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The Psychological Impact of COVID-19 on Arthroplasty Surgeons

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ABSTRACT

Background: After the COVID-19 pandemic declaration in March 2020, all the elective total joint replacement surgeries in Canada were abruptly canceled for an indefinite period of time. The principal objective of this study was to determine the prevalence of psychological morbidity experienced by arthroplasty surgeons during the peak of the COVID-19 pandemic. Secondary objectives included characterizing influential variables affecting the surgeon’s well-being and suggesting directives for improvement.

Methods: This study surveyed Canadian Arthroplasty Society (CAS) members regarding their psychological well-being using the validated General Health Questionnaire (GHQ-12), the Center for Epidemiological Studies Depression (CES-D) scale, and the Personal Wellbeing Index-Adult (PWI-A). As well, the survey included questions regarding concerns about COVID-19, precautionary measures, personal well-being, and sociodemographic characteristics.

Results: A total of 80 surgeons (52% of those surveyed) completed the questionnaire, representing all 10 provinces in Canada. The prevalence of emotional distress and depression were 38% and 29%, respectively. Psychological morbidity most commonly resulted from concerns of loss of income/operating time, experiences of emotional conflict, and generalized safety worries. The surgeons commonly (93%) demonstrated insight in recognizing the impact of COVID-19 on their emotional health.

Conclusion: Canadian arthroplasty surgeons demonstrated emotional resilience and insight during COVID-19. Continual communication, as well as remuneration action plans, could improve the mental well-being of at-risk individuals.

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On March 11, 2020, the World Health Organization declared a worldwide COVID-19 pandemic. The effect of COVID-19 on healthcare delivery in Canada was immediate and dramatic. During the first wave of the pandemic, virtually all nonurgent elective surgeries were abruptly canceled in order to free up hospital beds, reduce Personal Protective Equipment (PPE) use, minimize the risk of nosocomial spread of the virus and allow the reallocation of healthcare workers to the Intensive Care Unit (ICU) for the expected surge of COVID patients requiring hospitalization. This prioritization of surgery for only the most urgent cases, resulted in the inability of orthopedic surgeons to do total hip and knee arthroplasty for an indefinite period of time. This put a significant strain on not only the patients, but also the surgeons.

Across surgical subspecialties, orthopedic surgeons report the highest job satisfaction (80%) and lowest depression risks (21%) [1]. Not since the severe acute respiratory syndrome (SARS) outbreak in 2003 have elective surgeries in Canada been canceled for a prolonged period of time. At that time, surgeons in all hospitals in the...
Table 1
Electronic Survey on the Effects of the COVID-19 Pandemic Administered to Arthroplasty Surgeons in Canada.

Q1. Please Tell Us About Yourself
   Age
   Gender
   Years in practice
   Academic/Community practice
   Married/Single
   Live alone (yes/no)
   No. of Financial dependents
   Fee for service or Alternative Funding plan
   Full/Part time

Q2. Please Enter a Wait Time in months for Time to Consultation from Referral (Wait Time 1) and Time to Surgery from Decision (Wait Time 2)
   Wait time 1 as of March 1, 2020 – (Before Lockdown)
   Wait time 2 as of March 1, 2020 – (Before Lockdown)
   Wait time 1 as of May 1, 2020 – (After Lockdown in effect)
   Wait time 2 as of May 1, 2020 – (After Lockdown in effect)

Q3. Please Answer Yes/No to the following Questions
   Did you perform any elective surgery during COVID?
   Did you take call and/or perform emergency surgery during COVID?
   Did you consult with patients, either by direct contact or teleconferencing during COVID?

Q4. Please Indicate Your Agreement with the following Statements
   Did you feel safe at work?
   Were you provided with proper PPE?
   Did you feel testing in your area has been appropriate?
   Did you feel fully informed of local measures during crisis?
   How much did you agree with COVID measures put in place locally?
   Did you feel safe returning to elective practice?

Q5. Did you experience emotional distress (yes/no)?

