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Original Research

How Does the Physician Patient Fare After Primary Total Hip and Knee Arthroplasty?

Matthew B. Shirley, MD[a], Henry D. Clarke, MD[b], Robert T. Trousdale, MD[a], Matthew P. Abdel, MD[a,*], Cameron K. Ledford, MD[c]

[a] Department of Orthopedic Surgery, Mayo Clinic, Rochester, MN
[b] Department of Orthopedic Surgery, Mayo Clinic, Phoenix, AZ
[c] Department of Orthopedic Surgery, Mayo Clinic, Jacksonville, FL

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ABSTRACT

Background: Physician patients requiring surgery present with occupational risks and personality traits that may affect outcomes. This study compared implant survivorship, complications, and clinical outcomes of physicians undergoing primary total hip arthroplasty (THA) or total knee arthroplasty (TKA).
Methods: A retrospective review of our institutional total joint registry identified 185 physicians undergoing primary THA (n = 94) or TKA (n = 91). Physicians were matched 1:2 with nonphysician controls according to age, sex, body mass index, joint (hip or knee), and surgical year. Physician type (medical, n = 132 vs surgical, n = 53) subanalysis was performed. Implant survivorship was assessed via Kaplan-Meier methods. Clinical outcomes were evaluated by Harris hip scores and Knee Society Scores. Mean follow-up was 5 years.
Results: There was no significant difference in 5-year implant survivorship free of any reoperation ($P > .5$) or any revision ($P > .2$) between physician and nonphysician patients after THA and TKA. Similarly, the 90-day complication risk was not significantly different after THA or TKA ($P = 1.0$ for both). Physicians and nonphysicians demonstrated similar improvement in Harris hip scores ($P = .6$) and Knee Society Scores ($P = .4$). When comparing physician types, there was no difference in implant survivorship ($P > .4$), complications ($P > .6$), or patient reported outcomes ($P > .1$).
Conclusions: Physician patients have similar implant survivorship, complications, and clinical outcomes when compared to nonphysicians after primary THA and TKA. Physicians should feel reassured that their profession does not appear to increase risks when undergoing lower extremity total joint arthroplasty.

Introduction

A career as a physician is demanding and has been further exacerbated by the recent worldwide pandemic [1-3]. As physicians feel the burden of a demanding medical profession, they often tend to neglect their own health and medical care [4]. Subsequently, physician self-reported health is low and correlated with feelings of poor well-being [5,6]. Physicians also have unique personality traits, work habits, and occupational exposures that can affect medical or surgical treatment outcomes [7-11].

As access to total hip and knee arthroplasty increases, a variety of unique medical and socioeconomic cohorts, like medical physicians, will invariably require total joint arthroplasty (TJA) [12]. To the authors' knowledge, no research has investigated the outcomes of physician patients after primary TJA surgery. Our study sought to evaluate reoperations and revisions, complications, and clinical outcomes of physician patients undergoing primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) at midterm follow-up. We hypothesized that physician patients would experience similarly successful implant survivorship and clinical outcomes compared to nonphysician patients.

Material and methods

Utilizing our institution's total joint registry (TJR), all primary THAs and TKAs performed between January 2008 and December

* Corresponding author. Mayo Clinic, 200 First Street SW, Rochester, MN, 55905. Tel.: +1 507 284 2884.
E-mail address: abdel.matthew@mayo.edu

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2018 were queried for patients self-reporting "Dr." as their preferred title. In addition, natural language processing (NLP) algorithms were applied to this TJR cohort within our electronic medical record and identified phrases or references to any medical or surgical profession. All medical doctors identified were manually validated within the demographic section and clinical notes to verify their Doctor of Medicine or Osteopathic Medicine credentials. In addition, physician type (medical physician vs surgeon) was recorded. Doctor of Philosophy, Veterinarian Medicine, Dental Medicine, Dental Surgery, or Chiropractic professions were excluded. Further exclusion criteria included any indications other than osteoarthritis or avascular necrosis, partial joint replacement (hemiarthroplasty or unicompartmental knee arthroplasty), or conversion THA or TKA. Bilateral cases and all revisions were excluded. Institutional review board approval was obtained prior to initiating this study.

