Military Service and Decision Quality in the Management of Knee Osteoarthritis

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ABSTRACT Background: Decision quality measures the degree to which care decisions are knowledge-based and value-aligned. Because military service emphasizes hierarchy, command, and mandates some healthcare decisions, military service may attenuate patient autonomy in healthcare decisions and lower decision quality. VA is the nation's largest provider of orthopedic care. We compared decision quality in a sample of VA and non-VA patients seeking care for knee osteoarthritis. Methods: Our study sample consisted of patients newly referred to our orthopedic clinic for the management of knee osteoarthritis. None of the study patients were exposed to a knee osteoarthritis decision aid. Consenting patients were administered the Hip/Knee Decision Quality Instrument (HK-DQI). In addition, they were surveyed about decision-making preferences and demographics. We compared results to a non-VA cohort from our academic institution's arthroplasty database. Results: The HK-DQI Knowledge Score was lower in the VA cohort (45%, SD = 22, $n = 25$) compared with the non-VA cohort (53%, SD = 21, $n = 177$) ($p = 0.04$). The Concordance Score was lower in the VA cohort (36%, SD = 49%) compared with the control cohort (70%, SD 46%) ($p = 0.003$). Non-VA patients were more likely to make a high-quality decision ($p = 0.05$). Non-VA patients were more likely to favor a shared decision-making process ($p = 0.002$). Conclusions: Decision quality is lower in Veterans with knee osteoarthritis compared with civilians, placing them at risk for lower treatment satisfaction and possibly unwarranted surgical utilization. Our future work will examine if this difference is from conditioned military service behaviors or confounding demographic factors, and if conventional shared decision-making techniques will correct this deficiency.

INTRODUCTION

Military law requires “the subordination of the desires and interests of the individual to the needs of the Service.”¹ This requirement extends to healthcare where medical decisions can be made for military patients based on the interests of Nation and Command.^{2,3} This relationship further accentuates the normal imbalance of power observed between physicians and patients. This system may create gaps in trust between patients and providers and reduce patients’

willingness to question their providers’ recommendations, thereby reducing patients’ understanding of proposed treatments.¹ These conditioned behaviors of military service may persist after discharge and attenuate Veterans’ healthcare decision-making autonomy – a key component in patient-centered care.

Patient-centered care occurs when the chosen treatment considers the needs, values, and preferences of the well-informed patient.^{4–7} Decision quality is a measurable indicator of patient-centered care.^{8,9} Patient-centered care may be achieved through measurement and enhancement of decision quality. High decision quality requires two endpoints: (1) patients’ decisions are based on the best evidence; and (2) treatment decisions are consistent with the treatment features that matter most to the informed individual patient.^{9,10} Low decision quality may be improved through shared decision-making, a process of deliberate, collaborative treatment selection based upon the best available evidence supplemented with decision aids.¹⁰ However, this process may be more difficult in the setting of prior military service.

In this observational pilot study, we measured decision quality in VA and non-VA patients considering treatment for knee osteoarthritis to determine if associations exist between decision quality and prior military service. We hypothesized that decision quality in the VA cohort would be lower than in non-VA patients, given the prior exposure to military service and its command structure and healthcare mandates.

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MATERIALS AND METHODS

Study Population

After obtaining Institutional Review Board approval (Veteran's IRB of New England, VINNE), we educated, consented, and enrolled newly referred Veteran patients referred to our VA orthopedic clinic with a chief complaint of knee pain and grade III or IV osteoarthritis on plain radiographs.¹¹ Patients with an inflammatory or autoimmune arthritis diagnosis, concomitant hip pain, a prior total joint replacement or surgical intervention for osteoarthritis involving any joint, a contraindication for total joint replacement, or a sensory, cognitive, or other impairment that would preclude informed consent were excluded. No VA patients had exposure to a decision aid.

We screened patients for enrollment in person or via telephone. Twenty-five Veterans meeting inclusion criteria were consented and enrolled between October 2015 and September 2016. There were 24 men and one woman (Table I). The mean age was 66 yr. Educational levels for the patients were: graduate degree, $n = 4$; undergraduate, 6; high school graduate, 11; some high school, 3; no answer, 1. The patients' races were: White, 20; Hispanic (White), 1; Hispanic (Black), 1; American Indian or Alaska Native, 1; Asian or Pacific Islander, 1; no answer, 1. Lack of gender diversity in this cohort precluded gender-oriented inter-cohort analyses.