Q6. How did COVID-19 affect you the most? (number of responses not limited)

Q7. Please Respond to the following Statements in Reference to the last 2 wk
   Better than Usual | Same as Usual | Worse than Usual | Much Worse than Usual

   Able to concentrate
   Lost much sleep
   Playing a useful part
   Capable of making decisions
   Under stress
   Could not overcome difficulties
   Enjoy Normal activities
   Can face up to problems
   Feeling unhappy and depressed
   Losing Confidence
   Thinking of self as worthless
   Feeling reasonably Happy

Q8. Please Respond to the following Statements in Reference to the last 2 wk
   Rarely or None of the Time (less than 1 d) | Some or a Little of the time (1-2 d) | Occasionally or a Moderate Amount of time (3-4 d) | Most or all of the time (5-7 d)

   I was bothered by things that usually don't bother me.
   I did not feel like eating; my appetite was poor.
   I felt that I could not shake off the blues even with help from my family or friends.
   I felt I was just as good as other people.
   I had trouble keeping my mind on what I was doing.
   I felt depressed.
   I felt that everything I did was an effort.
   I felt hopeful about the future.
   I thought my life had been a failure.
   I felt fearful.
   My sleep was restless.
   I was happy
   I talked less than usual.
   I felt lonely.
   People were unfriendly.
   I enjoyed life.
   I had crying spells.
   I felt sad.
   I felt that people dislike me.
   I could not get “going.”

Q9. Please Respond regarding Your Satisfaction to the following Statements by Ranking Scale of 1 (Least) to 10 (best)
   Your standard of living?
   Your health?
   What you are achieving in your life?

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province of Ontario were quarantined. Mental health studies after
the epidemic found that 17% of doctors had findings indicating that
they were suffering from emotional distress [2]. Another study
found that although quarantined persons exhibited a high preva-
ance of psychological distress with symptoms of posttraumatic
stress disorder (PTSD) in 29% and depression in 31% of respondents,
healthcare worker status was not correlated with PTSD and
depressive symptoms [3].

There is no understanding of the effect on the orthopedic sur-
geon of an indefinite national shutdown of elective hip and knee
arthroplasty surgery. The principal objective of this study was to
determine the prevalence of psychological morbidity experienced
by Canadian arthroplasty surgeons during the peak of the first wave
of the COVID-19 pandemic using validated mental health ques-
tionnaires. Secondary objectives included characterizing influential
variables affecting their well-being and suggesting directives for
improvement.

Methods

In May 2020, a self-administered survey of the members of the
Canadian Arthroplasty Society (CAS) was used to assess the effect
of the COVID-19 pandemic on the psychological and general well-
being of orthopedic surgeons performing hip and knee arthro-
plasty in Canada. Survey Monkey was used to distribute an
electronically based questionnaire (Table 1) to all 153 orthopedic
arthroplasty surgeon members. Data were collected from May 11 to
25, 2020. This was 6–8 weeks after the first wave of the COVID
pandemic in Canada that forced the cancellation of all elective
arthroplasty surgeries. De-identified data and central processing
were followed to protect the anonymity and confidentiality of the
respondents.

The survey consisted of questions regarding sociodemographic
characteristics; occupation and work history; estimated changes in
wait times; shifting work commitments; closed and open-ended
questions about the respondent’s concerns about COVID-19 and
the use and effects of COVID-19 precautionary measures; the
General Health Questionnaire (GHQ-12) (Table 1, Q7); the Center
for Epidemiological Studies Depression (CES-D) scale (Table 1, Q8)
and the Personal Wellbeing Index-Adult (PWI-A) (Table 1, Q9).
Open-ended questions provided respondents with the opportunity
to relate the aspects of their professional and personal lives that
were most difficult for them during the lockdown for COVID-19 and
allowed them to provide additional comments on their unique
experiences.

The General Health Questionnaire (GHQ-12) is a frequently used
and well-standardized measure of recent emotional distress [4] -
normal (<16 points), higher than normal (16–20 points), or severe
indicating psychological, emotional distress (>20 points). The Cen-
ter for Epidemiological Studies Depression Questionnaire (CES-D)
is used to assess symptoms of depression and identify at-risk in-
dividuals for clinical depression. Higher scores reflect a higher de-
gree of depressive symptoms - scores ≥16 points are highly
suggestive of risk for clinical depression [5]. The Personal Wellbeing
Index-Adult (PWI-A) measures satisfaction in 9 life domains: stan-
dard of living, health, personal achievement, personal relationships,
personal safety, community connectedness, future security,
most surgeons (58%) felt that they were poorly informed of local measures during the crisis (Fig. 2).

