



# Addressing Disparities in the Total Joint Population: A Retrospective Analysis

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# Introduction

Health disparities are differences amongst individuals that stand in the way of providing optimal care. The existence of health disparities in regards to race/ethnicity, geographical location, comorbidities, and socioeconomic status is prevalent across the nation. Health disparities can stem from many different factors and it is important for healthcare practitioners to understand the impact of these disparities, and strategies to minimize adverse effects on patient outcomes.

The most unyielding health disparity is race and ethnicity. Previous literature has analyzed the impact of race and ethnicity on quality of care, and have proven different among minorities<sup>1</sup>. This can be a result of clinician bias and stereotypes, health care system factors, or characteristics of patients. Efforts are being made to try to eliminate clinician bias in the workplace by providing online resources demonstrating how to work through cultural differences<sup>2</sup>. There are many situations where minorities are not provided the optimal care due to faults of both the health care system and the provider. For example, Mexican Americans are more likely to be affected by diabetes and obesity than any other group<sup>1</sup>. It is important to note that it is difficult to measure the severity of health disparities in certain groups.

In addition, research has shown patients with more comorbidities are more likely to have a difficult time in recovery, and due to various co-founders such as socioeconomic status and access to care, minorities are more likely to suffer from certain diseases, depression, and injuries<sup>1</sup>. Providers are not able to give equal care if they cannot accommodate a patient's specific needs. The purpose of this paper is to evaluate the impact of clinical and socio-demographic variables on postoperative outcomes following Total Joint Arthroplasty (TJA).

# Methods

Patients undergoing either total hip or knee replacements from May 2014 to December 2019 were retrospectively analyzed. All patients were enrolled in the Force Therapeutics platform and completed the necessary outcome forms online. Primary outcomes of interest are the HOOS Jr (Hip disability and Osteoarthritis Outcome Score short form) at 1 year, the KOOS Jr (Knee injury and Osteoarthritis Outcome Score short form) at 1 year, and the VR-12 (Veterans RAND 12 Item Health Survey) PCS and MCS at 1 year. Several potentially confounding clinical and socio-demographic variables were recorded including gender, race, health literacy, use of alcohol, narcotics, and tobacco, as well as comorbidities. A stepwise multivariate regression was then completed using the software Statistical Analysis System (SAS) to determine if one subgroup is more likely to score below average on outcome forms. The odds ratio comparing the different subgroups was then analyzed to determine potential statistical differences.

# Results

Between 2014 and 2019, 30,973 patients were enrolled in the Force Therapeutics platform prior to undergoing TJA. Patients included in analysis completed baseline clinical and socio-demographic information and completed 1 year postoperative outcome forms. When comparing subgroups for the HOOS Jr. at 1 year form it can be determined that some subgroups are more likely to score a below average score when compared to others (Table 2). When comparing the races it was found that people who do not identify as white are more likely to receive a below average score. Patients who do not consider themselves extremely health literate are also more likely to score below average. Those with a comorbidity are more likely to perform worse on their outcome form. There are also differences when comparing gender. Females are more likely to do worse when compared to males. Use of tobacco and chronic narcotics also plays a role in performance on outcome forms. People who engage in the use of these are more likely to perform worse when compared to those who do not. Both VR-12 MCS and PCS saw similar results (Table 4-7).

When comparing the subgroups for the KOOS Jr. at 1 year, similar trends can be seen (Table 3). Patients who use chronic narcotics are more likely to perform worse. Those who consider themselves extremely health literate are more likely to perform better than those who are not. There are slight changes when looking at the race and comorbidity subgroups. Patients who identify as non-white are more likely to score worse on this outcome form. American Indian or Alaska Native subgroups are more likely to perform better when compared to those who identify as white. This result needs to be further researched to understand why this finding occurred. Patients with a history of anxiety and diabetes are less likely to score above average, but those with a history of hypertension are more likely to score higher than average.