Study Measures

We measured our primary outcome, decision quality, using the Hip-Knee Decision Quality Instrument (HK-DQI).¹⁰ We also measured patient demographics (age, gender, education), the preferred level of decision-making engagement (patient and doctor equally, mostly patient, mostly doctor, totally patient, totally doctor), and patients comfort level in

questioning the recommendations of their orthopedic provider.¹²

Observational Non-VA Control Cohort

We drew our observational control cohort (non-VA) from a convenience sample derived from the prior 3 yr of our academic medical center's orthopedic registry. This registry collects the HK-DQI, demographic, and decision-making preference data. We obtained separate Institutional Review Board approval for this query. The database contained 1,636 patients for the specified time period. Of these patients, 177 had undergone treatment for knee osteoarthritis and had completed the HK-DQI prior to treatment and had no exposure to a decision aid; these patients composed our unadjusted, bivariate analysis of decision quality (Fig. 1). Of these 177 patients, 69 had complete demographic and decision-making preference data sets that permitted multivariate logistic regression analyses. This final sample included 27 men and 42 women (Table I). We did not gender-match our cohort based upon prior work showing no gender-based differences in decision quality.¹³ The mean age was 65 yr (SD 11). Educational levels for this cohort were: graduate degree, $n = 18$; undergraduate, 16; some college, 14; high school graduate, 17; and some high school, 4. The patients' races were: White, 68; Asian or Pacific Islander, 1. Lack of racial diversity in this cohort precluded race-oriented inter-cohort analyses. There were

TABLE I. Patient Demographic Characteristics

	VA ($n = 25$)	Non-VA ($n = 69$)	p -Value
Age (mean (SD))	65.5 (12.1)	65.0 (10.5)	0.85
Gender = male (%)	24 (96.0)	27 (39.1)	<0.001
Race (%)			
American Indian or Alaska Native	1 (4.0)	0 (0.0)	0.031
Asian or Pacific Islander	1 (4.0)	1 (0.6)	
Black	0 (0.0)	0 (0.0)	
Hispanic, Black	1 (4.0)	0 (0.0)	
Hispanic, White	1 (4.0)	0 (0.0)	
Prefer not to answer	1 (4.0)	0 (0.0)	
White	20 (80.0)	68 (98.6)	
Education (%)			
Bachelors degree	6 (24.0)	16 (23.2)	<0.001
Graduate degree	4 (16.0)	18 (26.1)	
High school degree or equivalent	13 (52.0)	17 (24.6)	
High school without graduation	1 (4.0)	4 (5.8)	
Some college	0 (0.0)	14 (20.3)	
Prefer not to answer	1 (4.0)	0 (0.0)

FIGURE 1. Composition of VA cohort and observational non-VA cohort for the current investigation.

TABLE II. Unadjusted Univariate, Intercohort Comparison of HK-DQI Scores

Hip-Knee Decision Quality Instrument Scores	VA Cohort (<i>n</i> = 25)	Non-VA Cohort (<i>n</i> = 177)	<i>p</i> -Value
Total Knowledge Score (% <i>, SD</i>)	45 (21)	53 (19)	0.04
Concordance Score (% <i>, SD</i>)	36 (48)	70 (46)	0.003
Decision Process Score (% <i>, SD</i>)	51 (40)	NA	NA
High-Quality Decision (<i>n</i> , (%))	5 (20)	69 (41)	0.05

significant differences between the cohorts in terms of gender, race, and education.

Sample Size Calculations

We assessed sample size adequacy through power analysis for our primary outcome, decision quality, using available medical literature. Based on reported standard deviation values for decision quality scores with and without decision aid exposure, 18 and 19,¹⁰ respectively, we estimated that we would be able to detect a difference in decision quality scores of 12.0 points based on an unpaired *t*-test with a two-sided significance level of 0.05 and a power of 0.80 for samples of size 25. This calculation conservatively assumes that the intraclass correlation for the effect of matching is effectively zero. By comparison, the validation study of the HK-DQI demonstrated a difference of 14 between cohorts without and with shared decision-making,¹⁰ so our proposed detectable difference of 12 points seemed reasonable.

Statistical Analysis

Statistical analyses were conducted in R (version 3.3.0). Differences in means were calculated using a Student's *t*-test or Chi-squared test. Associations between outcomes (TKS, CS) and covariates (race, education, decision-making preference) were quantified using univariate linear models between each covariate and each outcome.

Compliance with Ethical Standards

One author (ERH) received funding (V1CDA2015-34) that was in support of this project.

