



# Online Patient Engagement leads to significantly better postoperative outcomes in TJA

---

# Contents

Introduction

Methods

Results

Discussion

Conclusion

About Force Therapeutics

# Introduction

Total Hip Replacements (THR) along with Total Knee Replacements (TKR) are common procedures among patients over the age of sixty. As a patient's age increases so can the time of recovery. With a multitude of preoperative and postoperative exercise regimens, instructions, and information, patients can feel overwhelmed and forget or misplaced instructions from physicians that are essential to a smooth recovery. Force Therapeutics provides a digital tether to the patients to integrate the necessary information from physicians to the patients to ensure that their recovery is simplified and quick. Providers can monitor how patients are doing in real time via the provider platform through engagement data, patient reported outcome measures (PROMs) administered through the platform, and patient-to-provider and provider-to-provider messaging. The technology used in the Force platform allows patients to play an active role in their recovery through engaging with pre and postoperative exercise videos, care instructions, messaging, reminders, and more. The purpose of this paper is to determine if a patient's engagement status with the online platform affects how they feel daily as well as how they score on the necessary outcome forms.

## Methods

A retrospective study on three hospitals containing patients undergoing either total hip replacements or total knee replacements from the start of May 2014 to December 2019 were included for analysis. Patients reported preoperative and postoperative pain, as well as completed the necessary outcome forms through the Force Therapeutics platform. Primary outcome forms of interest are the HOOS Jr (Hip disability and Osteoarthritis Outcome Score short form), KOOS Jr (Knee injury and Osteoarthritis Outcome Score short form), VR-12 MCS and PCS, and patient reported daily pain. Results of the high engaged patients were compared to those of the low engaged patients. A high engaged patient was defined as a patient who had above average videos watched, and total sessions attended. These values were based off of the averages of the three independent hospitals seen in Table 1. A two-tailed t-test was run to determine if there was either significant difference, trending to significance, or no significant difference between the high and low engaged patients. Significance was defined at  $p < 0.01$ .

Table 1: Averages for Hospitals A, B, and C

| Hospital           | Age of High Engaged | Age of Low Engaged | Videos Watched | Sessions Attended | n      | Avg. Time on Platform (High) | Avg. Time on Platform (Low) |
|--------------------|---------------------|--------------------|----------------|-------------------|--------|------------------------------|-----------------------------|
| Hospital A         | 65.6                | 68.5               | 16.3           | 23.9              | 8,193  | 43.4 min                     | 15.4 min                    |
| Hospital B         | 67.0                | 67.9               | 60.9           | 80.5              | 3,925  | 581.4 min                    | 136.8 min                   |
| Hospital C         | 65.1                | 67.0               | 22.3           | 37.3              | 5,112  | 168.9 min                    | 36.4 min                    |
| Hospital A, B, & C | 65.9                | 68.0               | 58.4           | 42.2              | 17,230 | 320.6 min                    | 81.6 min                    |

# Results

Baseline averages for Hospital A, B, and C can be found in Table 1. At baseline it was recorded that there were significant differences in age between the high and low engaged patients. High engaged patients reported significantly lower pain preoperatively among all three hospitals. At week 6, high engaged patients at Hospital A reported significantly less pain compared to low engaged patients. However, high engaged patients at Hospital B reported significantly higher pain scores at this time, despite this discrepancy the scores evened out by week 12 resulting in the need for further research to better understand why this spike occurred. At week 12, high engaged patients at Hospital A and C reported significantly less pain than low engaged patients. High engaged patients at Hospital B reported slightly lower pain than low engaged patients.

All three hospitals reported the high engaged group scoring significantly higher on the VR-12 MCS outcome form preoperatively. Hospital A saw high engaged patients scoring significantly higher on the following outcome forms: KOOS Jr. preoperatively, HOOS Jr. preoperatively and at 1 year, VR-12 MCS at week 12, and VR-12 PCS at week 12, 6 months, and 1 year. Hospital B reported high engaged patients performing significantly better on VR-12 MCS at time points 12 weeks, 6 months, and 1 year. Hospital C reported high engaged patients scoring significantly higher on VR-12 PCS.

