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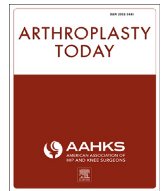

Original Research

Arthroplasty During COVID-19: Surveillance of AAHKS Members in the First Year of the Pandemic

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A B S T R A C T

Background: The COVID-19 pandemic has had a severe impact on the practices of adult reconstruction surgeons, primarily due to the elective nature of hip and knee arthroplasty.
Methods: To capture the impact of COVID-19 on its members, the American Association of Hip and Knee Surgeons sent 6 surveys over a span of 7 months from late March until September of 2020 querying its members regarding the effects of COVID on the health and well-being of their personal, financial, and clinical practice.
Results: Ninety-two percent of surgeons reported a cessation of elective inpatient cases during the height of the crisis. The reduction was greatest for surgeries performed in hospital-based sites of care. Ninety-one percent reported a drop in clinic volume. At the final surveys, these numbers where 7% and 59%, respectively. In addition, there was a widespread increase in the use of telemedicine during this period. Only a small number of orthopedic practices permanently closed because of COVID-19; 68% of surgeons, however, sought federal funding to offset their loss of revenue because of the restrictions placed on elective surgeries. Finally, once elective surgeries were reinstated, most surgeons reported no restrictions with surgical cases and that they believed they were adapting to the challenges of COVID successfully.
Conclusions: The impact of COVID-19 in 2020 on the practice of arthroplasty resulted in nearly universal loss of volume and significant financial stress. Recovery has been consistent but incomplete for most practices. Continued monitoring of the members of American Association of Hip and Knee Surgeons will be needed in 2021 to measure the strength of the demonstrated adaptive recovery of 2020.
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Introduction

The widespread SARS-Cov-2 virus and COVID-19 illness in 2020 significantly interrupted the provision of hip and knee arthroplasty in the United States and forced practice alterations while patients and surgeons return to the operating room. On March 11, 2020, the World Health Organization designated the COVID-19 outbreak a pandemic [1]. The COVID-19 pandemic has led to widespread social distancing, sheltering in place, and the closure of multiple workplaces. In late March of 2020, owing to concerns over limited health-care resources, the U.S. Surgeon General, the American College of Surgeons, and the Centers for Medicare & Medicaid Services recommended stopping elective surgeries in the United States [2-4]. These recommendations were largely based on initial U.S. pandemic modeling. Owing to these severe limitations, and the predominantly elective nature of lower extremity arthroplasty, surgeons providing joint reconstruction were especially impacted; surgical volume plummeted, and office-based care was hampered.

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All health-care providers and hospitals were impacted, with some facing imminent insolvency. In response to these challenges, the U.S. Congress passed the Coronavirus Aid, Relief, and Economic Security (CARES) Act, a $2.2 trillion bill with $100 billion designated to health care including hospitals and providers, as well as $350 billion designated to small businesses, including orthopedic practices [5,6]. These relief programs have helped to offset some of the financial burden for orthopedic practices, but large financial loses are expected in this fiscal year, with the possibility of more losses moving forward [5]. By the beginning of May 2020, most states had decreased some restrictions on performing elective surgeries. Over the first 7 months of the pandemic, there were many changes for arthroplasty surgeons. Insight into the impact on adult reconstruction surgeons, their patients, practices, and families became a priority of the leadership of the American Association of Hip and Knee Surgeons (AAHKS). In an effort to better understand the effects on its members, AAHKS administered a series of surveys to investigate the specific impact of the COVID-19 crisis on its members throughout the country.

Methods

The AAHKS represents over 3400 American surgeons (500 resident members) whose practices are focused on hip and knee replacement surgeries. Its members provide the majority of the estimated 900,000 total hip and knee replacements performed each year in the United States. Because most arthroplasty surgeon's cases are elective and were especially affected by the pandemic and resulting shutdowns, AAHKS conducted email surveys on March 20, 2020 (survey 1), April 3 (survey 2), May 1 (Survey 3), June 5 (Survey 4), August 24 (Survey 5), and September 24 (Survey 6) to assess the evolving effects of COVID-19 on its members. Surveys remained active for 1 week to allow for completion. Members were queried how the COVID-19 pandemic has impacted their personal lives, practice economics, surgical volume, patient care protocols, and attempts to resume normal clinical practices. The questionnaire distributed is provided in Supplementary Figure 1. The content of each questionnaire was adjusted slightly over the series of surveys as the specialty entered various lockdown periods and the subsequent attempts to recover raised new questions because of heterogenous strategies to rebuild elective volume.