## Discussion

Results suggest that there are discrepancies when comparing a patient's race, history of comorbidities, health literacy, and use of chronic narcotics or tobacco. These findings prove that patients who have a health disparity are more likely to score below average on outcome forms the majority of the time. These results are consistent with previous findings showing that the factors studied, race, comorbidity, and health literacy play a role in a patient's recovery<sup>1</sup>. Going forward, health systems, providers, and clinicians should all be made aware of these health disparities and provide the patient the appropriate care. Of note, the existence of hypertension, as well as identification of being American Indian or Alaska Native showed that these two subgroups were more likely to score above average on the KOOS Jr. at 1 year. Further research must be conducted to determine why the trend did not uphold these subgroups on this particular form. All hospitals included are located in different geographical locations.

These results display the need for a solution ensuring that all patients receive optimal care. These disparities can be addressed through the use of technology. More and more hospitals have been turning towards technology for solutions in the wake of COVID-19. One solution that has currently been circulating hospital systems is educating physicians and staff on different cultures in an effort to reduce bias when treating patients<sup>2</sup>. When health care staff is educated on different cultures it is more likely they will be more open minded and will not discriminate when providing care. In regards to health literacy for patients who are not as comfortable filling out forms, more detailed forms can be provided explaining what is required at each step. For those with pre-existing comorbidities supplemental resources can be provided to help patients. If a patient is dependent upon tobacco, alcohol, or narcotics the appropriate options should be presented to the patient. By individualizing care plans to fit specific patient needs, appropriate measures can be taken to guarantee all patients receive equal care and have optimal postoperative outcomes. At Force Therapeutics we utilize Intelligent Care Plans (ICP) to ensure customized care plans at scale so providers feel comfortable knowing that the appropriate education is being tailored to the patient based on who they are.

## Conclusion

Patients who have comorbidities, engage in the use of narcotics or tobacco, or do not self report as "extremely health literate" tend to be at a disadvantage. It is important to ensure that all patients are receiving not only the standard of care, but additional resources for those who have a health disparity. Additional studies can be administered to determine what can be done to further help those who are less likely to perform above average on outcome forms.

Table 1: Baseline Demographics

	Amount of Patient Responses	Average Age of Patient	Female	Male	Amount of Patients with a Comorbidity
Total Hip Replacement	1,439	67.0	54.2%	45.9%	55.1%
Total Knee Replacement	1,630	67.0	61.1%	38.9%	54.8%

Table 2: Odds ratio for HOOS Jr. at 1 year

Effect	Odds Ratio	95% Confidence Interval		p-value
Sex: Female vs. Male	1.794	1.415	2.276	p<0.01
Chronic Narcotics: No vs. Yes	0.608	0.434	0.851	p<0.01
Tobacco: Yes vs. No	1.962	1.174	3.280	0.011
Race, (base- white)				0.028
American Indian or Alaska Native	8.313	0.881	78.419	-
Asian	1.312	0.481	3.579	-
Black or African American	1.715	1.036	2.840	-
Other	1.681	0.675	4.187	-
Health Literacy, (base- extremely)				p<0.01
A little bit	1.636	0.810	3.306	-
Not at all	1.215	0.638	2.313	-
Quite a bit	1.966	1.474	2.621	-
Somewhat	1.946	1.247	3.035	-
Arthritis: Yes vs. No	1.259	0.959	1.653	0.097
Heart Disease: Yes vs. No	1.957	1.233	3.104	0.014
Diabetes: Yes vs. No	1.619	1.046	2.507	0.06
Presence of a Comorbidity: Yes vs. No	1.166	1.033	1.317	p<0.01

Table 3: Odds ratio for KOOS Jr. at 1 year

Effect	Odds Ratio	95% Confidence Interval		p-value
Chronic Narcotics: No vs. Yes	0.620	0.441	0.871	p<0.01
Race, (base- white)				p<0.01
American Indian or Alaska Native	0.789	0.128	4.982	-
Asian	1.384	0.636	3.011	-
Black or African American	2.203	1.428	3.400	-
Other	2.145	1.055	4.361	-
Health Literacy, (base- extremely)				p<0.01
A little bit	2.640	1.511	4.614	-
Not at all	1.138	0.650	1.991	-
Quite a bit	1.215	0.932	1.584	-
Somewhat	1.358	0.940	1.961	-
Anxiety: Yes vs. No	1.344	0.982	1.839	0.083
Diabetes: Yes vs. No	1.625	1.202	2.189	p<0.01
Hypertension: Yes vs. No	0.825	0.688	1.019	0.074

