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## ■ GENERAL ORTHOPAEDICS

# Restarting elective orthopaedic services during the COVID-19 pandemic

DO PATIENTS WANT TO HAVE SURGERY?

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## Aims

As the peak of the COVID-19 pandemic passes, the challenge shifts to safe resumption of routine medical services, including elective orthopaedic surgery. Protocols including pre-operative self-isolation, COVID-19 testing, and surgery at a non-COVID-19 site have been developed to minimize risk of transmission. Despite this, it is likely that many patients will want to delay surgery for fear of contracting COVID-19. The aim of this study is to identify the number of patients who still want to proceed with planned elective orthopaedic surgery in this current environment.

## Methods

This is a prospective, single surgeon study of 102 patients who were on the waiting list for an elective hip or knee procedure during the COVID-19 pandemic. Baseline characteristics including age, ASA grade, COVID-19 risk, procedure type, surgical priority, and admission type were recorded. The primary outcome was patient consent to continue with planned surgical care after resumption of elective orthopaedic services. Subgroup analysis was also performed to determine if any specific patient factors influenced the decision to proceed with surgery.

## Results

Overall, 58 patients (56.8%) wanted to continue with planned surgical care at the earliest possibility. Patients classified as ASA I and ASA II were more likely to agree to surgery (60.5% and 60.0%, respectively) compared to ASA III and ASA IV patients (44.4% and 0.0%, respectively) ( $p = 0.01$ ). In addition, patients undergoing soft tissue knee surgery were more likely to consent to surgery (90.0%) compared to patients undergoing primary hip arthroplasty (68.6%), primary knee arthroplasty (48.7%), revision hip or knee arthroplasty (0.0%), or hip and knee injections (43.8%) ( $p = 0.03$ ).

## Conclusion

Restarting elective orthopaedic services during the COVID-19 pandemic remains a significant challenge. Given the uncertain environment, it is unsurprising that only 56% of patients were prepared to continue with their planned surgical care upon resumption of elective services.

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## Introduction

Coronavirus disease 2019 (COVID-19) was first described in Wuhan, the capital city of the central Chinese province of Hubei.<sup>1</sup> Patients primarily develop a fever and pulmonary symptoms, which can quickly progress to an acute respiratory distress syndrome (ARDS) requiring intubation, ventilation,

and intensive therapy unit (ITU) admission. COVID-19 is a highly contagious disease with approximately 30% to 60% of those infected showing mild to no symptoms.<sup>2</sup> It was declared a pandemic by the World Health Organization (WHO) on 11 March 2020, who called all governments to take urgent aggressive action.<sup>3</sup> The initial challenge of

governments and healthcare systems was to manage the peak of the epidemic and limit lives lost. Due to COVID-19's unprecedented effect early on, numerous healthcare infrastructures reported a shortage of frontline workers, beds, ventilators and personal protective equipment.<sup>4</sup> As healthcare systems became overwhelmed, elective surgery was withheld in order to divert valuable and limited resources to fighting this pandemic. Surgical staff were redeployed to medical and intensive care unit (ICU) teams,<sup>5</sup> anaesthetists were reassigned as intensivists, and operating theatres were converted to intensive care beds.<sup>6</sup>

As the peak of the pandemic passes and government lockdowns begin to lift, the challenge shifts to safe resumption of routine medical services, including elective orthopaedic surgery. It is estimated that 516,000 elective operations will be cancelled in the UK during the initial wave of the pandemic.<sup>7</sup> Many orthopaedic patients have endured significant deteriorations in quality of life and pain as a result of cancelled or delayed operations. While progress is being made, there is no effective treatment or vaccination currently available for COVID-19.

As elective operating services resume, patients' coronavirus risk status must be balanced with the urgency of the procedure. The National Health Service (NHS) has published guidelines identifying two levels of higher risk: high risk (clinically extremely vulnerable) and moderate risk (clinically vulnerable).<sup>8</sup> Patients who are severely immunocompromised and those with organ transplants are deemed high risk. Patients aged > 70 years or those with comorbidities such as diabetes and heart disease are considered moderate risk. The British Orthopaedic Association (BOA) and NHS England have recently set out guidelines in order to minimize the risk of COVID-19 transmission in elective patients.<sup>9,10</sup> These provisions include a period of self-isolation prior to surgery, preoperative testing, and surgery at a "clean" non-COVID-19 site.

However, many patients awaiting elective surgery are likely apprehensive about having their procedures for fear of contracting COVID-19. Currently it is unknown how many patients would prefer to postpone their operations until after the pandemic has completely passed.