After exclusions, 185 physician patients underwent 94 THAs and 91 TKAs. A 1:2 match to nonphysician patients was performed according to joint type (same), sex (same), age (+5 years), body mass index (BMI) (+5 kg/m^2), and surgical year (+1 year). Both the TJR and electronic medical record were utilized to compare the entire study cohort (n = 555) regarding routine demographics, reoperations, revisions, nonoperative complications, and patient-reported clinical outcomes. Reoperations were defined as any return to operating room, and revisions involved any exchange of prosthetic components. Postoperative complications included: wound issues (delayed healing, dehiscence, or superficial infection requiring medical treatment), dislocations, intraoperative fracture requiring additional fixation, nonoperative fractures, and deep vein thrombosis (DVT). Patient-reported outcome scores collected were Harris Hip scores (HHSs) for THA and Knee Society Scores (KSSs) for the TKA patients [13,14]. Additionally, subgroup analysis was performed comparing the same outcomes between the physician type: medical physicians (internal medicine, family medicine, pediatrics, etc.; n = 132) vs surgeons (n = 53).

Demographic data were not different between physician patients and matched nonphysician control group (Table 1). The mean age at surgery was 73 (range, 33-92 years), 84% of patients were male, and the mean BMI was 29 (range, 19-48 kg/m^2). The mean operative time differed between physicians and nonphysicians (90 vs 98 minutes, respectively, $P = .007$). Final mean follow-up was 5 (range, 2-12 years).

Statistical analysis

The data are reported using means and ranges for continuous variables and counts and percentages for categorical data. Demographics were compared using a chi-square analysis or Fisher's exact test, when appropriate (expected observations for any group <10). Odds ratios were calculated for risk of postoperative complications, reoperations, and revisions and reported with 95% confidence intervals (CIs). In addition, survivorships free of any reoperation and any revision were calculated using the Kaplan-Meier method [15]. Patient-reported clinical outcomes were analyzed with nonparametric Wilcoxon rank sum tests as these variables did not follow a normal distribution. All statistical tests were 2-sided, and *P*-values less than .05 were considered statistically significant (BlueSky Statistics, Chicago, IL).

Results

Reoperations and revisions

For physician and nonphysician patients undergoing THA, there was no significant difference in 5-year survivorship free from any reoperation (98 vs 96%, respectively, $P = .5$; Fig. 1) or any revision (98 vs 96%, respectively, $P = .4$; Fig. 2). Two revision THAs were performed on physician patients, and both were for Vancouver B_2 periprosthetic femur fractures requiring stem revision.

For physician and nonphysician patients undergoing TKA, there was no difference in 5-year survivorship free from any reoperation (97 vs 96%, respectively; $P = .5$; Fig. 3) or any revision (100 vs 98%, respectively; $P = .2$; Fig. 4). There were 2 reoperations after TKAs among physician patients: 1 manipulation under anesthesia for postoperative knee stiffness and 1 open reduction internal fixation for a periprosthetic distal femur fracture.

Complications

The 90-day complication rate after THA for each physician and nonphysician patient cohorts was 3.2% ($P = 1$). All 3 complications in the physician group were dislocations successfully managed with a closed reduction. The nonphysician cohort also had 3 dislocations treated similarly (Table 2). The 90-day complication rate after TKA for physician patients and controls was 4.4% and 3.8%, respectively ($P = 1.0$). Among the physicians, there were 2 DVTs and 2 superficial wound complications treated with antibiotics and local wound care.

Clinical outcomes

Both groups demonstrated similar preoperative HHSs ($P = .05$) and KSSs ($P = .9$), respectively, though physicians trended toward presenting with worse preoperative HHSs. After THA, the mean HHSs in physician (90) and nonphysician patients (88) were not different ($P = .6$). After TKA, the mean KSSs in physician (80) and nonphysician patients (77) were also not different ($P = .4$) (Table 3).

Medical vs surgical physicians

There was no difference in survivorship free of any reoperation, revision, or complication between the medical or surgical physician subtype for THAs ($P > .05$) and TKAs ($P > .05$). Additionally, both physician subtypes demonstrated similar ($P > .1$) mean 4-year

Table 1
Patient demographics and perioperative details.

	Nonphysician	Physician	*P*-value	Medicine	Surgeon	*P*-value
Mean age, y (range)	73 (33-93)	73 (37-92)	.6	73 (37-92)	73 (50-88)	1
Male sex n (%)	310 (84)	155 (84)	1	106 (80)	49 (93)	.04[a]
Joint			1			.8
Hip (%)	188 (51)	94 (51)		68 (52)	26 (49)	
Knee (%)	182 (49)	91 (49)		64 (48)	27 (51)	
BMI kg/m^2 mean (range)	29 (20-44)	29 (19-48)	.3	28 (21-48)	30 (19-44)	.08
Operative time mean (range)	98 (36-333)	90 (31-285)	.01[a]	86 (37-195)	99 (31-285)	.02[a]
Length of stay, d (range)	2.7 (1-7)	2.7 (1-10)	.8	2.7 (1-10)	2.6 (1-8)	.5
Mean follow-up, y (range)	4.5 (2-12)	4.9 (2-11)	.02[a]	5.2 (2-10)	4.3 (2-10)	.1

[a] *P*-value < .05 is considered a significant value.

