KAISER PERMANENTE®

Does Disposition Following Primary Total Joint Replacement Affect Readmission Rates?

Stefano A. Bini, MD • Monti Khatod, MD • Liz Paxton, MA • Maria Inacio, MS • Donald Fithian, MD • Robert Namba, MD.

Introduction

The creation of the prospective payment system (PPS) under Medicare was the driving force behind the practice of early discharge from hospitals.[3] Since then, numerous papers have noted that there is little difference in functional outcome between patients discharged home and patients who are sent to skilled nursing facilities (SNF), even following total hip replacement.[3,4]

As patients are being discharged "quicker and sicker" (Kahn) through the use of skilled nursing facilities, we need to ask if there is a difference in the relative rates of 90 day hospital readmission between patients who are discharged home and those discharged to a skilled nursing facility following an uncomplicated primary total joint replacement. This is of particular concern following total joint replacement, where complications such as infection or myocardial infarction can be both difficult to manage and very costly.

Materials and Methods

We conducted a retrospective study of the effects of discharge disposition (home versus SNF) on hospital readmissions for TKA and THA procedures performed in a California Health Maintenance Organization (HMO). Hospital readmission within 90 days of surgery was the main outcome variable. Covariate variables included the American Society of Anesthesia (ASA) Physical Status Classification score, patient age at the time of surgery, and patient gender.

Data Sources

- **KP Total Joint Replacement Registry:** indentifed primary TKA and THA procedures performed between April 2001 and December 2004 at KP California hospitals. Patient age, gender, and ASA score were also extracted from the KP Total Joint Replacement Registry.
- **KP utilization database:** used to extract discharge disposition, admitting and discharge ICD-9 diagnosis, hospital length of stay (LOS), complications, and hospital re-admissions within 90 days of the surgery.

Inclusion/Exclusion criteria

- **Inclusion criteria:** primary TKA and THA procedures performed at KP California hospitals within a 3 year period (2001-2004).
- **Exclusion criteria:** patients with ASA scores greater than 2, and patients with complications during their hospital stay.
- **Hospital readmissions:** All hospital readmission discharge codes were evaluated to determine if hospital related to the total joint replacement procedure. Readmissions were categorized into surgical or medical complications based on whether the complication was primarily related to the procedure itself or to a comorbidity. Readmissions due to any event not related to the index procedure were excluded.

Statistical Methods

Chi-square and Fishers exact tests were used to evaluate categorical variables. The Mann-Whitney test was used to compare group ages, initial LOS, and ASA scores. Multivariate logistic regression was used to estimate adjusted odds ratios with each of the covariates (patients' age, gender, and ASA score) in determining hospital readmission within 90 days of the total joint procedure.

Results

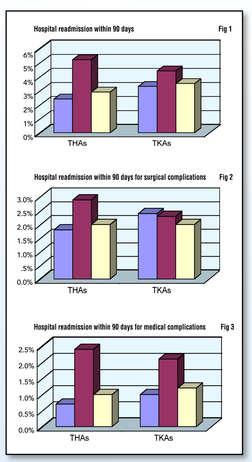
The final sample consisted of 3,432 THAs and 5,718 TKAs. Of the 3,432 THAs, 2,840 were discharged home and 592 to a SNF. For TKAS, 4,863 were discharged home and 855 to a SNF. SNF patients were significantly older (p<.001), had a higher ASA scores (p<.05), and were more predominately female (p<.001).[Table 1] THA SNF patients had a shorter initial hospital LOS than those discharged home (p=.002).

