



EVALUATION OF THE SHORT-TERM IMPACT OF COVID-19 IN A LARGE DISTRICT GENERAL HOSPITAL.

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ABSTRACT **Intro:** Since December 2019, SARS-CoV-2 has had a dramatic impact on the global landscape. One of the biggest challenges has been the additional strain that the virus has put on healthcare systems. Although there has been much data on the direct affects of COVID-19 on intensive care beds and ventilator availability, there has been little exploration into the wider impacts that the restrictions brought about by COVID-19 have had on the provision of other healthcare services. **Aim:** We designed this study to explore how COVID-19 has impacted surgical service provision at a tertiary centre. **Methods:** We compared the number and types of general surgeries carried out at a single hospital in the six months prior to the initial UK COVID-19 outbreak (September 2019 - February 2020) and the six months after (March 2020 - August 2020). **Results:** We found that since March 2020 there has been a 70% decrease in the number of operations being carried out, with numbers dropping from a pre-COVID surgery number of 1761 to a post-COVID number of 529. This mainly affected elective procedures however, with emergency surgeries remaining relatively constant (48 pre-COVID vs 44 post-COVID). **Conclusion:** COVID-19 has caused a significant decrease in the number of surgeries being undertaken. This is due to a combination of factors including staffing issues, reduced investigation, and national mandates requesting the cessation of non-urgent procedures. Although this has mainly affected elective operations, it is likely to have a larger impact in the future as surgical waiting lists continue to grow.

KEYWORDS : COVID-19, procedures, investigations, general surgery, morbidity

INTRODUCTION

In December 2019 a group of patients developed a pneumonia of unknown origin traced back to Wuhan, China. Sequencing of samples taken from these patients identified a novel coronavirus named Coronavirus Disease 2019 (COVID-19)¹. Cases of COVID-19 continued to rise over the next few months with increasing cases being reported worldwide. This led to the World Health Organisation declaring COVID-19 a pandemic on the 11th March 2020². Following this, on the 23rd of March 2020, the UK government, in response to rising number of cases across the nation, brought in national restrictions in an attempt to slow viral transmission³. At this time, the UK National Health Service (NHS) had already declared COVID-19 a level four national incident allowing NHS England to take over command and control of hospital resources⁴. This has had widespread impact on the provision of numerous services in hospitals across the country.

In order to manage the growing number of COVID-19 cases, the NHS had to reconfigure hospitals and redirect resources towards the treatment and management of patients with COVID-19. Surgical services were hit hard by this with a letter addressed to the chief executives of all NHS trusts requesting the postponement of all non-urgent elective operations for at least three-months⁵ (NHS England 2020). Some hospitals were also encouraged to repurpose beds, operating theatres, and recovery facilities to provide respiratory support for COVID-19 patients. Guidance released by the Royal College of Surgeons of England also suggested that surgeons and other theatre staff may be required to fulfil alternative roles during the worst of the pandemic⁶.

Although there are numerous documents describing the measures put in place by hospitals and the wider NHS to tackle COVID-19, as discussed by Al-Jabir, et al., there is limited evidence on exactly how COVID-19 has impacted surgical service provision⁷. This study was therefore designed to assess the impact of COVID-19 on surgical services at James Cook University Hospital (JCUH), a large district general hospital in the North-East of England.

METHODS

We collected data on the number and type of general surgeries carried out at JCUH in the six months prior to the UK COVID-19 outbreak (September 2019 - February 2020) and the six months after (March 2020 - August 2020). This data was then sorted into planned elective

procedures and unplanned procedures, where unplanned procedures were defined as expedited, urgent, or emergency surgeries. This data set was then analysed in Microsoft Excel to determine the impact of COVID-19 on service provision in the six months following the national COVID-19 restrictions. IBM SPSS Statistics, Version 26.0, was used to carry out an independent, two-tailed T-test to determine whether there was a statistically significant difference in the absolute number of surgeries carried out in the six month pre-COVID versus the six months post-COVID.