The responses were anonymous and reported in aggregate form. Descriptive statistics including mean, standard deviation, and trends were reported for all continuous variables.

Results

Response rates

Response rates (number of surgeons) were 20% (795 for survey 1), 21% (666 for survey 2), 20% (630 for survey 3), 12% (370 for survey 4), 10.4% (330 for survey 5), and 13.8% (437 for survey 6).

Reductions in elective arthroplasty procedures and clinic volumes

There was a dramatic reduction of surgeons performing inpatient arthroplasty starting at 82% late March, peaking to 92% early April, and then correcting to a 23% reduction by mid-June (Fig. 1). By the end of September, however, only 7% of surgeons reported their hospitals still restricted elective surgery. There was a relatively smaller reported reduction in outpatient joint replacements starting at 62%, peaking at 72%, and then falling to 12% over the same points in time. At the peak drop in surgeons conducting arthroplasty in early April, ambulatory surgery center (ASC) reduction was less at 44%, in mid-June only 13%, and again most recently 1% at the end of September (Fig. 2).

A consistent 75% to 84% of the surgeons reported delaying elective surgeries; an equally consistent 64%-67% of responders shared that patient-driven decisions were a factor delaying surgery. By the beginning of September, no surgeon reported that they were not operating. Eighty-six percent of surgeons stated that there were no restrictions with performing elective surgeries.

Clinic volume was universally reported as being reduced; the percentage of responders reporting reductions were over 90% the first 3 months dropping to 73% mid-June (Fig. 3), further decreasing to 59% in late September. About two-third of responders reported some use of telemedicine early in the pandemic period, and by September, 35% were still using telemedicine for clinic visits.

Effect on surgeons

The reported local occurrence of COVID-19 in the responders' community rose over time, with rates of 73%, 80%, and 96% in

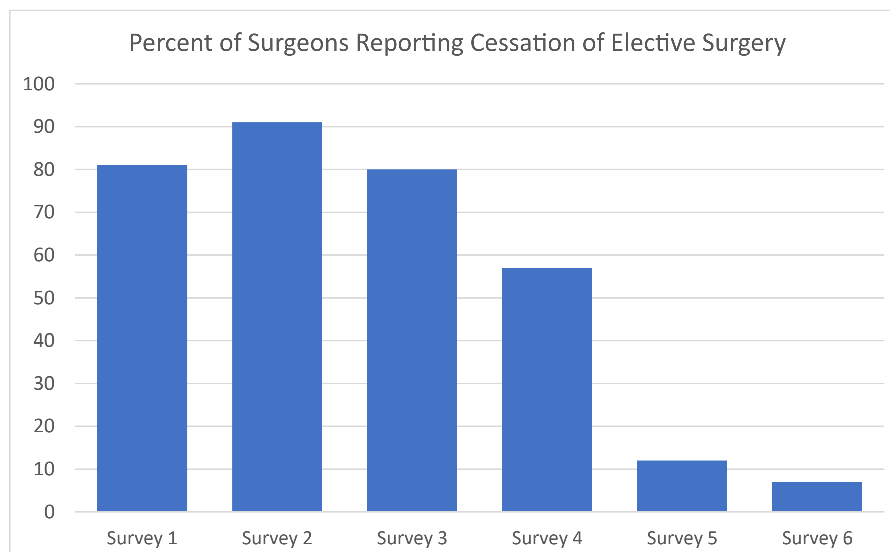

Figure 1. Percent of surgeons reporting cessation of elective joint arthroplasty during initial COVID-19 pandemic.

