

Translation from Concept to Clinic: A Novel Tool for Patient-Centered Care in Knee Arthroplasty Rehabilitation

BACKGROUND

- Patient-centered care improves orthopedic outcomes¹, but rehabilitation after total knee arthroplasty (TKA) is typically generic and relies on population-level recovery estimates.
- In collaboration with relevant stakeholders, we developed a new support tool—The Knee Recovery App—which creates patient-specific recovery estimates after TKA (Figure 1).

PURPOSE

To evaluate the preliminary effectiveness of The Knee Recovery App in TKA rehabilitation while gathering information about its implementation using the RE-AIM framework.²

PARTICIPANTS

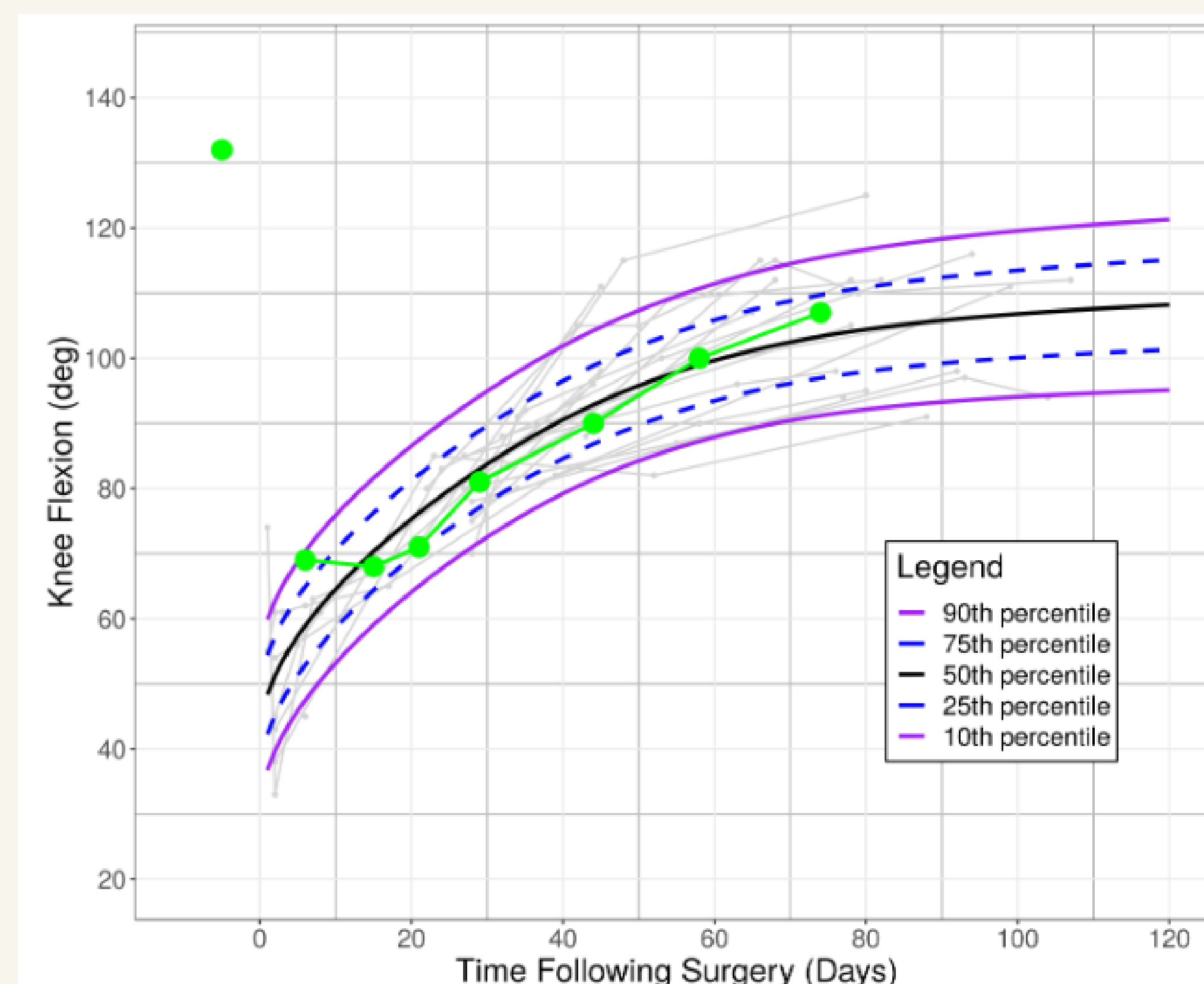
- Patients (n = 30)**
- All new patients between ages 40-90 with TKA treated with use of The Knee Recovery App
- Patient controls (n = 60)**
- Historical patient outcomes present in ATI Physical Therapy's TKA quality improvement (QI) database
- ATI Physical Therapy clinic participants (N = 2)**
- Greenville, South Carolina
 - Simpsonville, South Carolina
- Clinicians**
- All physical therapists and physical therapy assistants at participating ATI clinic locations