Among the three hospitals there were several outcomes that were trending towards significance in favor of the high engaged. In Hospital A these forms were HOOS Jr. at 12 weeks, and VR-12 MCS at 6 months and 1 year. Hospital B saw similar results in KOOS Jr. at 12 weeks and 1 year, and HOOS Jr. at 1 year. Hospital C also saw HOOS Jr. at 1 year and VR-12 PCS at 6 months trending towards significance in favor of the highly engaged.

# Discussion

Results indicate that highly engaged patients show significant differences in all the primary outcomes focused on. These findings prove that patients who are more active on the Force Therapeutics platform are more likely to succeed postoperatively over patients who are less engaged. Although significant differences were not found for every outcome form, it is important to note that throughout all three hospitals the high engagement group scored higher in comparison to the low engaged on the majority of forms. All improvements, even if slight, are critical in the recovery process. Of note there was a significant difference in baseline age between the high and low engaged groups. Further research must be conducted in order to gauge how to better reach the older population. All three hospitals are located in different geographical locations with similar sample sizes. Hospitals A and C are both located in urban areas and demonstrated the most similarities.

# Conclusion

Patients who were more engaged with online patient engagement technology had significantly better postoperative outcomes. As many aspects of the medical field are becoming more centered around technology, it is important to display the benefit of engagement to an online platform, and the advantages it has on a patient's recovery. Additional studies can be administered to determine if engagement in certain activities on the platform yields better outcomes.

Table 2: Differences in average patient outcome scores in high engaged patients and low engaged patients in Hospital A

| Outcome Forms                    | High Engaged | Low Engaged | p value          |
|----------------------------------|--------------|-------------|------------------|
| <b>Pain at Preop</b>             | <b>6.4</b>   | <b>6.7</b>  | <b>p&lt;0.01</b> |
| <b>Pain at 6 Weeks</b>           | <b>2.6</b>   | <b>3.0</b>  | <b>p&lt;0.01</b> |
| <b>Pain at 12 Weeks</b>          | <b>1.9</b>   | <b>2.3</b>  | <b>p&lt;0.01</b> |
| <b>KOOS Jr. Preop</b>            | <b>47.9</b>  | <b>46.3</b> | <b>p&lt;0.01</b> |
| KOOS Jr. at 12W                  | 67.3         | 66.7        | 0.26             |
| KOOS Jr. at 6M                   | 71.8         | 70.9        | 0.23             |
| KOOS Jr. at 1 Year               | 74.1         | 72.7        | 0.06             |
| <b>HOOS Jr. Preop</b>            | <b>50.5</b>  | <b>48.6</b> | <b>p&lt;0.01</b> |
| HOOS Jr. at 12W                  | 81.3         | 79.8        | 0.02             |
| HOOS Jr. at 6M                   | 84.4         | 83.3        | 0.16             |
| <b>HOOS Jr. at 1 Year</b>        | <b>87.0</b>  | <b>83.8</b> | <b>p&lt;0.01</b> |
| VR-12 Score at Pre-op PCS        | 30.9         | 30.5        | 0.18             |
| <b>VR-12 Score at Pre-op MCS</b> | <b>49.9</b>  | <b>48.7</b> | <b>p&lt;0.01</b> |
| <b>VR-12 Score at 12 W PCS</b>   | <b>41.9</b>  | <b>40.9</b> | <b>p&lt;0.01</b> |
| <b>VR-12 Score at 12 W MCS</b>   | <b>54.3</b>  | <b>53.4</b> | <b>p&lt;0.01</b> |
| <b>VR-12 Score at 6M PCS</b>     | <b>44.9</b>  | <b>43.9</b> | <b>p&lt;0.01</b> |
| VR-12 Score at 6M MCS            | 55.2         | 54.3        | 0.02             |
| <b>VR-12 Score at 1 Year PCS</b> | <b>45.5</b>  | <b>43.4</b> | <b>p&lt;0.01</b> |
| VR-12 Score at 1 Year MCS        | 54.7         | 54.0        | 0.02             |