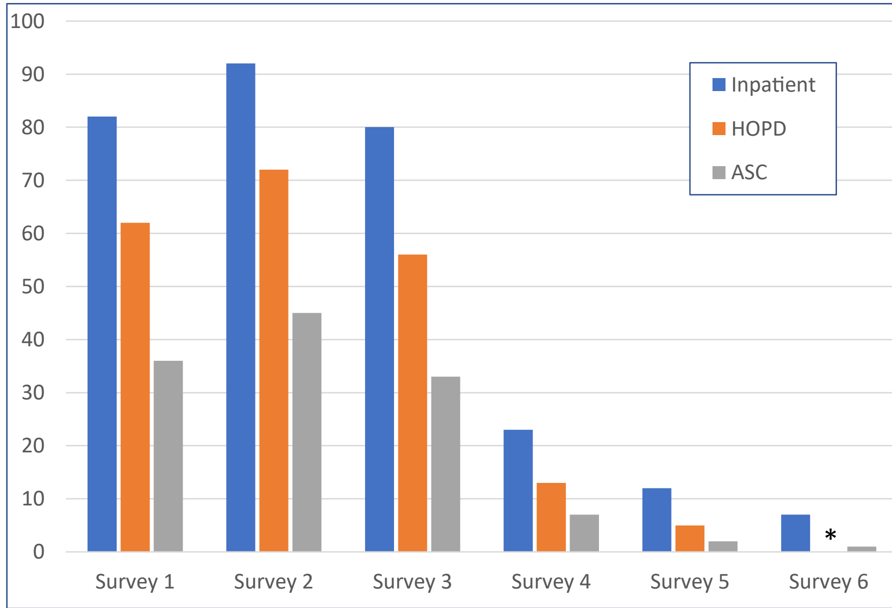

Figure 2. Percentage of responding surgeons reporting discontinuation of elective surgery by site. HOPD, hospital outpatient department; ASC, ambulatory surgery center. *In the final survey, question omitted option for HOPD.

March, April, and June, respectively. Less than 1% of responding surgeons reported being ill during the 3-month polling period.

The AAHKS members responded in late March that 69% were effectively not working, a number that peaked at 74% in early April and has sharply dropped to 3% in late August (Fig. 4). Only a small percentage (approximately 6%-7%) considered the effect of the pandemic on their practice a nonissue.

Just under half of the surgeons reported consistently over the surveyed time periods that they were feeling financial stress. A sense of being a potential health threat to their family was high in early April at 70% and remained consistent around 45% through the most recent survey. This correlated to the consistent rate of mental stress reported from 58% at the initial survey but has maintained around 40% over the same time period.

Practice economic impact

The reported need to furlough employees rose from 50% in early April, 58% in mid-June, to 18% by late September. Over the same time-period, 51%-64% of surgeons reported forgoing some amount of compensation. The shutting down of practices peaked at 20% in April and May but was down to 1.5% by the end of September.

Applications for support through the CARES Act rose from 46% in April to 67% in June. Reimbursement from at least the first tranche (April 10-17) was received by 52% of members, with 12% receiving funding from both the first and second tranche (after April 24). These loans have probably buffered any higher rates of furloughs and/or increased financial stress.

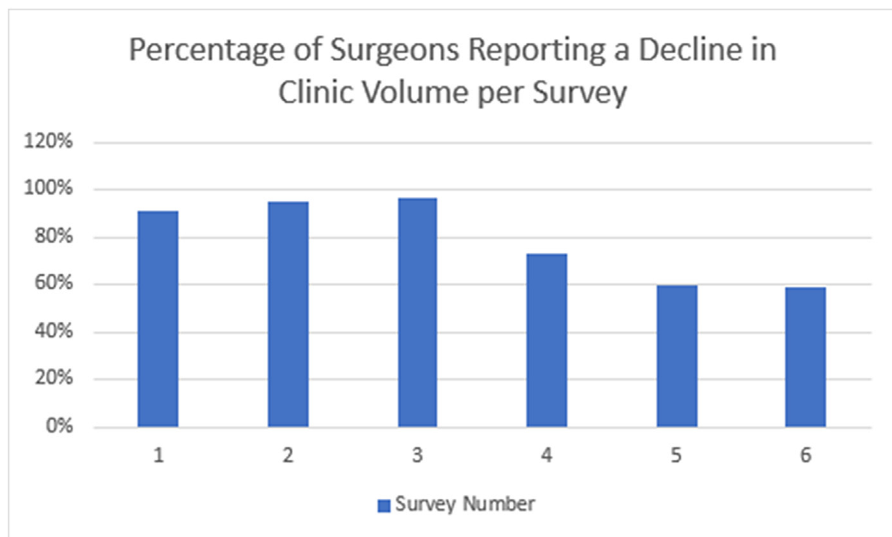

Figure 3. Percentage of arthroplasty surgeons reporting a decline in clinical volume.

