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Can We Reduce the Utilization of Home-Visiting Nurse Services After Primary Total Joint Arthroplasty?

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ABSTRACT

Background: Home-visiting nurse services (HVNSs) after total joint arthroplasty (TJA) are touted as advantageous compared with inpatient rehabilitation. No study has established the utility of HVNSs compared with discharge home without services.
Methods: A retrospective single-surgeon consecutive series of 509 primary TJA patients compared discharge disposition, length of stay, complications, and patient satisfaction between 2 cohorts. The cohorts were defined by the elimination of routine HVNSs.
Results: Surprisingly, without routine HVNSs, more patients were discharged home (95% vs 88.3% with routine HVNSs) and mean length of stay significantly decreased. Complication rate was similar (2.9% vs 3.9% with routine HVNSs). Patient satisfaction remained favorable. We estimated that eliminating HVNSs avoids excess costs of $1177 per hip and $1647 per knee arthroplasty.
Conclusions: With dramatically diminished HVNS utilization after primary TJA, there was an associated decrease in length of stay and no increase in complication rate suggesting no compromise of patient care with significant cost savings.

Home-visiting nurse services (HVNSs), including visiting nurse (VN) care and physical therapy (PT), in the post–acute care period after primary total joint arthroplasty (TJA) are touted to facilitate a shorter length of stay (LOS), increased discharge to home rate, and decreased postoperative complications, readmissions, and cost compared with inpatient rehabilitation facilities (IRFs) [1]. However, no study has established the utility of HVNSs compared with discharge to home without services.

As the delivery of health care in the United States evolves to increasingly emphasize quality care justified by outcome measures while limiting cost, it is important to assess the contribution of HVNSs to patient outcomes and satisfaction. Recent studies report shortcomings in the home health care industry stemming from insufficient support from home health agencies and inadequate coordination with patients and their families [2,3]. In the post-hospital transition to home with HVNSs, the surgeon's reliance on an intermediary introduces potential variability in practices and outcomes [4]. A highly coordinated, surgeon-driven rehabilitation protocol individualized to each patient is likely to result in a more rational, cost-effective approach to care [4]. It is also likely to increase patient satisfaction and improve patient outcome measures [4].

The goal of the present study is to examine whether complication rate, LOS, patient satisfaction, and costs are associated with the elimination of routine HVNSs after elective primary TJA. We postulate that routine use of HVNSs can be discontinued without an adverse impact on patient outcomes or satisfaction, while resulting in significant cost savings.

Methods

This analysis consisted of a 12-month (July 2012-June 2013) single-surgeon, single-institution consecutive series of 509 elective primary total hip arthroplasty (THA, n = 262) and total knee arthroplasty (TKA, n = 247) patients. Beginning January 1, 2013, an

Investigation was performed at the Rothman Institute/Department of Orthopaedic Surgery, Thomas Jefferson University, Philadelphia, PA.

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attempt was made to eliminate HVNSs including home PT. Patients who underwent TKA started outpatient PT immediately after discharge. Physical therapy was eliminated for THA patients. At the time of the patient's decision to proceed with surgery, the surgeon directly communicated the perioperative plan including the typical course of post–acute care to all patients to include discharge to home and follow-up in the office at 2 weeks after surgery, which was not altered in the transition away from the use of HVNSs. A retrospective analysis compared 6-month periods before (July-December 2012, n = 230) and after (January-June 2013, n = 279) this disposition change. Institutional review board approval was obtained for this study. Demographic data collected from institutional databases included age, gender, arthroplasty type (hip or knee), and Medicare usage. Outcome measures included discharge disposition, discharge-to-home rate, LOS, complication rate, reoperation rate, readmission rate, and charges of associated HVNSs. Patient satisfaction was gauged by Hospital Consumer Assessment of Healthcare Providers and Systems scores. Readmission rate was defined as readmission for any cause within 30 days of discharge. Early and late complications consisted of readmissions within 30 and 60 days, respectively. Reoperation rate was captured within 60 days after discharge and included patients requiring manipulation under anesthesia (MUA) for stiffness or surgery for periprosthetic joint infection or fracture. The complication of stiffness was defined as a failure of the patient to achieve 90° of flexion by 6 weeks postoperatively. All cases of stiffness were treated with MUA.

Hospital Consumer Assessment of Healthcare Providers and Systems scores, collected 2 weeks after hospitalization, were retrieved for the senior surgeon and reviewed in 4 patient satisfaction domains [5]. The number of "top box" responses, indicating the highest value response, was counted and expressed as a percentage [5,6]. A subset of patients over the same time period that received HVNSs were evaluated from data provided by 2 high-volume HVNS organizations. The effect of age, gender, and arthroplasty type was analyzed in relation to the number of visits (VN, PT, and total) to identify trends in HVNS utilization. The average charges for HVNS for each case were also identified.