The purpose of this study was to identify the number of patients who still want to proceed with their planned elective surgery in this current environment. Our hypothesis is that a significant number of patients will want to delay surgical intervention. In addition, we believe that younger patients, patients with low COVID-19 risk, and those undergoing day surgery will more likely want to proceed with surgery imminently.

## Methods

**Study design.** This is a prospective study of 102 patients who were on the waiting list of a single surgeon for an

elective orthopaedic procedure during the COVID-19 pandemic. The senior author is a high-volume lower limb arthroplasty and sports surgeon. All patients on the surgical waiting list who had previously been given a date for surgery were included. Patients requiring emergency procedures and trauma operations were excluded. Patients who were due to have their procedures performed privately during the pandemic were excluded. Ethics approval was not required as it was considered a necessary review of the waiting list. Patient management was not influenced by the results of the study. The census was undertaken starting 15 May 2020.

**Outcomes.** The primary outcome was patient consent to continue with planned surgical care after resumption of elective orthopaedic services. All patients were telephoned by a senior post CCT clinical fellow. Patients were informed of the standardized patient protocol for restarting elective surgery. This included 1) self-isolation for 14 days prior to the procedure date; 2) pre-operative COVID-19 screening; 3) a pre-operative COVID-19 test 48 to 72 hours prior to surgery at a "drive-through" testing site; 4) social distancing prior to treatment in hospital; and 5) surgery performed at a COVID-19-free hospital or COVID-19-free area. This protocol follows the guidelines set out by the BOA and NHS London.<sup>9,10</sup> All patients were informed that these measures were put in place to minimize risk of COVID-19 transmission but did not completely eliminate the risk. Patients were asked if they preferred to 1) continue with planned surgical care after restart of elective orthopaedic services; or 2) to defer surgical intervention after the COVID-19 pandemic had passed. Patients were aware that no accurate timeline could be given to predict when standard pre-COVID-19 pathways would begin.

Baseline characteristics including age, sex, American Society of Anaesthesiologists (ASA) grade, COVID-19 risk, planned procedure, clinical urgency and admission type were recorded. COVID-19 risk was classified as low, moderate and high as described by the NHS (Table I). Clinically urgent patients included 1) operations that if delayed would lead to worse outcomes (e.g. locked knee, bucket handle meniscal tears and prosthetic joint infections); and 2) severe progressive symptoms significantly affecting quality of life. Admission type was divided into day surgery and inpatient procedures. Subgroup analysis was also performed to determine if any specific patient factors influenced the decision to proceed with surgery.

**Statistical analysis.** Independent *t*-tests were used to compare study outcomes found to be normally distributed, while the Mann-Whitney U test was used for continuous outcomes found not to be normally distributed. Categorical outcomes were compared using the Chi-square and Fisher's exact test. Statistical significance was set at a *p*-value < 0.05 for all analyses and all statistical

**Table I.** People at moderate and high risk from coronavirus as defined by the NHS.<sup>8</sup>

Moderate risk	High risk
<ul style="list-style-type: none"> <li>▶ Age ≥ 70 years</li> <li>▶ Are pregnant</li> <li>▶ Have a non-severe lung condition such as asthma, SE, emphysema, or bronchitis</li> <li>▶ Have heart disease (such as heart failure)</li> <li>▶ Have diabetes</li> <li>▶ Have chronic kidney disease</li> <li>▶ Have liver disease such as hepatitis</li> <li>▶ Have a neurological condition such as Parkinson's disease, motor neuron disease, multiple sclerosis, or cerebral palsy</li> <li>▶ Immunocompromised patients</li> <li>▶ Patients on low-dose immunosuppressant medication</li> <li>▶ BMI &gt; 40</li> </ul>	<ul style="list-style-type: none"> <li>▶ Have had an organ transplant</li> <li>▶ Are having chemotherapy or antibody treatment for cancer, including immunotherapy</li> <li>▶ Are having an intense course of radiotherapy for lung cancer</li> <li>▶ Are having targeted cancer treatments that can affect the immune system</li> <li>▶ Have blood or bone marrow cancer</li> <li>▶ Have had a bone marrow or stem cell transplant in the past six months, or are still taking immunosuppressant medicine</li> <li>▶ Have severe lung disease such as cystic fibrosis, severe asthma, or SE</li> <li>▶ Severely immunocompromised patients such as those with severe combined immunodeficiency or sickle cell disease</li> <li>▶ Patients on high dose immunosuppressant medication</li> <li>▶ Pregnant with a serious heart condition</li> </ul>