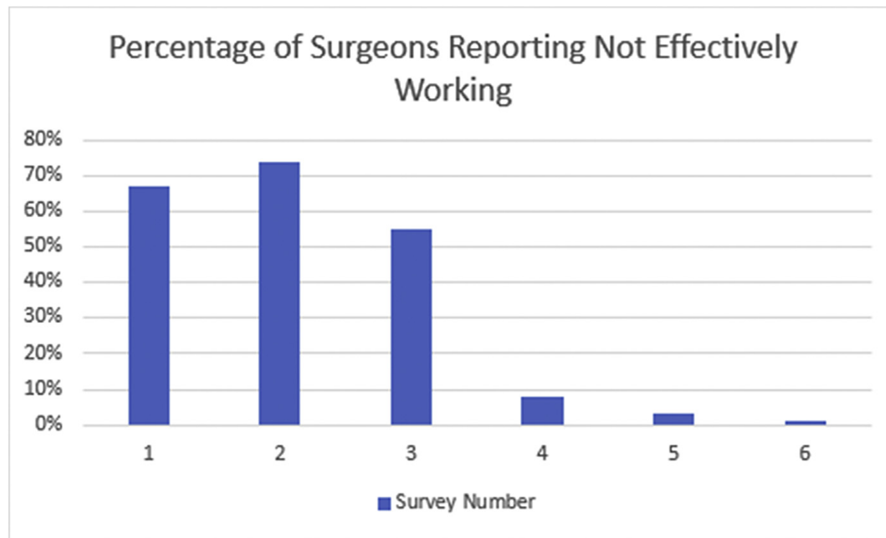

Figure 4. Surgeons not working because of COVID-19–related restrictions and shut-downs.

The period reported as being the limit of being able to maintain a reduced practice has ranged from 6 to 17 weeks. The average estimated change from normal volume in mid-June was 66% with an average estimated end-of-year return to 89%. However, there were still about 50% of surgeons who reported in September that they were still having to undergo reduced compensation.

Hospital/clinical procedural response

From the May 1 survey, 24% of surgeons reported a roll back of restrictions on elective cases and 29% a limited rollback; by mid-June, this had risen to 54% and 32%, respectively. In the most recent September survey, 18% of surgeons stated restrictions still remained in place. Over the same time-period, 25% of members had no return to elective cases, which fell to 5% by June.

From May to June, a response of "no change in surgical indications" rose from 15% to 53%. However, in both surveys, 27% reported limiting surgery to those without COVID risk factors for an adverse course. In May, it was reported that 41% of cases were being limited to same-day discharge candidates, which decreased to 21% by mid-June.

Preoperative testing for COVID-19 in all preoperative cases rose from 78% to 88% from survey 3 to 6, with the average time of testing 3 days before the date of surgery. Surgeons personally reported a negative COVID test as a requirement before an elective procedure 49% of the time. Routine acceptance of testing was highly accepted by patients at 97%. Requiring preoperative quarantine, however, has fallen from 40%-43% to 5% from May to June. Currently, testing for providers is occurring in 12% of institutions.

Routine use of an N95 mask has fallen from 31% to 14%, while the use of a surgical hood has risen from 76% to 82% from May to September. No consistent trends in anesthesia practices were discernable across the times surveyed.

Discussion

The COVID-19 pandemic has dramatically affected our nation's health-care system, stretching resources for essential workers and patients alike. Despite a growing body of institutional reports, the repercussions for total joint arthroplasty surgeons and their patients have not been reported from their perspectives at a national level. In addition, few studies have projected the number of arthroplasty cases postponed or canceled because of the strict halting of nonessential surgeries during the March-September time-period in the United States. Simple calculation of drops in volume fails to capture the linked associations of clinical practice alterations and surgeon well-being. The cumulative trends illuminated from the series of surveys highlight a significant impact on arthroplasty surgeons during the course of the COVID-19 pandemic, causing enduring personal and financial stresses and an incomplete attempt to return to pre-COVID levels of surgical and clinical production.

The results of these surveys illustrate the prevailing impact COVID-19 has had on hip and knee arthroplasty volume in the year 2020. The early surveys indicated that 92% of the respondents' hospitals stopped elective inpatient surgery because of COVID-19, and 74% of surgeons felt that they were not effectively working. The large number of canceled cases have caused major economic losses, many of which have continued through the third quarter of 2020. More specifically, these surveys give insight into the major financial and emotional issues faced by arthroplasty surgeons because of COVID-19. Over half of our members were fortunate to have received federal assistance through the CARES Act during the first 3 months of the pandemic. However, downstream consequences will abound if restrictions are reimposed and controlling overhead costs for surgeon practices becomes unsustainable [5].