RESULTS

The mean HK-DQI TKS in the VA cohort (*n* = 25) was 45 (*SD* 21). This value was significantly lower than the non-VA cohort (*n* = 177) of 53 (*SD* 19) (*p* = 0.04). The mean HK-DQI Concordance Score (CS) in the VA cohort was 36 (*SD* 48). This value was significantly lower than the non-VA cohort 70 (*SD* 46) (*p* = 0.003). The mean HK-DQI DPS in the VA cohort was 51 (*SD* 40) (Table II). This value was not measured in our comparative cohort; however, its relation to values reported

previously is considered in the discussion. The rate of VA patients making a high-quality decision (20%) was significantly lower than the rate of non-VA patients making a high-quality decision (69%) (*p* = 0.05).

When we analyzed TKS with respect to patient age and educational levels factors (age, gender, race, and education), we found no significant differences between VA and non-VA cohorts, however, our study was powered insufficiently to support these analyses. When we analyzed CS with respect to patient factors, we again found no significant differences between VA and non-VA cohorts, but our study was powered insufficiently to support these analyses. We analyzed the VA cohort for variables predicting a high-quality decision without significant findings (Table III).

In the subset with complete demographic and decision-making preference data, the mean TKS scores in the comparative cohort decreased from 53 to 47, which was higher than the VA cohort but no longer significant; CS was unchanged but no longer significant due to insufficient power (Table IV). The rate of non-VA patients making high-quality decisions also decreased. Survey results showed that no patients in the VA cohort reported preference for patient-only decision-making; 24% preferred mostly patient decision-making; 56% preferred equal patient-physician decision-making; no patients preferred mostly physician decision-making; one patient preferred physician-only decision-making; and 16% did not answer (Table IV). In the non-VA cohort, 13% of patients preferred patient-only or mostly patient decision-making; 84% preferred equal patient-physician decision-making; 3% of patients preferred mostly physician decision-making. The non-VA cohort had a significantly higher preference for a shared patient and physician decision-making process compared with the VA cohort (*p* = 0.002). The non-VA cohort also had a significantly higher initial preference for surgical treatment compared with the VA cohort (*p* < 0.001).

VA patients generally expressed comfort in questioning the recommendations of their orthopedic providers with no significant changes following their initial visit (Table V).

DISCUSSION

Military law and healthcare decision-making are topics rarely, if ever, mentioned together. Military physicians' first obligation is to the Nation, not to their patients.^{1,14} Because many aspects of their healthcare are mandated, without the opportunity for decision-making, we hypothesized that former military patients would have lower decision quality when considering treatment for knee osteoarthritis than a similar non-VA cohort.¹ Whether these challenges are real has not been studied previously. Our goal was to begin the process of determining if former military service portends an inherent disadvantage with medical decision-making. Our results indicate that VA patients with knee osteoarthritis have lower decision quality than non-VA patients.

TABLE III. Domains, Variables, and Bivariate Analyses for Predicting a High-Quality Decision* in VA Cohort. *TKS > 60 and positive concordance

Domains and Variables	High-Quality Decision 20% (n = 5)	Low-Quality Decision 80% (n = 20)	OR (95% CI)	p-Value
Age group				1.000
Age <60 (ref)	20% (1)	25% (5)		
Age >60	80% (4)	75% (15)	0.638 (0.335–1.220)	
Gender				1.000
Female (ref)	0% (0)	5% (1)		
Male	100% (5)	95% (19)	0.923 (0.502–1.685)	
Education				0.99
College or more (ref)	40% (2)	40% (8)		
High school degree	60% (3)	50% (10)	0.914 (0.161–7.082)	
High school unfinished or less	0% (0)	10% (2)	0.750 (0.085–7.503)	
Initial treatment preference				0.43
Non-surgical (ref)	40% (2)	15% (3)		
Surgical	20% (1)	15% (3)	0.4286 (0.130–1.366)	
Unsure/delay	40% (2)	65% (13)	0.132 (0.016–1.631)	
No answer	0% (0)	5% (1)	NA	
Final treatment selection				0.39
Non-surgical (ref)	80% (4)	95% (19)		
Surgical	20% (1)	5% (1)	NA	
No answer	0% (0)	0% (0)	NA	
Pre-visit comfort level questioning provider				0.22
Comfortable (ref)	80% (4)	70% (14)		
Neutral	0% (0)	20% (4)	1.000 (3.6e-16 – 2.50)	
Not comfortable	20% (1)	0% (0)	NA	
No answer	0% (0)	10% (2)	NA	
Post-visit comfort level questioning provider				0.24
Comfortable (ref)	80% (4)	60% (14)		
Neutral	20% (1)	5% (1)	3.500 (0.105–123.6)	
Not comfortable	0% (0)	0% (0)	1.822 (0.422–12.415)	
No answer	0% (0)	25% (5)	NA	

Bold values represents significance as a *p* value < 0.05.