The COVID pandemic and the loss of elective surgery did result in signs of emotional distress and depression in some of the arthroplasty surgeons. The results of the GHQ-12 questionnaire demonstrated many surgeons were experiencing normal (62%) or slightly higher than normal (28%) levels of stress; however, 10% of the surgeons demonstrated severe distress resulting in psychological, clinical distress (Fig. 3). The CES-D questionnaire found a positive screen for 29% of surgeons at risk for clinical depression (Fig. 4). The subgroup of patients experiencing psychological, emotional distress was more likely to have a positive screen for clinical depression than those not experiencing emotional distress, 70% vs 23%, respectively (P = .01). The following were statistically significantly different between the psychologically stressed cohort and the rest of the cohort: “What you are achieving in life?” (7.8 vs 6.4, P = .02); “How safe you feel?” (7.8 vs 6.4, P = .02); and “Your future security?” (7 vs 5.5, P = .01).

The Personal Wellbeing Index scale maximum score for the total cohort of arthroplasty surgeons in this study was 79%, which is higher than the normative value range of 70-80% for adult individuals of western culture [6]. The frequency for each value (range 0-10) recorded by individual surgeons for each of the 9 domains can be seen in Figure 5. The most frequent score for the domains of the standard of living, health, life achievement, personal relationships, personal safety, community connectedness, personal perspective, and spirituality was 8 (maximum 10). The most frequent score for the domain of future security was 7 (maximum 10). For subgroup analysis of the emotionally distressed group (GHQ-12 > 16), their domain scores in personal achievement and personal safety were lower than the total cohort (6.8 and 6.8 vs 8, P = .02). For subgroup analysis of the depressed group (CES-D >16), their domain scores in personal achievement and personal safety were lower than the total cohort (6.4 and 6.4 vs 7.8, P = .02), as well as for future security (5.5 vs 7, P = .01).

Self-Reliability in Identifying Emotional Distress

By direct questioning of the arthroplasty surgeons “if they were experiencing emotional difficulties,” 36% (29 surgeons) reported that they were. Of these 29 surgeons, 27 were positively identified by their GHQ-12 and CES-D scores with mental distress. Eleven surgeons were experiencing a state of psychological, emotional distress as indicated by their GHQ-12 score report and 16 surgeons were experiencing significant symptoms of depression with risk of developing clinical depression as indicated by their CES-D score report; resulting in positive reliability in 93% of surgeons (27/29) for self-recognizing the influence of the pandemic on their psychological state. In 8 of the 51 arthroplasty surgeons that reported no, “they did not feel as if were experiencing emotional difficulties” as a result of the pandemic restrictions, 1 surgeon was experiencing psychological, emotional distress as indicated by their GHQ-12 score, and 7 surgeons were experiencing significant symptoms of depression with risk of developing clinical depression as indicated by their CES-D score. This indicates that 16% of surgeons, (8/51) had not identified the extent of distress that the pandemic might be having on their mental health. Overall, surgeon reliability in identifying emotional difficulties were reasonable in accordance with the individual score reports.

The most frequently reported concerns when CAS surgeons were asked, “How did COVID affect you the most,” were income loss (52%), emotional conflict (31%), and safety worries (22%). Univariate analyses demonstrated the highest associated variable with each

Table 2

| Demographic       | Median | Range [Min-Max] |
|-------------------|--------|-----------------|
| Yrs of Age        | 48     | 34-74           |
| Yrs in practice   | 15     | 1-40            |
| No. of dependents | 3      | 0-8             |

Gender

| Gender | Frequency | Percentage |
|--------|-----------|------------|
| Male   | 76        | 95.0       |
| Female | 4         | 5.0        |

Practice type

| Practice type | Frequency | Percentage |
|---------------|-----------|------------|
| Academic      | 49        | 61.3%      |
| Community     | 31        | 38.7%      |

Martial status

| Martial status | Frequency | Percentage |
|----------------|-----------|------------|
| Married        | 77        | 96.2%      |
| Single         | 3         | 3.8%       |

Live independently

| Live independently | Frequency | Percentage |
|--------------------|-----------|------------|
| Yes                | 2         | 2.5%       |
| No                 | 78        | 97.5%      |