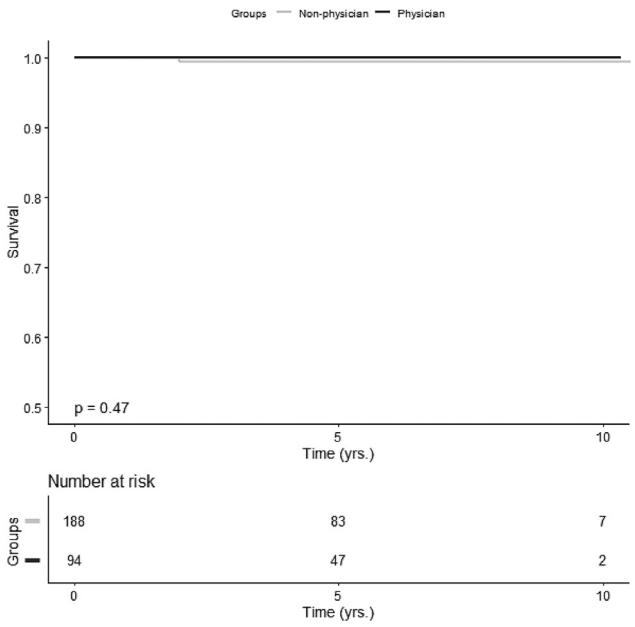

Figure 1. THA survivorship free of reoperation. Reoperation-free survival of physician and nonphysician patients. Reoperation is defined as any return to the operating room.

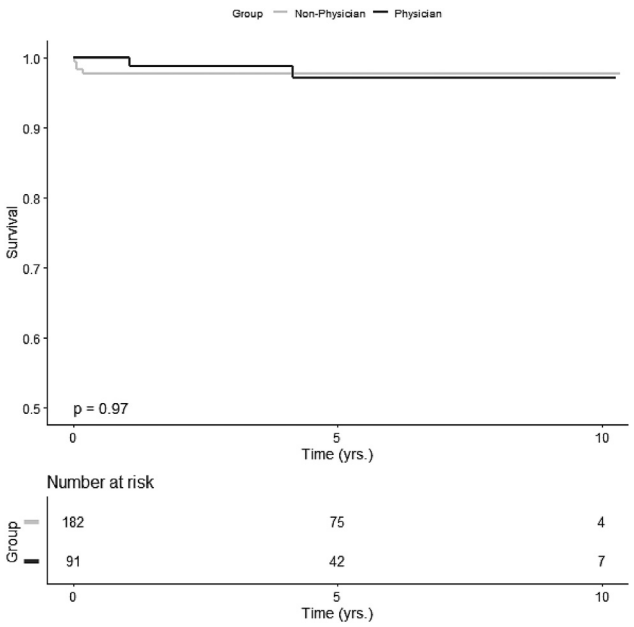

Figure 3. TKA survivorship free of reoperation. Reoperation-free survival of physician and nonphysician patients. Reoperation is defined as any return to the operating room.

postoperative HHSs (92 vs 80, respectively) and KSSs (80 vs 79, respectively) (Table 3).

Discussion

The identification of high-risk cohorts in primary TJA is important in reducing complications and improving outcomes [12,16-21]. Physician occupational exposure [1-3,22,23], reluctant tendencies in seeking medical care [4-8,24], and perspective on medical outcomes seemingly place them at increased risk for complications or poor outcomes following any medical or surgical treatment. However, in our retrospective matched cohort study, physician patients did not have an increased risk of reoperation, complications, or worse clinical outcomes compared to nonphysician-matched controls after primary TJA.

