. Second, no information was reported on the socioeconomic factors (e.g., income, geographic location) that might affect readmission. The lack of comprehensive data for THR procedures precludes policy-makers and researchers from knowing whether efforts to reduce readmission are having their intended (or unintended) effects on other patient groups (e.g., Medicaid beneficiaries). Building on past work, the purpose of this brief report was to (1) describe changes in 30-day hospital readmission rates among patients undergoing THR surgery in 2009 and 2014, stratified by demographic and socioeconomic subgroups and (2) identify causes of readmission that might serve as important targets for improving healthcare quality and patient safety.

METHODS

Data Source

This study used a retrospective cross-sectional descriptive design. The Agency for Healthcare Research and Quality (AHRQ) developed the Healthcare Cost and Utilization Project (HCUP), a nationwide database designed to provide health information and statistics on utilization, cost, and overall quality of health services. HCUPnet, an online query system based on data from the HCUP was used to access health statistics and information on hospital utilization and readmission rates from the Nationwide Readmissions Database (NRD). The sampling frame for the NRD is limited to discharges for patients treated at community hospitals that were not in rehabilitation or Long Term Adult Care (LTAC) facilities. All of the discharges in the sampling frame were selected from the HCUPnet with a primary procedure identified using the Clinical Classification Software (CCS) code 153 for THR. The Clinical Classifications Software (CCS) uses a standardized diagnosis and procedure categorization scheme based on the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM).

Outcomes of interest included national 30-day hospital readmission rates and reasons for returning to the hospital for care. Patient variables included age groups (18 to 44, 45 to 64, and 65 years and older), sex (male, female), primary payer (Medicare, Medicaid, and private insurance), median household income (1st quartile [lowest] to 4th quartile [highest]), and residence (metropolitan/non-metropolitan).

RESULTS

There were 31,232 and 32,863 patients who underwent THR surgery in 2009 and 2014 and subsequently were readmitted within 30 days following hospital discharge. Descriptive statistics on 30-day hospital readmission for THR patients is shown in Table 1. The overall readmission rate dropped from 2009 to 2014 by 1.3%. The 65 year and older age group had the greatest reduction (1.8%) followed by the 45–64 year old age group (0.4%); however, there was a 0.5% increase in readmission rates for 18–44 year age group from 2009 to 2014. Both male and female THR patients experienced 1.3% reduction in readmission. During the study period, THR patients with Medicare and Medicaid experienced a 1.6% and 1.1% decrease in readmissions, respectively; while readmissions among patients with private insurance decreased 0.7%. Patients in the 1st quartile income group had a decrease readmission rate of 0.7% while those in the 2nd quartile, 3rd quartile and 4th quartile saw decreased readmission rates nearly doubling that at 1.2%, 1.5%, and 1.3% respectively. THR patients from metropolitan areas had the largest percent reduction in readmission rates (1.5%) but readmission rates among THR patients residing in non-metropolitan areas experienced a 0.6% reduction during the study period.

HCUPnet data presented in Figure 1 shows causes of 30-day hospital readmissions among THR patients in 2009 and 2014. In 2009, device complications (implant or graft) was the most frequent cause, accounting for 19.8% of readmissions. Complications from surgical procedure or medical care (13.2%) and septicemia (5.3%) were the second and third most frequent causes for readmission. In 2014, device complications remained the most common

cause for readmission at nearly 24%. Complications of surgical procedure or medical care (12.2%) and septicemia (7.6%) were the second and third most frequent causes of readmission.

DISCUSSION

Despite a decline in 30-day hospital readmission rates across most THR demographic and socioeconomic groups, those between 18 and 44 years of age experienced an increase in 30-day hospital readmission rates. Though annual incidence of THR in the US has increased across all age groups, there has been a disproportionate growth in utilization among younger patients (less than 65 years of age)⁸ – obesity is associated with an increase need for and a contributor to peri- and post-operative complications⁹ – which could explain increased rates of hospital readmission among younger patients in the current study. Given the financial pressures of the HRRP, hospitals might be too narrowly focused on Medicare beneficiaries rather than the broader population. The trend of increasing incidence of THR, particularly among younger patients who might be at risk for readmission, should be studied and understood in order to guide population-based strategies. In addition, we found higher rates of readmission for THR in patients residing in lower-income communities compared to higher-income communities. Witt et al.¹⁰ found patients from low-income communities are 12% more likely to have post-surgical complications compared to those from higher-income communities. More research is needed to better understand differences in access to post-acute rehabilitation access and outcomes among low-income THR patients.

Device complications were responsible for the greatest proportion of THR readmissions, and increased proportionately over the study period. The type of device (components include polyethylene, metal, ceramic or a combination of these materials) could not be identified using HCUPnet; however, type of device has been shown to contribute to complications (i.e., loosening, deep infection, dislocation, and acetabular fracture) and revisions. Past studies show metal-on-metal implants have a greater risk of loosening or causing early failure, particularly among women.^{11–12} Future research should identify the most effective devices for THR patients, with specific efforts to evaluate the causative factors behind the higher rate of failure of THR in women.