TABLE IV. Comparison of Decision-Making Preferences Between VA Cohort and Non-VA Cohort with Complete Demographic and Decision-Making Preference Data

Result	VA Cohort (n = 25)	Non-VA Cohort (n = 69)	p-Value
Decision-making engagement preference (%)	n (%)	n (%)	0.002
Physician-only or mostly physician	1 (4)	2 (3)	
Equal patient-physician	14 (56)	58 (84)	
Mostly patient or patient-only	6 (24)	9 (13)	
No answer	4 (16)	0 (0)	
Initial treatment preference	n (%)	n (%)	<0.001
Non-surgical	5 (20)	4 (6)	
Surgical	4 (16)	49 (71)	
Unsure/Delay	15 (60)	16 (23)	
No answer	1 (4)	0 (0)	

Bold values represents significance as a *p* value < 0.05.

High-quality treatment decisions are based upon the best available evidence, match treatment decisions with patients' individual goals and beliefs, and establish realistic outcome expectations.^{4–6,9,10,15} A high-quality decision, therefore, requires the patient to be educated regarding positive and

TABLE V. Pre- and Post-Visit Veteran Comfort with Questioning Provider Recommendations

Result	VA Cohort (n = 25)
Pre-visit comfort questioning surgeon recommendations	
Comfortable or very comfortable	18 (72)
Neutral	4 (16)
Not comfortable	1 (4)
No answer	2 (8)
Post-visit comfort questioning surgeon recommendations	
Comfortable or very comfortable	18 (72)
Neutral	2 (8)
Not comfortable	0 (0)
No answer	5 (20)

negative aspects of the proposed treatments, which is often achieved using decision aids. Decision aids have a demonstrated positive effect on decision quality.^{10,16} The current investigation focused on decision quality in the absence of decision aids in order to establish baseline decision quality in the VA. Our academic center's orthopedic registry does contain patients with decision aid exposure. While these results were not explored in this study, prior work suggests that exposure to decision aids did result in a higher total knowledge score (57.2, SD 19) and concordance score (74.3,

SD 44), although these differences were more modest than reported previously.^{10,16}

Shared decision-making for hip and knee osteoarthritis has demonstrated benefits in the civilian population. These benefits include higher decision quality, engagement, satisfaction, and overall health in addition to lower rates of surgery, demographic-based treatment disparity, anxiety and decisional conflict, hospital readmission, and healthcare costs.^{4-6,10,16-25}

There could be tangible benefits for Veterans and healthcare costs if shared decision-making was adopted in VA. In 2016 VA performed over 15,000 total hip and knee replacements. A formal shared decision-making program showed a 26% and 38% reduction in total hip and knee replacements respectively.¹⁷ Extrapolated to the volume of total hip and knee arthroplasty performed by VA this would represent a savings of \$150 M in the private sector.^{26,27} Despite the high prevalence of osteoarthritis in VA and the important benefits of shared decision-making for patients undergoing treatment, the need for and feasibility of a shared decision-making program in the VA has not been assessed. We believe this deficiency is due most likely to a lack of shared decision-making awareness and training amongst orthopedic surgeons in the VA.

There are limitations to consider in interpreting our findings. Socioeconomic status (SES) has known effects on decision quality and we were unable to control for SES in our statistical model.¹⁰ This is relevant to the current study because prior work demonstrated that Veterans had lower mean SES than civilians,²⁸ however, these differences are lessened in our current Veteran population.²⁹⁻³² Second, our non-VA cohort data do not include history of military service. This information is available for our academic institution as a whole but it does not allow us to exclude Veterans. We must, therefore, assume that approximately 6% of our control patients are Veterans, albeit these small differences are unlikely to change the conclusions drawn from our findings.³³

In conclusion, in the absence of decision aid exposure, decision quality is lower in patients seeking treatment for knee osteoarthritis in VA compared with non-VA patients. This finding presents an opportunity to improve care practices while reducing treatment costs for patients with knee osteoarthritis in VA.^{4-6,10,17-25} A trial of decision aids for osteoarthritis is needed to determine if these positive effects seen in non-VA populations will be experienced similarly in VA.

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