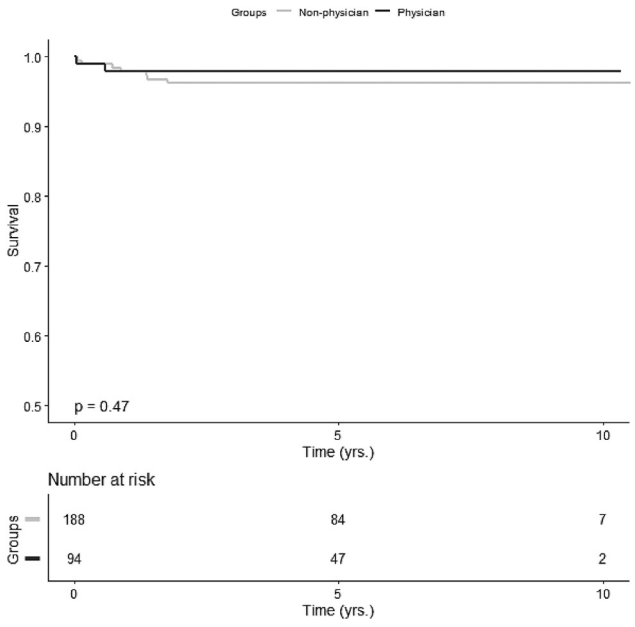

Figure 2. THA survivorship is free of any revision. Revision-free survival of physician and nonphysician patients. Revision is defined as any return to the operating room in which a modification to the arthroplasty construct is made.

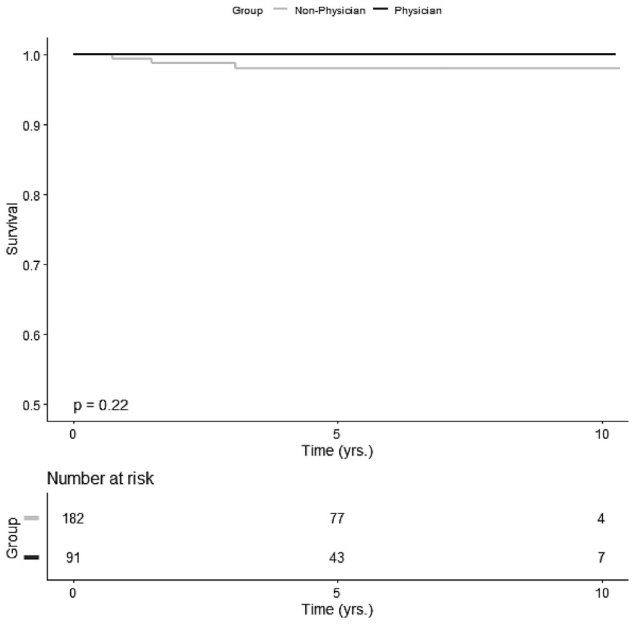

Figure 4. TKA survivorship is free of any revision. Revision-free survival of physician and nonphysician patients. Revision is defined as any return to the operating room in which a modification to the arthroplasty construct is made.

Table 2
Major complications for physician and nonphysician patients after total joint arthroplasty.

Complications	Nonphysician	Physician
THA n (%)	6 (3.2)	3 (3.2)
Dislocation	3	3
DVT	1	0
Other	2[a]	0
TKA n (%)	7 (3.8)	4 (4.4)
Wound healing	3	2
DVT	3	2
Nerve palsy	1	0

[a] Complications included stress fracture of proximal healing treated with a period of protected weight bearing and postoperative hematoma requiring transfusion.

Despite the concern for their increased risk, the physician patient's survivorship free from any reoperation or revision was not statistically different from that of nonphysicians after primary THA and TKA. Our findings may be surprising, as previous authors have demonstrated physicians indeed view themselves as having similar-to-poor health, are less likely to seek any medical treatment, or often self-treat chronic medical issues—all of which may decrease preoperative optimization [24]. Even if this behavior was present among our physician patients presenting for TJA, it did not affect their risk for reoperation or revision. The authors presume that our standardized preoperative optimization, infection reduction regimens, and follow-up surveillance may be credited for this finding. Saleh et al [25] uncovered correlations between the risk of revision after TKA in poorly educated and lower socioeconomic classes, but no protective effect of highly educated (and presumed higher socioeconomic class) was seen in our physician patient cohort. Nonetheless, the data should be reassuring to both surgeons performing and physician patients undergoing primary TJA that their occupation does not appear to increase risk of reoperation or revision.

Overall complication rate among physician patients undergoing primary THA and TKA was also similar compared to nonphysicians. Specifically, there were no incidences of periprosthetic joint infection (PJI) in the physician cohort, whereas 2 acute PJIs occurred in the matched controls. However, it should be noted that the sample size of this study is underpowered to make any strong inferences regarding the risk of rare events such as DVT and PJI. Crowe et al [26] showed that methicillin-resistant Staphylococcus aureus (MRSA) colonization is an independent risk factor for infection after TKA, and Elie-Turenne et al [27] have shown that physicians have a higher prevalence of MRSA colonization compared to the general public. Rao et al [28,29] demonstrated that preoperative screening and decolonization of MRSA reduce orthopaedic infections, and indeed, MRSA screening with decolonization or universal decolonization is routine for all our patients undergoing TJA. The relative low rates of infection found in our physician patients emphasize the importance of preoperative optimization protocols particularly, given the high rates of bacterial colonization in the community and hospital settings [23,27]. Furthermore, the authors note that optimization of modifiable risk factors known to increase the risk of PJI, including diabetes, obesity, and nicotine use, remains critical to minimizing complications.

