Effect of Institution and COVID-19 on Access to Adult Arthroplasty Surgery

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Abstract

Background: Although insurance status is important to patients’ ability to access care, it varies significantly by race, age, and socioeconomic status. Novel coronavirus disease 2019 (COVID-19) negatively impacted access to care, while simultaneously widening pre-existing health-care disparities. The purpose of the present study was to document this phenomena within orthopedics.

Methods: Patients undergoing hip or knee arthroplasty at two medical centers in San Francisco, California, were evaluated. One cohort came from the University of California San Francisco (UCSF), a tertiary center, and the other from Zuckerberg San Francisco General Hospital (ZSFGH), a safety-net hospital. Patients who underwent arthroplasty before the pandemic (March 2020) and those after pandemic declaration were evaluated. Patient demographics, surgical wait times, and operative volumes were compared.

Results: Two-hundred sixty-nine (pre-COVID, 184; post-COVID, 85) cases at UCSF and 63 (pre-COVID, 47; post-COVID, 16) cases at ZSFGH met inclusion criteria. Patients at ZSFGH had a significantly higher body mass index, were more often racial minorities, and were less likely to speak English. Patients at ZSFGH were less likely to have private insurance. A comparison of case volumes showed a larger decrease at ZSFGH than at UCSF after COVID. Wait times between the two sites before and after COVID showed a larger increase in wait times at ZSFGH. Notably, wait times at ZSFGH before COVID were more than double the wait times at UCSF after COVID.

Conclusions: COVID-19 worsened access to primary hip and knee arthroplasties at two academic medical centers in San Francisco. The pandemic also worsened pre-existing disparities. Racial minorities, non-English speakers, and those with nonprivate insurance were affected the most.

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Introduction

Insurance status is a well-known predictor of patients’ ability to access medical care in the United States [1]. While the Affordable Care Act expanded coverage for many Americans, there are still large disparities [2-5]. Lower rates of provider reimbursement, onerous paperwork, and increasing clinical complexity and comorbidities associated with Medicaid-insured patients have all been hypothesized to contribute [6]. These disparities in access have been well documented not just in primary care but also specifically in elective and nonelective orthopedic care [7-11].

More recently, studies have focused on the novel coronavirus disease 2019 (COVID-19) pandemic and its effects on access to medical care [12]. By the time COVID-19 was declared a pandemic by the World Health Organization [13], recommendations had been made by the American College of Surgeons [14], the Centers for Disease Control [15], and the American Academy of Orthopedic Surgeons [16] to postpone all elective surgical cases. As a result, rates of elective procedures, such as total knee arthroplasty (TKA) and total hip arthroplasty (THA), decreased dramatically across the United States beginning in March 2020. While resource allocation and restrictions on elective procedures affected all institutions nationwide, it potentially affected underinsured populations more substantially [17,18].
The aim of the present study is thus to evaluate the effect of the COVID-19 pandemic on access to orthopedic care using primary hip and knee arthroplasty as a demonstrative, common, elective surgical procedure. We hypothesize that access to care worsened after the pandemic for all patients undergoing elective THA and TKA and that patients seeking care at a public institution, which provides an unbalanced amount of care to the underinsured, were disproportionately impacted.

Material and methods

Patient selection and data collection

After receiving institutional review board approval, a retrospective review was performed of adult patients who had undergone primary THA or TKA at two academic medical centers in San Francisco, California. One cohort was obtained from the University of California San Francisco (UCSF), a tertiary referral center for the region, and the other cohort from Zuckerberg San Francisco General Hospital (ZSFGH), the public hospital for the city and county of San Francisco. From each institution, data from two time periods were collected, one just before the declaration of the pandemic (pre-COVID) and one just after (post-COVID). At UCSF, the pre-COVID group consisted of adult patients undergoing hip and knee arthroplasty (Current Procedural Terminology codes 27130, 27134, 27137, 27138, 27446, 27447, 27486, 27487) from December 1, 2019, to February 29, 2020, and the post-COVID group consisted of such patients from March 1, 2020, to May 31, 2020. At ZSFGH, owing to the much lower baseline volume of cases, these time frames were expanded (September 1, 2019, to February 29, 2020, [pre-COVID] and March 1, 2020, to August 31, 2020, [post-COVID]) to allow for larger numbers for comparison.

After evaluating individual records, patients were excluded (Table 1) if the procedures had been performed for revision, were resection arthroplasties, were associated with hardware removal, or performed for fracture. Patients were also excluded if surgery had been delayed because of patient preference, bilateral staging, or substance abuse screening, all of which were felt to artificially influence wait times.

With pre- and post-COVID groups obtained from both institutions, medical records were evaluated to extract patient demographics and insurance status (Table 2). Surgical wait times were then calculated for each group; this was defined as the time from first documented recommendation for surgery by a member of the arthroplasty service (attending physician, physician assistant, or nurse practitioner) to actual operative date. Surgical volume was also tabulated and compared between the two institutions during the study time periods.