A unique stochastic decision tree model was developed based on the derived probabilities and charges. A modified Monte Carlo simulation with 1000 iterations averaged over 10 trials each for THA and TKA was performed to compare HVNS costs before and after eliminating HVNS utilization at the individual patient and population level. Results of the cost-savings analysis were compiled with descriptive statistics.

Bivariate analyses were performed using Student's t test, Fisher's exact test, and Wilcoxon signed-rank test where appropriate to identify differences between groups. Significance was established at $P \leq .05$.

Results

The 2 patient groups were similar in age, gender, arthroplasty type (hip or knee), and Medicare usage (Table 1). The discharge-to-home rate significantly improved from 88.3% to 95% after the elimination of routine use of HVNSs, reflected by a decline from 81.7% of patients being discharged home with HVNSs to 3.6% ($P = .008$; Table 2). Despite the dramatic drop in HVNS usage, the number of patients discharged to IRFs and skilled nursing facilities (SNFs) did not show a compensatory increase and in fact trended downward with an overall substantial decrease in post–acute care utilization from 93.5% to 8.6% ($P < .001$; Table 2). Mean LOS decreased from 2.5 to 2.1 days ($P = .001$; Table 3). Readmission, complication, and reoperation rates showed no significant differences between patient cohorts (Table 3). The incidence of MUA for TKA stiffness was higher in patients with routine HVNSs (Table 3). Reoperation rate excluding MUA was still not significantly different between the cohorts ($P = .69$). Table 4 provides a summary of the specific early and late complications.

Regarding patient satisfaction, 113 patients before and 151 patients after the elimination of HVNSs completed HCAPS surveys with 84% and 89% giving "top box" ratings, respectively ($P = .22$). The patients' assessment of the senior surgeon's overall communication indicated favorable "top box" ratings for the following questions: "Doctors explained in way you understand," "Doctors listened carefully to you", and "Doctors treated you with courtesy/respect." The patient responses were not significantly different when comparing the patient groups before and after HVNS discontinuation.

Patient usage of HVNSs was characterized by a mean of 8.3 ± 4.5 visits total, consisting of 4.4 ± 1.5 VN visits and 3.7 ± 3.7 PT visits. The number of VN visits did not significantly vary on consideration of age, gender, or arthroplasty type.

When routine utilization of HVNSs was eliminated, the model developed from our data demonstrated savings of $1177 (95% CI: $1129-$1225) per THA and $1647 (95% CI: $1586-$1708) per TKA.

Discussion

Health care systems, payers, and physicians must establish cost-effective methods of delivering high-quality, value-based health care to meet the growing need for arthroplasty services in the context of finite health care resources and increasing costs [4,7]. Recently, the Centers for Medicare and Medicaid Services enacted a new Bundled Payments for Care Improvement initiative to enable health care systems, payers, and physicians to control costs; improve coordination, quality, and efficiency of care; and increase patient satisfaction. The bundled payment includes inpatient, post–acute care, and all costs through 90 days after discharge. Thus, there is incentive to create streamlined care paths and reduce inpatient hospital and post–acute care consumed by TJA services [4]. Controlling variations in post–acute care spending is a major opportunity to decrease the total episode-of-care costs of TJA [7]. Recent studies have confirmed that the in-home model of care

Table 1
Patient Cohort Demographics.

Demographics	2012	2013	*P* Value
Patients (N)	230	279	
THA, % (n)	50.0 (115)	52.7 (147)	.59
TKA, % (n)	50.0 (115)	47.3 (132)	
Male, % (n)	40.9 (94)	48.0 (134)	.11
Female, % (n)	59.1 (136)	52.0 (145)	
Age (mean y)	64.1 ± 10.2	63.6 ± 9.9	.71
% Medicare	41.3 (95/230)	42.0 (118/279)	.86

THA, total hip arthroplasty; TKA, total knee arthroplasty.

Table 2
Patient Discharge Disposition.

Discharge Disposition	2012	2013
Total patients	230	279
Home	15	255
HVNS	188	10
IRF	12	5
SNF	15	9
Discharge-to-home rate, % (n)	88.3 (203/230)	95.0 (265/279) [a]$P = .008$
HVNS utilization, % (n)	93.5 (215/230)	8.6 (24/279) [a]$P < .001$

HVNS, home-visiting nurse service; SNF, skilled nursing facility; IRF, inpatient rehabilitation facility.
[a] Represents values that are statistically significant.