Payments type

| Payments type | Frequency | Percentage |
|---------------|-----------|------------|
| FFS           | 71        | 92.2%      |
| AFP           | 6         | 7.8%       |

* 3 missing dependents.
concern category; Income loss was reported exclusively by Fee For Service surgeons (100%) and none by Alternate Funding Plan surgeons (0%). Emotional conflict was reported more by surgeons that did not feel informed of the rationale for local pandemic restrictions (64%). Risk calculations found that individuals most at risk of psychological morbidity were individuals reporting emotional conflict as a concern; for experiencing distress (48%) vs individuals who were more concerned with either income loss (31%) or safety concerns (28%). Similarly, those with emotional conflict or distress were more likely to suffer clinical depression than those with worries of income loss (17%) or those members reporting safety concerns (5%) (Fig. 6).

Discussion

The consequences of the COVID-19 pandemic on elective surgeries have been predominantly focused on the backlog of cases and the effects on healthcare systems. This study indicates that the COVID pandemic and the loss of elective surgery resulted in psychological morbidity in Canadian arthroplasty surgeons. Signs of emotional distress and depression were present in 38% and 29% of the surgeons, respectively. The psychological morbidity experienced by the arthroplasty surgeons resulted most commonly from concerns of loss of income/operating time, experiences of emotional conflict, and generalized safety worries. These findings stress the importance of developing prevention strategies and targeted interventions to improve the psychological well-being of Canadian arthroplasty surgeons in the events of large-scale procedural shutdowns.

Prior to the pandemic, a Canadian Medical Association (CMA) Survey found that the prevalence of low psychological well-being in surgeons was 17%, low emotional well-being was 13%, and depression was 29%, and 74% had a greater chance of having a lower state of well-being compared to nonsurgeons [8]. Orthopedic surgeons maintained the highest job satisfaction of all surgeons, boding well for their mental health. At the time of this survey, the reduction in patient visits due to COVID precautions in the clinics and the cancellation of elective hip and knee surgery resulted in unprecedented increases in surgeon wait times - a 65% increase for a surgical consultation and a 100% increase for surgery. As a result, the emotional distress associated with the inability of arthroplasty surgeons to provide their standard quality and time appropriate care to their patients, as well as their personal financial losses, responsibility to family dependents, and generalized COVID-related safety concerns were found to be the most influential variables on the psychological morbidity experienced by Canadian arthroplasty surgeons during the first wave of the COVID-19 pandemic. Despite that, the majority of the Canadian arthroplasty surgeons surveyed showed strong emotional resilience. Although 29% of surgeons were at risk for clinical depression in this study, this is no different than the baseline risk reported prior to the pandemic. In addition, although this study did find that 38% of the arthroplasty surgeons demonstrated higher than normal psychological distress, this is similar to the
prevalence of 38% reported in the general population of the United Kingdom in April 2020 [9].

Additionally, these surgeons displayed reliable self-identification of a negative aspect state, with 93% of surgeons correctly identifying their state of emotional distress as indicated by their GHQ-12 and/or CES-D score results.

Previous studies after the severe acute respiratory syndrome (SARS) epidemic and from the present COVID-19 pandemic have also documented the negative effect of the pandemic on the mental and emotional well-being of health care workers. SARS resulted in adverse psychological impacts in 29% of local health-care workers [2]. One could expect that the effect on arthroplasty surgeons would be magnified since the cessation of nonurgent elective surgery put a disproportionate burden on these surgeons who were severely limited in their ability to treat their operative patients and in whom surgery contributes to a greater proportion of their income than clinical work. In this study, signs of emotional distress were found in 38% of respondents, with 10% experiencing severe psychological distress. Recent studies conducted during the current pandemic reporting on the psychological consequences on physicians in European and Asian countries have demonstrated 20–40% prevalence of mild to moderate depression in physicians, with hospital-based physicians being more vulnerable than office-based physicians [10,11]. The risk-of-exposure is largely accountable for similar trends seen in physicians in highly affected areas vs lower areas [10,11]. For Canadian arthroplasty surgeons, the reduction in case volume and patient contact suggests a surrogate cause for the prevalence of depression observed in this study. The personal well-being of arthroplasty surgeons had normative values in all PWI-A domains, but those surgeons experiencing emotional distress (GHQ-12 > 16) or depression (CES-D > 16) reported significantly lower satisfaction in personal safety, future security, and personal achievement domains. This mirrors data from the SARS outbreak in Hong Kong, where those highly impacted by the virus were more concerned for their personal safety and future security [12].