Table 1

| Case data                                      | UCSF | ZSFGH |
|-----------------------------------------------|------|-------|
| Total arthroplasty (hip and knee)             | 375  | 111   |
| Total exclusions                              | 106  | 48    |
| Revision                                      | 78   | 20    |
| Resection arthroplasty/hardware removal        | 0    | 6     |
| Fracture                                      | 6    | 3     |
| Patient preference                            | 17   | 14    |
| Bilateral staging                             | 5    | 0     |
| Active substance use                          | 0    | 5     |
| Final cohort                                  | 269  | 63    |

Values are presented as no. of patients unless otherwise specified.


discussion

Insurance status is a well-documented predictor of access to orthopedic surgical care in the United States. Prior authors, before the pandemic, documented increased surgical wait times for knee arthroplasty, ankle fracture fixation, anterior cruciate ligament reconstruction, and shoulder stabilization procedures in patients.
who lacked insurance or were underinsured [7-11]. These mirror the findings of the present study. Patients who sought care at the public hospital (ZSFGH) were far less likely to have private insurance and had significantly longer mean wait times for hip and knee arthroplasty than those seeking care at the private, academic center (UCSF) even before the COVID-19 pandemic. Also, similar to prior research, patients seeking care at the public, safety-net hospital were more often non-White and/or non-English speaking [19-24].

The COVID-19 pandemic necessitated a temporary shift of resources away from elective orthopedic surgical care [21-24]. Prior authors have documented up to 80% of US orthopedic surgeons experiencing a decline in surgical volume after the onset of the pandemic [25]. Similarly, in Europe, in April of 2020, it has been estimated that 92.6% of joint replacements were canceled [26]. Again, the findings of the present study are consistent with prior reports, with both institutions having clear reductions in surgical volume and increases in wait times immediately after the onset of the pandemic.

To the senior author’s knowledge, this is the first study in the orthopedic literature to evaluate the compounding effects of pre-existing underinsurance status and the COVID-19 pandemic on access to elective orthopedic surgical care. As would be predicted, pre-existing disparities only worsened, with case volumes falling more and surgical wait times ballooning further at the safety-net hospital (ZSFGH) relative to the private, academic center (UCSF). Perhaps of particular note, the pre-COVID wait times at ZSFGH were more than double the post-COVID wait times at UCSF. The exact reasons for the disparate baseline and post-COVID access to TKA at ZSFGH, relative to the private, academic center (UCSF), and thus, deserve special mention. As much as one-quarter of patients presenting for arthroplasty at ZSFGH are actively using illicit substances or have done so within the last 12 months. This was found to correlate highly with postoperative complications at this institution, and so a previously published “sobriety pathway” was developed and has been in place for 2 decades [27]. This requires patients to have a documented period of sobriety for 12 months before proceeding with arthroplasty. This obviously intentionally elongates surgical wait times in this population at this hospital, and they were thus excluded from analysis. In addition, all surgeries were performed at two institutions, which limits the generalizability of the results to other institutions and geographic locations. Finally, only wait times and case volumes were used to measure access to surgical care. Other studies have also assessed the number of appointments before surgery, complication rates, and long-term outcomes as at least equally valid measures.

### Conclusion

The COVID-19 pandemic acutely worsened access to surgical care worldwide, including access to primary hip and knee arthroplasty at two medical centers in San Francisco, California. However, the pandemic did not affect the populations treated at these hospitals equally, instead worsening pre-existing disparities as assessed by wait times and surgical volume. Racial minorities, non-English speakers, and those with nonprivate insurance were affected most, widening the large gaps that preceded the pandemic.

### Conflicts of interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: P. Toogood is a AAOS OITE member.

For full disclosure statements refer to [https://doi.org/10.1016/j. artd.2022.01.027](https://doi.org/10.1016/j. artd.2022.01.027).

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### Table 3

| Case volume UCSF vs ZSFGH |            |            |
|---------------------------|------------|------------|
|                           | UCSF cohort | ZSFGH cohort |
| Pre-COVID                 | 184        | 47         |
| COVID                     | 85         | 16         |
| Difference (N)            | −99        | −31        |
| Difference (%)            | −53.8%     | −66.0%     |

*Bold values indicate statistical significance.*

### Table 4

| Wait times UCSF vs ZSFGH |
|--------------------------|
|                          |
| Surgical wait time (mean ± SE) | UCSF cohort | ZSFGH cohort | P value |
| Pre-COVID (d)             | 115.5 ± 5.4 | 298.0 ± 14.9 | <.001  |
| COVID (d)                  | 132.1 ± 6.4 | 344.8 ± 29.6 | <.001  |
| P value                   | .045        | .001        |
| Difference (d)            | +16.6       | +53.0       |
| Difference (%)            | +14.4%       | +18.1%      |

*Bold values indicate statistical significance.*

* a Student unpaired-samples t-test for mean values and chi-square test for categorical values.
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