Table 4: Odds ratios for VR-12 PCS at 1 year for TKA

Effect	Odds Ratio	95% Confidence Interval		p-value
Sex: Female vs. Male	1.281	1.036	1.584	p<0.01
Chronic Narcotics: No vs. Yes	2.152	1.209	3.830	p<0.01
Tobacco: Yes vs. No	2.152	1.209	3.830	p<0.01
Health Literacy, (base- extremely)				p<0.01
A little bit	1.839	1.060	3.188	-
Not at all	1.385	0.783	2.450	-
Quite a bit	1.482	1.131	1.944	-
Somewhat	1.874	1.277	2.749	-
High Cholesterol: Yes vs. No	0.761	0.584	0.991	0.043
Hypertension: Yes vs. No	0.746	0.578	0.964	0.051
Presence of a Comorbidity: Yes vs. No	1.387	1.240	1.553	p<0.01

Table 5: Odds ratios for VR-12 MCS at 1 year for TKA

Effect	Odds Ratio	95% Confidence Interval		p-value
Sex: Female vs. Male	1.274	1.008	1.610	p<0.01
Chronic Narcotics: No vs. Yes	0.722	0.504	1.033	0.074
Tobacco: Yes vs. No	1.779	1.005	3.150	0.06
Health Literacy, (base- extremely)				p<0.01
A little bit	1.738	0.993	3.041	-
Not at all	2.439	1.372	4.333	-
Quite a bit	1.578	1.184	2.102	-
Somewhat	2.350	1.600	3.449	-
Anxiety: Yes vs. No	2.074	1.469	2.929	p<0.01
Arthritis: Yes vs. No	1.282	1.011	1.625	p<0.01
Depression: Yes vs. No	2.728	1.912	4.047	p<0.01

Table 6: Odds ratios for VR-12 PCS at 1 year for THA

Effect	Odds Ratio	95% Confidence Interval		p-value
Sex: Female vs. Male	1.471	1.142	1.896	p<0.01
Chronic Narcotics: No vs. Yes	0.447	0.316	0.632	p<0.01
Health Literacy, (base- extremely)				p<0.01
A little bit	2.064	0.994	4.285	-
Not at all	1.2.138	1.126	4.060	-
Quite a bit	1.873	1.383	2.536	-
Somewhat	2.056	1.304	3.240	-
Arthritis: Yes vs. No	1.510	1.138	2.005	p<0.01
Heart Disease: Yes vs. No	1.721	1.075	2.755	0.023
Total Comorbidities	1.292	1.150	1.450	p<0.01

Table 7: Odds ratios for VR-12 MCS at 1 year for THA

Effect	Odds Ratio	95% Confidence Interval		p-value
Sex: Female vs. Male	1.436	1.110	1.858	p<0.01
Tobacco: Yes vs. No	1.765	1.031	3.021	0.05
Health Literacy, (base- extremely)				p<0.01
A little bit	2.665	1.272	5.587	-
Not at all	1.260	0.625	2.539	-
Quite a bit	1.757	1.293	2.389	-
Somewhat	1.974	1.246	3.126	-
Anxiety: Yes vs. No	3.540	2.421	5.176	p<0.01
Arthritis: Yes vs. No	1.302	1.015	1.670	0.047
Depression: Yes vs. No	5.363	3.423	8.403	p<0.01
Heart Disease: Yes vs. No	1.716	1.098	2.682	0.017

# About Force

Force Therapeutics was founded in 2010 as an episode-based digital care platform and research network designed to help clinicians intelligently extend their reach. Our platform leverages video and digital connections to directly engage patients at every step of the care journey – from the point of surgery scheduling, to post-op recovery and beyond. Backed by the insights of more than 60 leading healthcare centers across the country, Force is proven to drive more effective recovery, lower costs, and achieve better patient outcomes.

## References

- 1 <https://www.ncbi.nlm.nih.gov/books/NBK425844/>
- 2 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3863703/>