Physicians presented with similar preoperative HHSs and KSSs compared to matched controls, perhaps indicating a common threshold of debilitating hip and knee pain that necessitates surgery. It should be noted, however, that physicians preoperative HHSs did trend toward lower values compared to controls. This finding is contrary to studies performed by others who demonstrated significantly lower presenting knee function and pain scores among less educated and lower socioeconomic patients [30,31]. Davis et al [32] and Keeney et al [33] have shown minimal to no correlation between TJA outcomes and education level and such findings were confirmed in our study as all cohorts, including physician subtypes, achieved similar successful outcome scores at a mean of 4 years postoperatively. Thus, our results suggest that physician occupational status does not positively or negatively impact the expected improvement in pain and function after THA and TKA.

There are limitations to this study including its retrospective design and relatively small number of physician patients and subtypes from a single institution that is a tertiary referral center. This could portend to patient and surgeon selection bias. This could limit the general applicability to all physician patients. Physician patients were also identified based on self-reported titles or mentions of the medical doctor profession in the chart via the NLP algorithm, and it is possible that physicians who never disclosed their profession were not captured or alternatively included as controls. Moreover, our matching criteria did not utilize specific comorbidity indices, but rather BMI and age as surrogates, and this could potentially impact complication profiles. Additionally, acute inpatient perioperative data were not compared, as the primary aim of the research was to provide midterm follow-up outcomes. While the institution's database is comprehensive with established historical follow-up, the small sample size limits the power to detect differences, particularly in rare events like reoperation and revision after THA and TKA. Nevertheless, the data represents the first report of physician patient outcomes after primary total joint arthroplasty and may serve as foundation for further research on physician health and well-being.

Conclusions

Physician patients, including surgeons, do not appear to have an increased risk of reoperation, complications, or inferior clinical outcomes when compared to nonphysicians after primary THA and TKA. Both arthroplasty surgeons and the physician patient may be reassured of an equal likelihood of a successful outcome when undergoing primary TJA. Despite the findings of this study, proper shared decision-making and consenting practices should be employed, as physician patients still share similar risk profiles as nonphysician patients.

Table 3
Clinical outcome scores of physician and nonphysician patients before and after total joint arthroplasty.

Mean outcome score	Nonphysician	Physician	*P*-value	Medical	Surgeon	*P*-value
Preoperative HHS (range)	53 (4-94)	40 (5`-71)	.05	38 (5-71)	61 (61-61)	.4
Postoperative HHS (range)	88 (34-100)	90 (32-100)	.6	92 (58-100)	80 (32-100)	.1
Mean time, y (range)	4.2 (1-10)	4.6 (2-10)		4.6 (2-10)	4.7 (2-6)	
Preoperative KSS (range)	41 (3-80)	41 (20-65)	.9	44 (20-65)	35 (21-45)	.2
Postoperative KSS (range)	77 (47-94)	80 (77-89)	.4	80 (77-89)	79 (79-79)	.8
Mean time KSS (y)	3.9 (1-10)	4.9 (1-10)		4.7 (1-10)	5.8 (3-10)	

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Conflicts of interest

R. T. Trousdale receives royalties from DePuy and Conformis. M. P. Abdel receives royalties from Stryker/OsteoRemedies and Springer and is on the Board of Directors of the AAHKS, IOEN, and Mid-America. H. D. Clarke receives royalties from Zimmer, Optimus, ConforMIS, and Biomet; is a speaker bureau of Biomet and Zimmer; is a paid consultant for Biomet, ConforMIS, Optimus, and Zimmer; is an unpaid consultant for Biomet, ConforMIS, and OSSO VR; has stock options in Optimus and Zimmer; and is a board/committee member of AAOS and Knee Society. C. K. Ledford is a committee member of AAHKS, AAOS, and ABOS. The other author declares no potential conflicts of interest.

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CRediT authorship contribution statement

Matthew B. Shirley: Writing – original draft, Methodology, Investigation, Conceptualization. **Henry D. Clarke:** Writing – review & editing, Visualization, Methodology, Investigation. **Robert T. Trousdale:** Writing – review & editing, Visualization, Data curation, Conceptualization. **Matthew P. Abdel:** Writing – review & editing, Visualization, Supervision, Methodology, Investigation, Conceptualization. **Cameron K. Ledford:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Conceptualization.

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