The exact number of arthroplasty cases postponed since the surgeon general's recommendation to stop "nonessential" elective procedures on March 14, 2020, [7] is unknown. However, it can be estimated using the American Joint Replacement Registry to calculate the amount of nonurgent hip and knee arthroplasty cases performed per week in the United States. Bedard et al. determined that up to 30,000 primary TJAs and 3000 revision TJAs were delayed each week during the time of maximal restriction [8]. That estimated 75% cancellation rate for nonessential cases aligns with our findings in the early pandemic months showing that 75%-84% of surgeons were delaying cases; there were likely more than 22,500 primary and 2000 revisions not performed each week of April and May. Even as restrictions have slowly been relaxed, in some places not until June, the most recent survey demonstrates that at least one-third of surgeons are still dealing with some restrictions. Based on the estimations from Bedard et al., this represents further cancellations for another 10,000 primary and 1000 revision TJAs per week. In addition, over half of respondents reported continued reductions in clinic volumes.

The resilience to the impact of COVID in the outpatient ASC environment was an interesting finding with the lowest reduction in surgical volume reported at this setting over each survey. This finding is likely multifactorial. First, ASC patients tend to be healthier with fewer risk factors that have been associated with poorer outcomes after a COVID-19 infection [9]. In addition, a typical ASC facility has a lower utilization of key health-care resources (ie, ventilators, intensive care beds, and so on). Finally, by definition, surgeries performed at an ASC obviate the need for admission to a hospital or postacute facility, which have been associated with higher rates of COVID-19 infections. These findings suggest that the COVID-19 pandemic may act as another catalyst to the disproportionate growth in outpatient arthroplasty [10].

In addition to the immense clinical and economic impact of canceled cases, this is the first report on the human effects on the surgeons themselves. During the course of the survey, just under half of the surgeons reported feeling financial stress. More striking, most surgeons reported a sense of being a potential health threat to their family, a concern that has persisted in the most recent survey. This has correlated with consistent rates of mental stress over the same time period and remains something that hospital and practice administrators should consider coping systems and support strategies to promote physician well-being [11]. Patient attitudes toward elective arthroplasty have been previously documented. Brown et al. found that >85% of patients reported anxiety and uncertainty regarding arthroplasty during the pandemic [12]. However, as a profession, we should not lose sight of the emotional and psychological implications on surgeons.

Despite the appeal of using a national organization to survey respondents regarding real-time practice changes during these trying times, our efforts are not without limitations. First, the presence of "survey fatigue" is genuine given the observed drop-off in response rates seen over time. It is highly plausible the length of each questionnaire and breadth of topics covered in the first wave of administered surveys were redundant to surgeons. Second, there is obvious response bias where surgeons participating in the survey may have been experiencing increasing challenges and hardships secondary to the pandemic and wanted their voices to be heard. Individual responses are also not based on objective data and likely represent the opinions and views of the surgeon. Thus, the results presented may not be uniformly representative of all arthroplasty surgeons throughout the country. Furthermore, we did not collect demographic information for surgeons who completed the surveys, further limiting our ability to draw conclusions regarding possible regional or practice type (academic vs private vs hospital) differences that may exist regarding the physical, economic, and personal effects COVID may have taken.

Arthroplasty surgeons have demonstrated an ability to adapt and rebound from the initial surge of the pandemic; however, it has been an incomplete recovery to date. The true strength of the recovery will be challenged by the ongoing recurrent surge pending possible vaccines vs a more prolonged eventual resolution typical of viral pandemics. AAHKS plans on continued surveillance of its membership during this unprecedented pandemic. Its goals are to provide members with benchmarking information, let them know that they are not alone in their efforts to cope, and assure them that their colleagues are there for help and support.

Conclusions

Key findings

- At its peak, 92% of respondents had stopped performing elective inpatient procedures.
- As many as 74% of respondents reported not working, and 65% reported foregoing some amount of compensation.
- An estimated 22,500 primary and 2000 revision total joint replacements were not performed each week of April and May, and a further estimated 10,000 primary and 1000 revisions were not completed each week of June.
- When comparing sites of care, ASCs showed the least reduction in volume, followed by hospital outpatient department and hospital-based surgery.
- Most recently, surgeons report returning to approximately 79% of their pre-COVID volume, with respondents projecting a return to 88% of volume by the end of 2020.
- Fourty-seven percent of respondents reported concern that their work poses risk to their family, and 40% reported mental/emotional stress due to the effects of the pandemic.

