Does Home Health Care Protect Against Readmissions After Primary Total Joint Arthroplasty?

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INTRODUCTION: The benefits of Home Health Care (HHC) after primary Total Joint Arthroplasty (TJA) remain unclear. Ostensibly, HHC would be expected to improve outcomes. However, the data regarding this are contradictory. At least one study has reported higher rates of emergency department visits and readmissions after total knee arthroplasty (TKA) when patients had HHC. However, lower rates of readmission have been observed in other studies (e.g. High BMI primary THA and Robotic-TKA) when HHC was utilized. Regardless, HHC adds cost to the 90-day episode of care after TJA. If it prevents complications and/or reduces readmissions, it adds value. However, if it is ineffective in preventing poorer outcomes, it is an added expense which should be scrutinized.

METHODS: IRB approval was obtained before commencement of this study. A retrospective review of all primary THA and TKA performed in a large, integrated health care system between 1/1/2018 and 12/31/2020 was performed. Patients discharged directly home, with or without HHC, were identified through the health system database and selected for study. Demographic and cost data, Length of stay (LOS), utilization of HHC, and readmission rates were collected. To balance the confounding factors between THA and TKA patients, a 1:1 propensity score matching model was performed by including age, BMI, LOS, inpatient/outpatient classification, and ASA score as the matching variables.

RESULTS:

Prior to matching, 17,878 TKA and 16,801 THA were identified (Table 1a). Of these, 12,264 were discharged home with HHC, 22,415 without. HHC patients were older (+2.3 years), sicker (42% ASA III or higher vs. 37%), and had greater LOS (+0.2 day) than those discharged home without HHC (Table 1b).

After matching THA to TKA, there were 10,194 patient in each cohort (Table 1a). 3879 TKA were discharged with HHC, and 6315 TKA were discharged without HHC (Table 2). 3146 THA were discharged with HHC, and 7048 THA discharged without HHC (Table 3). HHC patients remained older (TKA +1.7 y, THA +2.2 y p<.0001) and had longer LOS (TKA +0.6, THA +0.2 p< .0001) than those without HHC. THA patients with HHC continued to have higher ASA scores than those without (p<.0001), but no significant difference in ASA scores remained for TKA patients (p=.5791). Direct costs for HHC patients were greater (TKA +$828, THA +$833 p<.0001) than for those without. Readmission rates were equal (3%) for TKA patients with or without HHC. Readmission rates were slightly higher for THA patients with HHC (3% vs. 2%), but this was not significant (p=0.1629).

Further 1:1 matching was performed between HHC and non HHC cohorts to eliminate the remaining differences in age, LOS, BMI, and ASA scores (Table 4), resulting in 3085 THA with and without HHC, and 3820 TKA with and without HHC. Readmission rates were not significantly different for either TKA with/without HHC (2.5% vs. 2.7% p=0.6287) or THA with/without (1.9% vs. 2.0% p=0.8040).

DISCUSSION AND CONCLUSION:

In this large database study of primary THA and TKA, HHC was not observed to have any significant effect on readmissions, though the addition of HHC added approximately $800 to direct cost of the admission. We observed neither the greater risk of readmissions previously reported nor the possibly “protective” benefit of HHC seen in other studies.

After initial matching, HHC patents had some greater risks (age, ASA, LOS), but while statistically significant, they were unlikely to be clinically significant. Nonetheless, the rates of readmission were equal for those with/ without HHC after TKA and slightly greater for those with HHC after THA. When those risk factors were corrected through further matching, no difference was seen in readmissions after either TKA or THA in patients for whom HHC was ordered compared with those for whom it was not.

In summary, HHC had no effect on readmissions after primary THA or TKA. HHC was associated with slightly older, sicker patients, and there may have been cost and social benefit if it expedited their discharge home and/or prevented transfer to a skilled nursing facility. However, further analysis is required to determine if these hidden benefits offset the additional $800 cost per patient generated by HHC.