Table 1. Patient Demographics

	Discharged Home	SNF	Total
Age (Mean, Stdv)			
THA	63 (12)	73 (10)	65 (12)
TKA	66 (9)	73 (9)	67 (10)
Gender (% Female)			
THA	53%	73%	58%
TKA	63%	68%	64%
ASA score			
THA			
ASA 1	8%	3%	7%
ASA 2	92%	97%	93%
TKA			
ASA 1	5%	3%	5%
ASA 2	95%	97%	95%
Initial Hospitalization LOS Mean, (Stdv)			
THA	3.62 (.91)	3.46 (.98)	3.61 (.92)
TKA	3.62 (.94)	3.72 (1.3)	3.63 (1.0)

Hospital Readmissions

The overall hospital readmission rate was 3.3%. Following THA in this cohort was 2.9%, and for TKA 3.5% (p=.13). Patients discharged to a SNF had a higher rate of hospital readmissions within 90 days than patients discharged home (THA 4.4% vs. 3.3%, p<.001; and 5.2% vs. 2.4% for TKA, p=.10).[Figure 1] While hospital readmissions for surgical reasons did not differ significantly between patients discharged to home versus SNF,[Figure 2] THA and TKA patients discharged to SNF had higher rates of readmissions due to medical complication (THA p<.001, TKA p=.006).[Figure 3]



The adjusted odds ratio for THAs indicated that patients discharged to SNFs were 1.9 times (95% C.I., 1.2 to 3.2) more likely to be readmitted to the hospital within 90 days of surgery than those discharged home. TKA SNF patients were 1.6 times (95% C.I., 1.1 to 2.4) more likely to be readmitted within 90 days of the surgery than patient discharged home. [Table 2]

Table 2. Multivariate Logistic Regression Adjusted Odds Ratios

		Sig.	Adjusted Odds Ratio	95.0% C.I. for EXP (B) Lower	Upper
THA	Gender	.588	.886	.571	1.374
	Age	.966	1.000	.981	1.018
	ASA	.846	.924	.416	2.053
	Discharge Group	.008	1.943	1.189	3.176
TKA	Gender	.511	1.103	.823	1.479
	Age	.000	.969	.955	.983
	ASA	.443	1.327	.644	2.734
	Discharge Group	.011	1.629	1.116	2.377

Discussion

Several studies have compared functional outcomes for patients discharged to a skilled nursing or rehabilitation facility vs. home.[2,3,4,5,6] None of these reports has revealed statistical differences in functional outcomes or patient satisfaction between patients discharged home and those sent to inpatient rehabilitation. However, few papers have looked beyond functional results to analyze whether transfer to a sub acute care setting following elective total joint replacement in the lower extremity leads to increased complications.[2,9]

We defined a serious complication as one that required readmission to the hospital. To avoid the selection bias identified by Buntin that favors admission to SNF for patients who are sicker and therefore predisposed to complications, only elective patients with an ASA score of 1 or 2 were included.[2] We also excluded patients who suffered complications during their acute hospitalization and were therefore predisposed to readmission at the time of discharge. Our large cohort is representative of a community based patient population. The study included patients from 33 different centers in California distributed over a 3 year period.

Our results indicate that discharge to a skilled nursing unit is an independent variable associated with a 1.9 times higher readmission rate within 90 days following THA (p< .001) and a 1.6 times higher readmission rate following TKA (p=.10). For both procedures, readmissions are more commonly due to medical complications, rather than surgical complications. Table 3 shows how selected complication rates compare to those published elsewhere.

Table 3. Comparison of Complication Rates

	MI (%)		PE(%)		Infection (%)		Dislocation (%)
	THA	TKA	THA	TKA	THA	TKA	THA
Bini et al	0	0.30	0.15	0.16	0.41	0.71	0.087
Mahomed et al	na	0.80	0.90	0.80	0.24	0.40	3.10
Mantilla et al	0.40	0.40	0.70	0.70	na	na	na

The fact that patients that are discharged to SNFs, tend to be female, more likely to have an ASA score of 2, and to be predominantly older is not surprising and is consistent with other reports.[5,6,7] A key driver to discharge to a SNF is the lack of social support systems at home, more common in the elderly.

LOS following primary total joint replacement in our cohort is relatively short for both THA and TKA compared to other studies (3.2 days vs 5.6 days).[1] It is therefore surprising that our overall rate of discharge to SNF is half the rate for Medicare patients reported by Buntin.[2] The shorter length of stay and lower rate of discharge to SNF can be partly explained by our selection criteria and bears further study.