Table 3: Differences in average patient outcome scores in high engaged patients and low engaged patients in Hospital B

| Outcome Forms                    | High Engaged | Low Engaged | p value          |
|----------------------------------|--------------|-------------|------------------|
| <b>Pain at Preop</b>             | <b>5.3</b>   | <b>5.9</b>  | <b>p&lt;0.01</b> |
| <b>Pain at 6 Weeks</b>           | <b>2.4</b>   | <b>2.1</b>  | <b>p&lt;0.01</b> |
| Pain at 12 Weeks                 | 1.5          | 1.6         | 0.15             |
| KOOS Jr. Preop                   | 54.2         | 53.4        | 0.15             |
| KOOS Jr. at 12W                  | 72.4         | 70.9        | 0.01             |
| KOOS Jr. at 6M                   | 76.3         | 75.1        | 0.11             |
| KOOS Jr. at 1 Year               | 79.6         | 77.6        | 0.02             |
| HOOS Jr. Preop                   | 55.5         | 54.1        | 0.06             |
| HOOS Jr. at 12W                  | 84.0         | 83.8        | 0.77             |
| HOOS Jr. at 6M                   | 88.3         | 87.0        | 0.10             |
| HOOS Jr. at 1 Year               | 89.7         | 88.0        | 0.05             |
| VR-12 Score at Pre-op PCS        | 32.7         | 32.1        | 0.06             |
| <b>VR-12 Score at Pre-op MCS</b> | <b>54.1</b>  | <b>52.0</b> | <b>p&lt;0.01</b> |
| VR-12 Score at 12 W PCS          | 42.7         | 42.7        | 0.93             |
| <b>VR-12 Score at 12 W MCS</b>   | <b>56.1</b>  | <b>54.8</b> | <b>p&lt;0.01</b> |
| VR-12 Score at 6M PCS            | 45.6         | 45.8        | 0.65             |
| <b>VR-12 Score at 6M MCS</b>     | <b>56.6</b>  | <b>55.4</b> | <b>p&lt;0.01</b> |
| VR-12 Score at 1 Year PCS        | 46.5         | 45.9        | 0.17             |
| <b>VR-12 Score at 1 Year MCS</b> | <b>56.6</b>  | <b>55.6</b> | <b>p&lt;0.01</b> |

Table 4: Differences in average patient outcome scores in high engaged patients and low engaged patients in Hospital C

| Outcome Forms                    | High Engaged | Low Engaged | p value          |
|----------------------------------|--------------|-------------|------------------|
| <b>Pain at Preop</b>             | <b>6.4</b>   | <b>6.6</b>  | <b>p&lt;0.01</b> |
| <b>Pain at 6 Weeks</b>           | <b>2.4</b>   | <b>2.8</b>  | <b>p&lt;0.01</b> |
| <b>Pain at 12 Weeks</b>          | <b>1.7</b>   | <b>2.0</b>  | <b>p&lt;0.01</b> |
| KOOS Jr. Preop                   | 46.3         | 45.3        | 0.27             |
| KOOS Jr. at 12W                  | 64.2         | 63.7        | 0.62             |
| KOOS Jr. at 6M                   | 71.3         | 67.2        | 0.06             |
| KOOS Jr. at 1 Year               | 71.8         | 70.9        | 0.40             |
| HOOS Jr. Preop                   | 51.9         | 50.8        | 0.07             |
| HOOS Jr. at 12W                  | 80.2         | 79.3        | 0.16             |
| HOOS Jr. at 6M                   | 84.8         | 81.3        | 0.15             |
| HOOS Jr. at 1 Year               | 86.7         | 84.7        | 0.01             |
| VR-12 Score at Pre-op PCS        | 31.4         | 31.4        | 0.92             |
| <b>VR-12 Score at Pre-op MCS</b> | <b>49.9</b>  | <b>48.1</b> | <b>p&lt;0.01</b> |
| VR-12 Score at 12 W PCS          | 42.4         | 42.1        | 0.41             |
| VR-12 Score at 12 W MCS          | 54.2         | 53.5        | 0.06             |
| VR-12 Score at 6M PCS            | 44.9         | 42.7        | 0.03             |
| VR-12 Score at 6M MCS            | 52.9         | 51.1        | 0.09             |
| <b>VR-12 Score at 1 Year PCS</b> | <b>46.6</b>  | <b>45.4</b> | <b>p&lt;0.01</b> |
| VR-12 Score at 1 Year MCS        | 54.2         | 54.0        | 0.60             |

# 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.