Determining the variables that influence the risk of psychological morbidity as found in this study; loss of income/OR time, experiences of emotional conflict, and generalized safety worries afford opportunities that work on strategies to strengthen resilience and improve well-being of surgeons performing mainly elective procedures that are nonessential in times epidemic or pandemic crises. In regard to loss of income, interestingly, only 59% of the FFS physicians reported this as a problem. Given the short time frame after lockdown to this survey and the limited time frame for loss of

**Fig. 4.** Center for Epidemiological Studies Depression (CES-D) Score Results.

![ CES-D Score Results](image)

**Fig. 5.** Personal Wellbeing Index-Adult (PWI-A) Domain Score Results.

![ PWI-A Domain Score Results](image)
income from canceled surgeries, this could be an under-representation, and an extended pandemic with a protracted loss of income may lead to greater psychological distress in FFS compared to AFP (Salary) surgeons as each wave hits. One possible strategy is to consider AFP remuneration for all surgeons in epidemic or pandemic situations, as this would lessen the immediate burden of personal and familial financial pressures experienced. One of the major causes of emotional conflict among surgeons found in this study was a lack of confidence in the rationale for local pandemic restrictions. It appears that many surgeons surveyed did not agree or understand some of the local measures employed early on in dealing with the pandemic. To comply with measures that were not communicated well or seemed irrational led to frustration and conflict in their duty to provide patient care. Similar findings were found after the SARS epidemic among health care workers, and yet the same issues that are occurring now may indicate the generational gap from the time of SARS and what was learned from that epidemic may have been lost [13]. It is key to understand that good communication and consistent messaging from government and hospital administration to all physicians and healthcare workers would likely result in more positive attitudes. Generalized safety worries are inherent to an epidemic/pandemic situation, and as such, had equal distribution across CAS members regardless of differences in the type of practice, payment schedules, or agreement to pandemic measures for restrictions, also likely reflects the same worries faced by the population at large. Numbers-at-risk calculations for distress and depression failed to identify any specific surgeon demographic type at risk. Therefore, unless mass screening is performed to detect mental health, then institutions, governing bodies, and medical associations should ensure resources for support, counseling, education, and other means of prevention at all times and not just pandemics.

There are several limitations in this study. First, the response rate was 52% and may not represent the nonrespondents. Therefore, any attempt to generalize our results with respect to other national or cultural contexts must be approached with caution. In addition, the survey did not identify race and ethnic characteristics that can be at risk for distress and depression. Second, although retrospective measurement represents a common way to investigate past experiences and psychological states, it remains a self-reported measure that can be potentially biased and influenced by several factors. Using a validated GHQ-12 questionnaire assessed health and is a good screening tool and indicator that a formal evaluation by a psychiatrist is needed before establishing a diagnosis. Third, the study lacks a control group for the surgeons or a prepandemic assessment of the same surgeons. Prepandemic comparison with orthopedic surgeons would be more accurate than comparison to historical values for nonorthopedic surgeons in Canada or the general population. Finally, the survey is a snapshot in time and may not reflect the psychological state of the surgeons as the pandemic continues. At the time of the survey during the first wave, we were unable to identify the psychological variances in the caseload of COVID across the country to determine high risk areas and the impact they may have on perceived risk by each surgeon surveyed; it was only after reopening and subsequent waves, did geographical variation become evident. With the re-emergence of new waves and variants of COVID-19, these issues deserve proper attention to ensure the well-being of surgeons, physicians, and all health care workers going forward.

The findings of this study suggest that during the peak of the first wave of COVID-19 pandemic restrictions on elective hip and knee surgeries, Canadian arthroplasty surgeons demonstrated emotional resilience and insight. Progressive communication and remuneration action plans in epidemic or pandemic situations could improve the mental well-being of at-risk individuals and should be addressed appropriately. The extent of subsequent waves leading to protracted loss of service and income with mounting patient demand for services may indeed see an escalation of the problems highlighted in this study.

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