The present study has clear limitations. Controlling for patient selection is complicated and using ASA scores may not be an accurate proxy for physico-medical status. Further, discharge criteria across 33 medical centers can vary greatly. The quality of care between rehabilitation centers or nursing homes can vary greatly, and minor complications that do not lead to readmission are not captured for either group. We also could not control for ambulatory status prior to discharge. It is possible that it is a patient's ambulatory status, rather than discharge setting, that predisposes a total joint patient to transfer to a SNF and that non ambulatory patients are more likely to develop medical complications leading to readmission. This may be particularly true as medical and not surgical complications predominate. Lastly, these data largely reflect skilled nursing or rehabilitation services provided in facilities that are separate and removed from the primary hospital. Thus these data may not apply to inpatient rehabilitation facilities, although Buntin et al saw little if any differences in outcomes between these two types of sub acute settings in their report.[2]

Readmissions are costly and anxiety provoking for patients and their families. An increased role for SNF based physicians in the care of these patients during their recovery may offer an opportunity to reduce the incidence of post operative complications.

Conclusion

In conclusion, after controlling for ASA score, age and hospital complications, elective patients who are discharged to a skilled nursing facility following lower extremity joint replacement are at higher risk for post operative complications requiring readmission than patients who are sent home. This relationship is statistically significant and warrants further study.

Acknowledgement

We would like to thank all Kaiser Permanente orthopedic surgeons who contribute to the success of the Total Joint Registry.

References

1. Bozic KJ, Katz P, Cisternas M, Ono L, Ries, MD and Showstack, J. Hospital Resource Utilization for Primary and Revision Total Hip Arthroplasty . The Journal of Bone and Joint Surgery (American). 2005;87:570-576.
2. Buntin MB, Deb P, Escarce J, Hoverman C, Paddock S, Sood N. Comparison Of Medicare Spending And Outcomes For Beneficiaries With Lower Extremity Joint Replacements. Rand Health. 2005
3. Kane RL, Chen Q, B Lewett LA, Sangl J. Do Rehabilitative Nursing Facilities Improve The Outcomes Of Care? J Am Geriatric Soc. 1996;44(5):545-54.
4. Kelly MH, Ackerman RM. Total Joint Arthroplasty: A Comparison Of Post-Acute Settings On Patient Functional Outcomes. Orthop Nurs. 1999; 18(5):75-84.
5. Mahomed NN, Koo Seen Lin MJ, Levesque J, Lan S, Bogoch ER. Determinants And Outcomes Of Inpatient Versus Home Based Rehabilitation Following Elective Hip And Knee Replacement. J Rheumatol. 2000;27(7);1753-8
6. Mahomed NH, Barrett J, Katz JN, Baron JA, Wright J, Losina E.. Epidemiology of Total Knee Replacement in the United States Medicare Population. The Journal of Bone and Joint Surgery (American). 2005;87:1222-1228.
7. Mahomed NN, Barrett JA, Katz JN, Phillips CB, Losina E, Lew RA, Guadagnoli E, Harris WH, Poss R, Baron JA. Rates and outcomes of primary and revision total hip replacement in the United States Medicare population. J Bone Joint Surg Am. 2003 Jan;85-A(1):27-32.
8. Mantilla CB, Horlocker TT, Schroeder DR, Berry DJ, Brown DL. Frequency of myocardial infarction, pulmonary embolism, deep venous thrombosis, and death following primary hip and knee arthroplasty. Anesthesiology. 2002 May;96(5):1140-1148.
9. Phillips CB, Barrett JA, Losina E, mahomed NN, Lingard EA, Guadagnoli E, Baron JA, Harris WH, Poss R, Katz JN. Incidence rates of dislocation, pulmonary embolism, and deep infection during the first six months after elective total hip replacement. J Bone Joint Surg Am. 2003 Jan;85-A(1):20-6