Exclusion Criteria: None

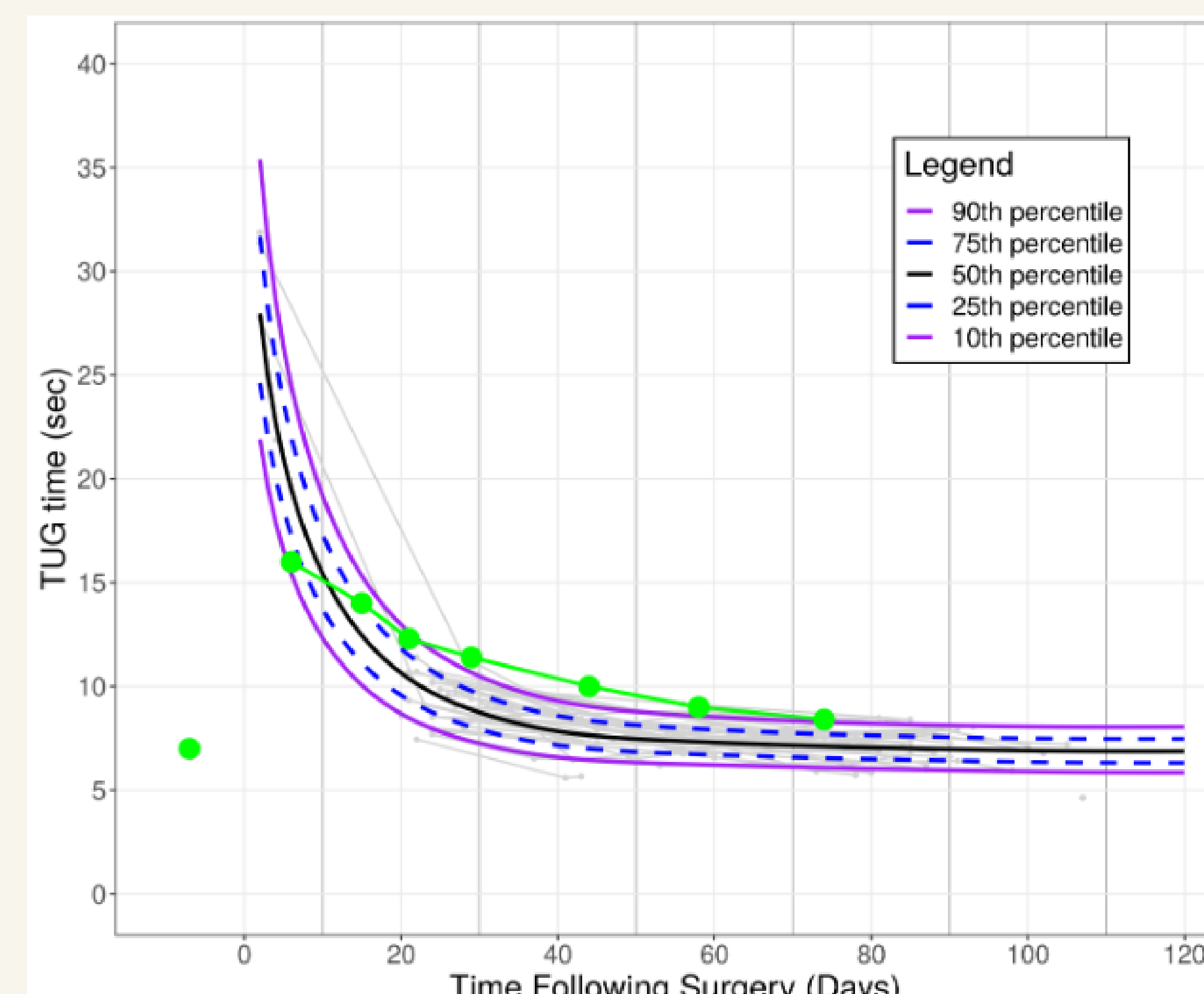
Hybrid Type 1 Design

- Effectiveness**
- Cohort comparison using descriptive statistics and linear mixed models
 - Clinical measures
 - Surveys measures of patient-centeredness
 - Visit utilization
 - App prediction accuracy
- Implementation**
- Mixed methods evaluation in prospective cohort using RE-AIM³ (Table 1)
 - **Quantitative**
 - Information extracted from app
 - Information extracted from QI database
 - **Qualitative**
 - Semi-structured stakeholder interviews
 - Virtual observation of fidelity and adaptations

Intervention



Knee flexion ROM recovery is faster than expected: only 35 percent of similar patients have more flexion ROM at this time point.