While THR patients experienced modest reductions in surgical/medical complications, septicemia increased during the study period. Past reports have shown increases in the incidence of sepsis in elective surgery¹³; the emergence of drug-resistant pathogens and increasing levels of co-existing comorbidities that predispose older adults to sepsis have been hypothesized to explain this increase.¹⁴ Increased surveillance and adoption of care pathways shown to reduce infections are needed to improve THR outcomes. A systematic review and meta-analysis indicated a significant decline in mortality among performance improvement programs with increasing compliance with the use of sepsis bundles¹⁵ – evidence-based practices (EBPs) including fluid resuscitation, hemodynamic monitoring, glycemic control, corticosteroids, and antimicrobial therapy.

Study Limitations

Several limitations in this report are noted. No multivariate analyses were conducted to estimate associations between variables or control for confounders because the HCUPnet provides aggregated data and does not allow the linkage of other datasets. As such, we did not assess several patient (race, comorbidities), health system (teaching status, surgical volume) or community-level (access to and quality of post-acute care) factors known to be associated with readmission.^{16–18} The HCUPnet contains data on total charges for each hospital discharge in the NRD – charges represent the amount hospitals bill for services while costs reflect the actual expenses incurred in the production of services. Finally, differences across time points were not tested for statistical significance, but rather only clinical significance is interpreted.

Conclusion

In conclusion, rates of 30-day readmissions after THR decreased by 1.3%, from 2009 to 2014; rates varied by groups – reductions in readmission rates were lower for THR patients who were younger, with private insurance, residing in lower-income and rural communities. Device complications were the leading cause for readmission among THR patients, increasing from 19.8% in 2009 to 23.9% in 2014. Managers may benchmark their facility performance against this nationally representative sample of 30-day hospital readmission rates, and this comparison may inform quality improvement efforts. Lastly, clinicians can contribute to THR readmission reduction by using EBPs to prevent complications and facilitate successful discharges to lower levels of care.

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List of Abbreviations

CMS	Centers for Medicare and Medicaid Services
HRRP	Hospital Readmissions Reduction Program
AHRQ	Agency for Healthcare Research and Quality
HCUP	Healthcare Cost and Utilization Project
NRD	Nationwide Readmissions Database
CCS	Clinical Classification Software
ICD9-CM	International Classification of Diseases, 9th Revision, Clinical Modification
EBP	Evidence-based Practice

LTAC Long Term Adult Care

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Highlights

1. Compared to 2009, overall rates of 30-day readmissions after THR decreased by 1.3% in 2014. The decrease in readmission rates varied by groups with lesser improvements seen among THR patients who were younger, with private insurance, residing in lower-income and rural communities.
2. Among all groups, only the THR patients between 18–44 years of age, showed an increase (0.5%) in 30-day hospital readmission rates.
3. Device complications were the leading cause for readmission among THR patients, increasing from 19.8% in 2009 to 23.9% in 2014.

Figure 1.
Causes of readmissions within 30 days among Total Hip Replacement patients in 2009 and 2014.

Table 1

Number of stays, percent readmitted, and costs per stay for THR patients, 2009 and 2014

Characteristics	Number of stays		30-day percent readmitted		Mean costs per initial stay	
	2009	2014	% change, 2009–2014	2009	2014	% change, 2009–2014
Overall	31,232	32,863	5	7.9	6.6	1.3
Age						
18–44	924	1,004	8	4.9	5.4	–0.5
45–64	6,213	7,738	24	4.8	4.4	0.4
65+	24,083	24,090	0.02	9.8	8.0	1.8
Sex						
Male	12,369	13,362	8	7.7	6.4	1.3
Female	18,863	19,501	3	8.1	6.8	1.3
Payor						
Medicare	24,974	25,822	3	9.9	8.3	1.6
Medicaid	1,098	1,579	44	8.3	7.2	1.1
Private Insurance	4,559	4,750	4	3.9	3.2	0.7
Income						
1 st quartile (lowest)	8,021	7,826	–2	9.0	8.3	0.7
2 nd quartile	8,079	8,728	8	7.9	6.7	1.2
3 rd quartile	7,748	7,218	–7	7.9	6.4	1.5
4 th quartile (highest)	6,875	7,619	11	6.9	5.6	1.3
Residence						
Metropolitan	25,255	26,699	–1	8.1	6.6	1.5
Non-metropolitan	5,977	6,163	10	7.3	6.7	0.6

Notes: To calculate percentage change for number of stays and mean costs per stay: First, determine the difference by subtracting 2009 data from 2014 data. Then, divide the difference by the 2009 data and multiply by 100. Negative numbers reflecting reduced stays or costs. Data not presented for patients aged 0 to 17 years. To calculate percentage change for 30-day hospital readmission: subtract percentage rate 2009 data from 2014 data. Negative numbers reflecting an increase readmission