Impact of the COVID-19 Pandemic on post-operative convalescence in patients recovering from total knee arthroplasties

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INTRODUCTION

The COVID-19 pandemic significantly impacted the post operative convalescence for patients undergoing a total knee arthroplasty (TKA). The PEPPER trail (Pulmonary Embolization Prevention after hiP and kneE Replacement) occurred during the pandemic and was able to collect data from thousands of patients before and after the pandemic.

TKA recovery commonly includes structured rehabilitation, and patient-reported outcomes are routinely assessed at 1, 3, and 6 months within the PEPPER infrastructure. The COVID-19 pandemic disrupted elective surgery and site operations across North America beginning around March 2020, likely affecting access to and use of formal physical therapy (PT). Using de-identified PEPPER data, this study examines changes in formal PT utilization before versus after the pandemic and explores associations with functional recovery, length of stay, and adverse events . The dataset includes standardized variables (e.g., PROMIS-10, KOOS Jr., adverse events) enabling consistent pre/post comparisons.

Current literature supports that telerehabilitation and other telehealth resources were just as effective in supporting patients with TKAs during the pandemic.

Primary Research Question

How did the COVID-19 pandemic effect total knee arthroplasty post operative convalescence as measured by the patient reported outcomes, adverse events, length of stay, and discharge disposition.

Population

PEPPER trail patients with TKAs (*n* = 4342)
Any patient from the PEPPER trail receiving a TKA for the first time at one of the approved US sites

Primary Analytic Cohort (*n* = 2842)
Of the 34 sites, 10 sites meet the inclusion criteria of the primary analytic cohort for having at least 50 TKAs in both time periods

Secondary Generalized Cohort (*n* = 4342)
All 34 US sites

METHODS

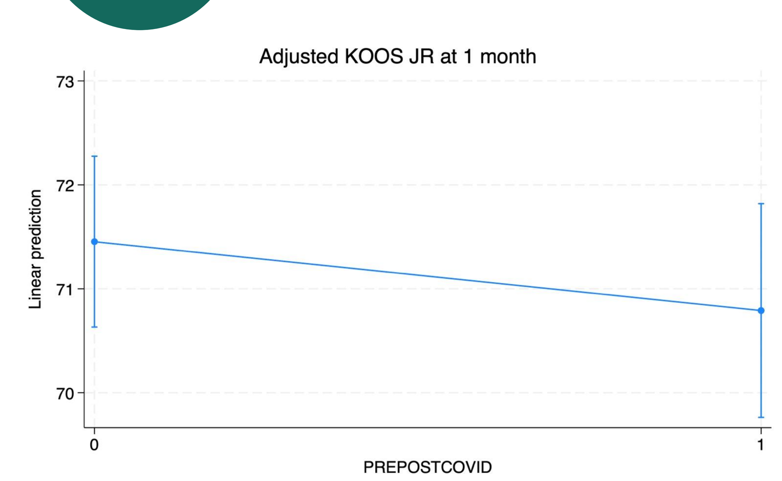
Primary Analytic Cohort

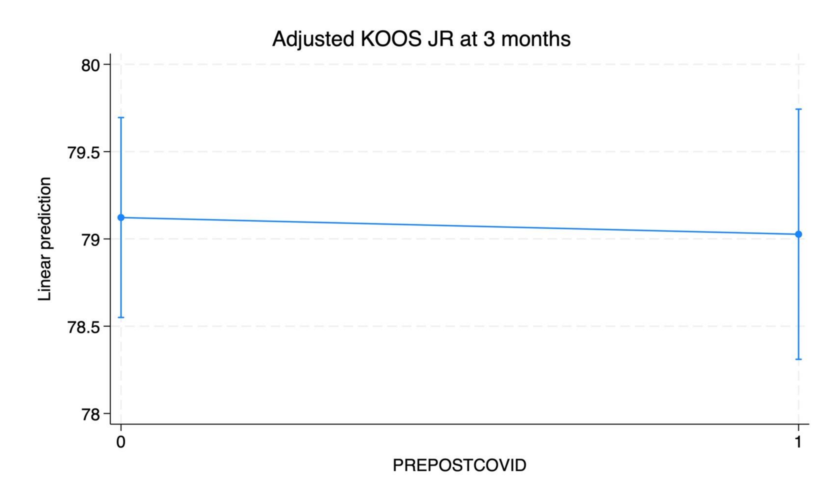
- Model: Site fixed effects with adjustment for age, sex, BMI, Charlson comorbidity score, and baseline KOOSjr/PROMIS-10
  - Outcome: Patient reported outcomes at 1 month, 3 month, and 6-month post-op, adverse events (knee and systemic health related), length of stay, and discharge disposition
  - Inclusion criteria: US sites with at least 50 TKAs in pre and post pandemic time periods