BMI, body mass index

**Table II.** Baseline characteristics and study outcomes for all patients.

	Patients agreed to surgery, n (%)	p-value
<b>Overall (n = 102)</b>	58 (56.8)	
<b>Age, yrs</b>		
< 60 (n = 37)	23 (62.2)	
60 to 70 (n = 24)	12 (50)	
> 70 (n = 41)	24 (55.8)	0.64
<b>ASA</b>		
ASA 1 (n = 38)	23 (60.5)	
ASA 2 (n = 45)	27 (60)	
ASA 3 (n = 18)	8 (44.4)	
ASA 4 (n = 1)	0 (0)	0.01
<b>COVID-19 risk</b>		
Low (n = 42)	24 (57.1)	
Moderate (n = 49)	30 (61.2)	
High (n = 11)	4 (36.4)	0.36
<b>Type of procedure</b>		
Primary hip arthroplasty (n = 35)	24 (68.6)	
Primary knee arthroplasty (n = 39)	19 (48.7)	
Revision hip or knee arthroplasty (n = 2)	0 (0.0)	
Soft tissue knee surgery (n = 10)	9 (90)	
Hip or knee injection (n = 16)	7 (43.8)	0.03
<b>Surgical priority</b>		
Urgent (n = 57)	35 (61)	
Routine (n = 45)	23 (51.1)	0.30
<b>Admission type</b>		
Day surgery (n = 27)	15 (55.5)	
Inpatient (n = 75)	43 (57.3)	0.87

Summary statistics represent mean ± SD deviation or number (percentage).

ASA, American Society of Anaesthesiologists.

analyses were performed using SPSS software version 26 (SPSS, Chicago, Illinois, USA).

**Results**

This study included 102 patients with 66 females (64.7%) and 36 males (35.3%). The age was < 60 years in 37 patients (36.2%), between 60 to 70 years in 24 patients (19.4%), and > 70 years in 41 patients (40.2%) (Table II).

ASA was classified as grade I in 38 patients (37.2%), grade II in 45 patients (44.1%), grade III in 18 patients (17.6%), and grade IV in one patient (0.9%). COVID-19 risk was low in 42 patients (41.1%), moderate in 49 patients (48%), and high in 11 patients (10.7%). In all, 57 patients (55.9%) were classified as clinically urgent and 75 patients (73.5%) were scheduled for inpatient surgery. Procedures waitlisted included primary hip arthroplasty (n = 35), primary knee arthroplasty (n = 39), revision hip or knee arthroplasty (n = 2), soft tissue knee surgery (n = 10), and hip or knee injection (n = 16).

Overall, 58 patients (56.8%) agreed to continue with planned surgical care (Table I). Patients classified as ASA I and ASA II were more likely to agree to surgery (60.5% and 60.0%, respectively) compared to ASA III and ASA IV patients (44.4% and 0.0%, respectively) (p = 0.01). In addition, patients undergoing soft tissue knee surgery were more likely to consent to surgery (90.0%) compared to patients undergoing primary hip arthroplasty (68.6%), primary knee arthroplasty (48.7%), revision hip or knee arthroplasty (0.0%), or hip and knee injections (43.8%) (p = 0.03). Agreement to continue with planned surgical care was not affected by age (< 60 years: 62.2%, 60 to 70 years: 50%, and > 70 years: 55.8%, p = 0.64), COVID-19 risk (low: 57.1%, moderate: 61.2%, and high: 36.4%, p = 0.36), surgical priority (urgent: 61% vs routine: 51.1%, p = 0.3), or admission type (day surgery: 55.5% vs. inpatient: 57.3%, p = 0.87).

**Discussion**

Our study demonstrates that 56.8% of patients prefer to continue with planned surgical care upon resumption of elective orthopaedic services. Patients who were ASA I or II, and those undergoing soft tissue knee surgery were more likely to wish to proceed with surgery. This is unsurprising as these patients tend to be younger, more active and have a low risk of COVID-19 related complications. While the results were not statistically significant, there was also higher proportion of patients who were

classified as low or moderate COVID-19 risk who wanted to proceed with surgery compared to high risk patients. Interestingly, clinical urgency did not factor into patient decision making. This is likely due to a large number of patients awaiting urgent arthroplasty who are at higher risk of COVID-19. Age, surgical priority, and admission type were not found to be significant factors affecting patient decision.