Conflict of interests:

J. M. Kerr, American Association of Hip & Knee Surgeons. J. B. Stambough, Journal of Arthroplasty, American Association of Hip & Knee Surgeons, Education Committee American Joint Replacement Registry, Steering Committee. M. J. Zarski, American Association of Hip & Knee Surgeons. J. T. Deen, Board of Directors, Florida Orthopedic Society, and Quality Measures Committee, American Association of Hip & Knee Surgeons. A. J. Yates, JOA and AHHKS representative to BOS.

For full disclosure statements refer to https://doi.org/10.1016/j.artd.2020.12.029.

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AAHKS COVID-19 Practice Survey #1, March 2020

AAHKS is seeking your input on how the COVID-19 pandemic is affected your patients and your practice. Please complete the survey below, which should take about five minutes, to give us insight from our members and determine how we can help you.

Thank you for your participation in this survey. If you have any questions or concerns please contact us at aahksstaff@aahks.org or (847) 698-1200.

We encourage you to report any developments, observations, or suggestions about the pandemic to AAHKS leadership through our website. http://www.aahks.org/covid-19/covid-19-practice-feedback/

What specific effect has the COVID-19 pandemic had on your patients? (Mark all that apply)

- No changes at the hospital affecting TJA.
- The hospital has stopped elective inpatient surgery.
- The hospital has selectively restricted inpatient elective surgery.
- Hospital based elective outpatient surgery has been stopped.
- Hospital based elective outpatient surgery has been selectively restricted.
- Patients with acute periprosthetic infections/fractures have surgery delayed.
- Patients with semi-acute need for TJA revisions (loosening, dislocations) have surgery delayed.
- All TJA patients are being tested for COVID-19.
- TJA patients with positive screening questions/symptoms are being tested for COVID-19.
- No changes at our surgicenter/ASC.
- TJA has been selectively restricted at our surgicenter/ASC.
- TJA has been stopped at our surgicenter/ASC.
- I am voluntarily deferring surgery.
- Patients are cancelling/delaying scheduled surgery.
- The hospital is affected with staffing shortages due to the pandemic.
- The surgicenter/ASC is affected by staffing shortages due to the pandemic.
- Other effects: (Please describe)

How has the COVID-19 pandemic affected your practice? (Mark all that apply)

- No impact.
- I am delaying primary TJA surgery due to the pandemic.
- My clinic volume is reduced due to the pandemic.
- My staff and I are spending time discussing the pandemic with patients.
- My training or teaching (student/resident/fellow) is disrupted.
- I am doing more non-surgical orthopaedic clinical care.
- I am doing more administrative work.
- I am doing more non-elective orthopaedic surgery (trauma, tumor).
- I am doing non-orthopaedic patient care because of the pandemic.
- I am experiencing supply disruptions related to the pandemic.
- I am experiencing staff disruptions related to the pandemic.

Supplementary Figure 1. AAHKS COVID-19 member practice survey administered on March 20, 2020.

Are you providing care through telemedicine? (Mark all that apply)

Zoom videoconference
FaceTime / Google Chat
Through my EHR
Telephone
Other [text box]

What surgeries are still being performed at your site of care? (Mark all that apply)

"Elective" primary TJA
1st stage explants for PJI
2nd stage reimplantations for PJI
Aseptic TJA revisions
Massively failed TJA (collapse, dislocation, component failure w/imminent dislocation)
Periprosthetic fracture
Other [text box]

What is the impact of the pandemic on you? (Mark all that apply)

I am effectively not working due to institutional or self-imposed deferral of elective surgery.
I am not working due to personal illness, COVID-19 exposure, or post-travel quarantine.
I consider myself in a high-risk group for COVID-19 (age greater than 60, underlying condition).
At this time, no confirmed cases of COVID-19 have occurred in my community or institution.
Confirmed COVID-19 cases have occurred in my community or institution.
How many weeks can you sustain disruption to your practice due to the pandemic?

How are you compensated?

Salaried
RVU model
Mixed

How can AAHKS help you?

Supplementary Figure 1. (*continued*).