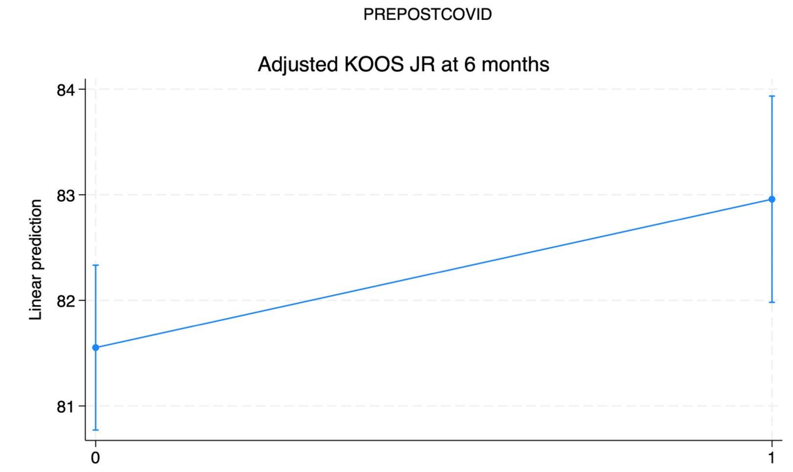
Secondary Generalized Cohort

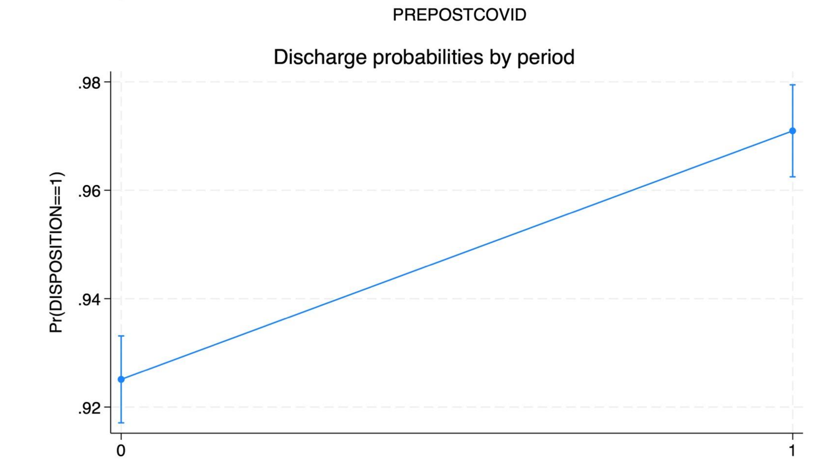
- Model: Mixed effects regression with site random intercepts and adjustment for covariates.
- Inclusion criteria: US Sites

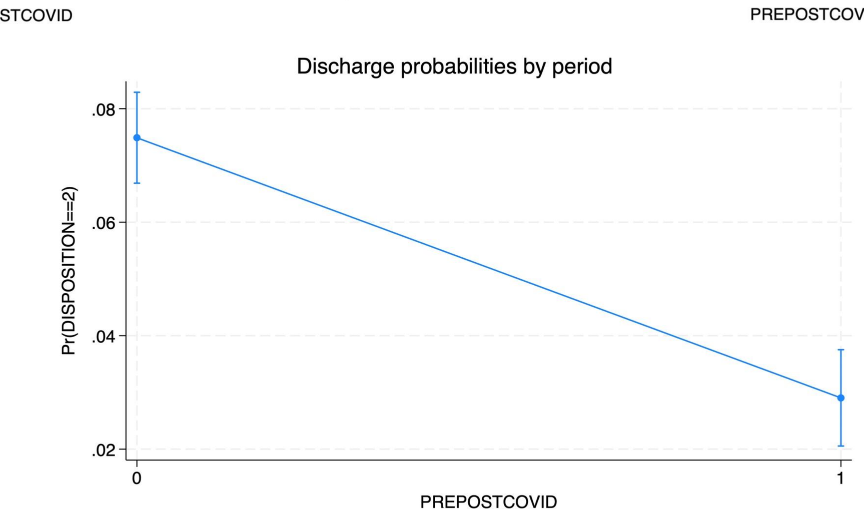
RESULTS











DISCUSSION

Preliminary results from the primary analytic cohort suggest a post-COVID decline in formal PT utilization after TKA. Potential explanations include pandemic-related service disruptions, capacity constraints, shifts to tele-rehabilitation, and patient hesitancy.

Strengths include a large multicenter dataset with prospectively collected outcomes at standardized intervals, centralized follow-up procedures, and use of de-identified data .

Project Limitations

Limitations include the observational design with potential residual confounding, site-level rather than patient-level pandemic exposure definition, and possible misclassification of PT modality. Ongoing work includes mixed-effects modeling to characterize site-level heterogeneity and analyses linking PT use with PROMIS-10 and KOOS Jr. trajectories and adverse events.

Future Directions

Currently, we have only analyzed KOOS Jr. scores and discharge disposition for the primary analytic cohort for the 1, 3, and 6-month intervals. We plan to continue to analyze the primary analytic cohort for PROMIS-10 scores, adverse events, length of stay, and the secondary generalized cohort.

CONCLUSIONS

In a multicenter analysis of de-identified PEPPER data spanning pre- and post-COVID periods, adjusted models indicate a decrease in formal PT use at 1, 3, and 6 months following TKA. Continued mixed-effects analyses will assess cross-site heterogeneity and quantify relationships between PT utilization, functional recovery, and adverse events, informing strategies to sustain rehabilitation access during health system disruptions

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