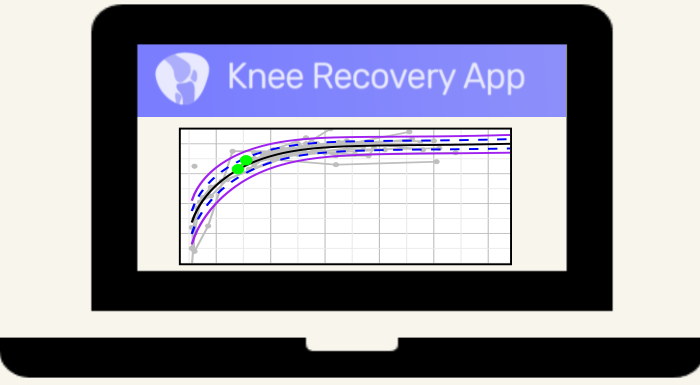
TUG recovery is slower than expected: only 8 percent of similar patients are slower at this time point

The Knee Recovery App generates individualized recovery estimates in common outcome measures for patients after TKA including: range of motion, Timed Up & Go (TUG), and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain subscale. Physical therapists will use these recovery estimates to (1) inform patients of their expected recovery and (2) facilitate the development of a patient-centered plan of care.

Table 1: Mixed-methods outcome measures informed by RE-AIM

RE-AIM Element	Quantitative Measure(s)	Qualitative Measure(s)				
Reach	1. Proportion of eligible patients with information entered into The Knee Recovery App 2. Characteristics of participating and non-participating patients	1. Semi-structured interviews with stakeholders to determine barriers/facilitators to patient participation				
Effectiveness	<table border="1"> <tr> <th>Functional outcomes</th> <th>Survey measures</th> </tr> <tr> <td>1. Timed Up & Go 2. Range of motion 3. Visit utilization / clinical efficiency 4. Algorithm vs. clinician prediction accuracy</td> <td>1. Patient perception of knowledge and inclusion in plan of care 2. Clinician decision-making preferences</td> </tr> </table>	Functional outcomes	Survey measures	1. Timed Up & Go 2. Range of motion 3. Visit utilization / clinical efficiency 4. Algorithm vs. clinician prediction accuracy	1. Patient perception of knowledge and inclusion in plan of care 2. Clinician decision-making preferences	1. Semi-structured interviews with stakeholders to provide context to observed quantitative outcomes
Functional outcomes	Survey measures					
1. Timed Up & Go 2. Range of motion 3. Visit utilization / clinical efficiency 4. Algorithm vs. clinician prediction accuracy	1. Patient perception of knowledge and inclusion in plan of care 2. Clinician decision-making preferences					
Adoption	1. Percentage of eligible clinicians who used The Knee Recovery App 2. Characteristics of participating and non-participating clinicians	1. Semi-structured interviews with clinicians to elucidate barriers/facilitators to adoption				
Implementation	1. Fidelity checklist assessment 2. Clinician-rated burden associated with using the app measured by the NASA Task Load Index 3. Clinician-rated app usability measured by the System Usability Scale	1. Semi-structured interviews with clinicians regarding barriers/facilitators to implementation and critical incident analysis of positive and negative events associated with using the app 2. Virtual observation to assess adaptations				
Maintenance	1. Clinician and administrator survey measure of likelihood to continue app use after intervention	1. Semi-structured interviews with clinicians and administrators regarding their likelihood to continue using the app				

Stakeholder Engagement

- The Knee Recovery App was developed iteratively with consistent input from patients, physical therapists, surgeons, and healthcare administrators. 
- The app's predictive algorithms were generated using clinically-collected data primarily from the clinics selected for participation in this project.
- The selected outcome measures leverage existing data collection efforts at these clinics and our implementation strategy is designed to complement existing clinical workflows.

Future Directions

- The results from this quality improvement project will inform our research strategy for a future cluster-randomized trial with ATI Physical Therapy
- Pilot data to inform power analysis and outcome measure selection
 - Mixed-methods analysis to inform future implementation strategy and necessary app updates

CLINICAL RELEVANCE

The Knee Recovery App was designed to improve patient-centered care in TKA rehabilitation. This quality improvement project will establish its preliminary effectiveness and implementation potential. The results of this project will directly inform future research efforts involving The Knee Recovery App. Furthermore, the experience gained from this project may form the basis for expanding our methodology into tools designed to support patient-centered care in additional populations.

REFERENCES

1. Sepucha KR, Atlas SJ, Chang Y, et al. Informed, patient-centered decisions associated with better health outcomes in orthopedics: prospective cohort study. *Med Decis Making.* 2018;38(8):1018-1026
2. Glasgow RE, Harden SM, Gaglio B, et al. RE-AIM planning and evaluation framework: adapting to new science and practice with a twenty-year review. *Front Public Health.* 2019;7:64.
3. Holtrop JS, Rabin BA and Glasgow RE. Qualitative approaches to use of the RE-AIM framework: rationale and methods. *BMC Health Serv Res.* 2018;18(1):177.

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