Table 1a – Total Hip and Knee Arthroplasty Cohort Pre and Post Matching

	Pre-Matching			Post-Matching		
	Hip (N=17,878)	Knee (N=16,801)	SMD	Hip (N=10,194)	Knee (N=10,194)	SMD
Age	66.2 (10.4)	66.9 (9.1)	0.080	67.2 (9.5)	66.9 (9.1)	-0.036
BMI	29.0 (5.7)	31.6 (6.2)	0.442	30.1 (5.4)	30.6 (5.6)	0.083
LOS (days)	1.3 (1.2, 2.2)	1.4 (1.2, 2.3)	0.102	1.3 (1.2, 2.2)	1.4 (1.2, 2.3)	0.031
Patient Class						
Inpatient	194 (1%)	266 (2%)	0.053	157 (2%)	178 (2%)	0.016
Outpatient	14853 (99%)	14270 (98%)	-0.053	10037 (98%)	10016 (98%)	-0.016
ASA						
I	803 (5%)	330 (2%)	-0.138	284 (3%)	282 (3%)	-0.001
II	10024 (61%)	8438 (54%)	-0.110	6262 (61%)	6107 (60%)	-0.031
III	5417 (33%)	6590 (42%)	0.163	3579 (35%)	3713 (36%)	0.028
IV+	133 (1%)	180 (1%)	0.020	69 (1%)	92 (1%)	0.025

Note: In pre-matching, there were 16468 hip patients (8% missing) and 14515 knee patients (14% missing) with BMI info. SMD=Standardized mean difference.

Table 1b – Total Hip and Knee Arthroplasty Cohort Pre-Matching

	Discharge to Home (N=22,415)	Home Health (N=12,264)
Age	65.7 (9.8)	68.0 (9.6)
BMI	30.4 (6.0)	29.8 (6.1)
LOS (days)	1.3 (1.1, 2.2)	1.5 (1.2, 2.4)
Patient Class		
Inpatient	356 (2%)	104 (1%)
Outpatient	18879 (98%)	10244 (99%)
ASA		
I	813 (4%)	320 (3%)
II	12073 (59%)	6387 (55%)
III	7317 (36%)	4694 (41%)
IV+	183 (1%)	129 (1%)

Table 2 – Total Knee Arthroplasty Cohort

	Discharge to Home (N = 6,315)	Home Health (N = 3,879)	p-value
Age	66.2 (9.2)	67.9 (8.9)	<.0001
BMI	30.9 (5.6)	30.1 (5.6)	<.0001
Direct Cost	9400 (8275, 11101)	10228 (9191, 11970)	<.0001
LOS (days)	1.3 (1.1, 1.2)	1.9 (1.2, 2.4)	<.0001
30-day Readmission (N readmitted, %)	125 (2%)	75 (2%)	0.8710
ASA			0.5791
I	173 (3%)	109 (3%)	
II	3811 (60%)	2296 (59%)	
III	2271 (36%)	1442 (37%)	
IV	60 (1%)	32 (1%)	

Note: Two sample t-tests were used to test the differences in age and BMI between the two comparison groups. Wilcoxon rank sum tests were used to test the differences in direct costs and LOS. Associations between ASA and the two comparator groups were compared by using chi-square tests.

Table 3 – Total Hip Arthroplasty Cohort

	Discharge to Home (N = 7,048)	Home Health (N = 3,146)	p-value
Age	66.9 (9.3)	68.6 (9.7)	<.0001
BMI	30.3 (5.4)	29.6 (5.5)	<.0001
Direct Cost	10022 (9064, 11161)	10855 (9974, 12405)	<.0001
LOS (days)	1.3 (1.2, 2.1)	1.5 (1.3, 2.3)	<.0001
30-day Readmission (yes readmitted, %)	146 (2%)	79 (3%)	0.1629
ASA			<.0001
I	208 (3%)	76 (2%)	
II	4435 (63%)	1827 (58%)	
III	2357 (63%)	1222 (39%)	
IV	60 (1%)	32 (1%)	

Note: Two sample t-tests were used to test the differences in age and BMI between the two comparison groups. Wilcoxon rank sum tests were used to test the differences in direct costs and LOS. Associations between ASA and the two comparator groups were compared by using Pearson's Chi-square tests.

Table 4 – Readmission Rates After Propensity Score Matching*

	Discharge to Home	Home Health	p-value
Total Hip Arthroplasty (N)	3085	3085	
30-day THA Readmission	82 (2.7%)	76 (2.5%)	0.6287
Total Knee Arthroplasty (N)	3820	3820	
30-day TKA Readmission	76 (2.0%)	73 (1.9%)	0.8040

*matched for age, BMI, LOS, and ASA;
Differences in 30day readmission rate were tested using Pearson's Chi-square test.