It is natural that both surgeons and patients are apprehensive about restarting elective operating services. An early pandemic study from Wuhan looking at outcomes of elective surgery in patients with confirmed COVID-19 reported that 44.1% of patients needed postoperative ICU admission and a general mortality rate of 20.5%.<sup>11</sup> While the results are clearly concerning, this retrospective cohort study collected data from amid the peak of the Wuhan pandemic. There is optimism that current risk is much lower as the peak of the pandemic passes. Nevertheless, this highlights the significant risk of performing elective surgery, and patients must be adequately informed and formally consented for COVID-19 risk.

Despite these risks, a significant number of patients are desperate for early surgery. Elective orthopaedic procedures are generally considered life-enhancing procedures.<sup>12,13</sup> It is well documented that joint arthroplasty is one of the most successful quality of life-improving procedures accessible to patients.<sup>14-16</sup> Significant delay of surgery can lead to deterioration of physical and mental health. A Scottish study reported that 19% of patients waiting for a total hip arthroplasty (THA) and 12% of those waiting for a total knee arthroplasty (TKA) are in a state of being 'worse than death' (WTD) based on the EuroQol five-dimension (EQ-5D) questionnaire, where pain is a key determinant.<sup>17</sup> The authors also suggested that increasing waiting times prior to surgery may increase the proportion of patients who are WTD. While minimizing COVID-19 risk is clearly essential, this highlights the importance of restarting elective orthopaedic services to serve our patient population. This is likely a major determinant in patients wanting to proceed with surgery in this current environment.

There are many other factors that influence patient decision to proceed with surgery apart from COVID-19 risk. Significant commitment is required in order to undergo their procedure. The BOA have recommended that patients self-isolate for the 14 days prior to their date of surgery. While the definition of self-isolation is unclear, the BOA recommends that the entire household self-isolates prior to surgery<sup>9</sup>. This has a massive social impact and may not be feasible for all patients and their respective families. Patients (and families) with the ability to work from home are more likely to be able to accommodate these regulations. Patients are also required to attend pre-assessment clinic; however, in certain situations it may be appropriate to conduct this over the telephone.<sup>9</sup>

Testing (RT-PCR) for COVID-19 is also required in the 48 to 72 hours prior to the date of surgery.<sup>9</sup> Access to ancillary care, such as physiotherapy, will also be limited in the postoperative period compared to pre-COVID times. Despite this, a large number of patients (56%) on our lower limb waiting list were still eager to proceed with their respective operations. This is likely attributed to their individual perception that their urgency outweighs the additional risk that is brought about by COVID-19.

There are some limitations to our study. Our hospital is a tertiary centre located in central London, which is considered an epicentre of COVID-19. It is possible that the increased prevalence of COVID-19 increases patient reluctance in having their operations in the near future. Patients who live in geographical areas with low transmission rates of COVID-19 rates may be more likely to want to proceed with early surgery. In addition, this study was performed on a single lower-extremity arthroplasty surgeon's waiting list. It is possible that ambulatory patients, such as those undergoing upper limb procedures, would have higher consent rates. It is also likely that the attitudes of patients will change as more is learned about the virus and as the transmission rate decreases. However, this study provides valuable information that surgeons can use to plan their operating lists and expected waiting lists.

## Conclusion

Restarting elective orthopaedic services during the COVID-19 pandemic remains a major challenge. Although protocols have been developed to minimize the risk of COVID-19 transmission, the risk cannot be completely eliminated. It is imperative for surgeons to highlight the additional risk of contracting COVID-19 and formally document this in the consenting process. Despite this, 56% of patients were prepared to continue with their planned surgical care at the earliest possibility. As routine services resume, surgeons need to maintain vigilance in order to minimize transmission of the virus while continuing to provide appropriate orthopaedic care.

## Twitter

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**Author contributions:**

- J. S. Chang: Prepared the manuscript, Collected and interpreted the data.
- W. Wignadasan: Collected the data, Prepared the manuscript.
- C. Kontoghiorghe: Prepared the manuscript.
- B. Kayani: Prepared the manuscript, Interpreted the data.
- S. Singh: Collected the data, Prepared the manuscript.
- R. Plastow: Collected the data, Prepared the manuscript.
- A. Magan: Collected the data, Prepared the manuscript.
- F. S. Haddad: Hypothesis generation, Prepared the manuscript.

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**Ethical review statement:**

- Ethics committee approval was not required as this study was considered a necessary review of service.

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