RESULTS

In the six months prior to COVID-19, JCUH carried out a total of 1761 general surgical procedures. Of these, 73% were planned elective procedures with unplanned procedures making up the remaining 27% (Figure 1). In the six months following the COVID-19 outbreak, only 529 general surgeries were undertaken representing a 70% decrease in to the hospital's usual surgical capacity. This data demonstrates a statistically significant decrease in the number of surgeries carried out per month in the post-COVID era ($M=88.17$, $SD=76.95$) compared to the pre-COVID era ($M=293.5$, $SD=21.57$), $t(5) = 6.29368$, $p < .001$ (Table 1). The 529 general surgeries which did go ahead in the six months following COVID-19 were made up of a 50:50 split between planned and unplanned procedures (Figure 1). Although unplanned procedures as a whole also went down from 481 surgeries pre-COVID to 263 post-COVID, the absolute amount of emergency procedures remained constant with 48 emergency surgeries being carried out pre-COVID versus 44 post-COVID (Figure 2).

Pre-COVID Surgeries (Sep19 - Feb20) Post-COVID Surgeries (Mar20 - Aug20)

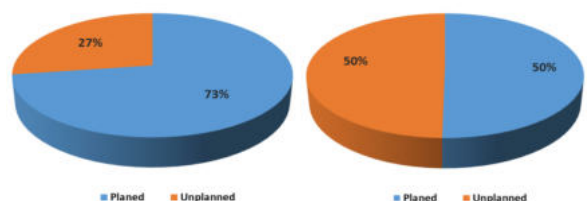
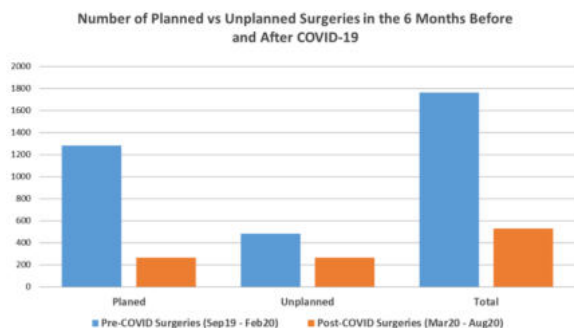


Figure 1: The proportion of planned versus unplanned procedures carried out in the pre and post-COVID-19 eras where planned procedures were elective surgeries and unplanned procedures were defined as the combined number of urgent, expedited, and emergency surgeries.

Table 1: Statistical analysis of the number of surgeries carried out in the six months before and after the COVID-19 outbreak.

	n	Mean	SD	P Value
Pre-COVID Surgeries	6	239.50	21.57	<.001
Post-COVID Surgeries	6	88.17	76.95	

n, Number of months. The P value was determined by an independent, two-tailed t-test to compare the number of surgeries carried per month in the six months before and after the UK COVID-19 outbreak.

**Figure 2: The absolute number of planned and unplanned surgeries carried out in the six months before and after the COVID-19 pandemic.**

DISCUSSION

The COVID-19 pandemic has clearly had a large impact on the provision of surgical services at JCUH. Since the pandemic, the hospital has operated at less than a third of its usual surgical capacity. The reasons for this decrease however are obviously multifactorial. Overall, elective procedures dropped the most, with their numbers decreasing by 80% in the six months after March 2020. This was in keeping with the initial NHS mandate requesting the cessation of all non-urgent operations within the first three months of the first UK COVID-19 peak. This was exacerbated by staff shortages on account of both self-isolation and staff being off sick with COVID-19. In some cases, staff were also repurposed to work in other areas. Anaesthetics teams in particular were redirected to departments such as intensive care and respiratory support meaning that a number of surgeries could not go ahead despite adequate facilities and surgeon availability. As well as these staff shortages, some procedures were actually cancelled directly by patients due to their reluctance to expose themselves to the hospital environment in the mist of the COVID-19 pandemic. The combination of these factors shows how COVID-19 restrictions and the associated changes directly impacted surgical service provision at JCUH.

Another factor to consider is the decrease in investigations and surveillance due to increased infection control measures during this period. The British Society for Gastroenterology published advice in March 2020 to postpone all non-urgent endoscopic activity⁸. Additional guidance set out in this document also included the cessation or postponement of bowel cancer screening and surveillance. A recent study by Rutter, et al. demonstrated the large impact that this has had on endoscopy services across the nation⁹. The number of endoscopies performed nationally has dropped by 88% compared to those carried out in the pre-COVID time period. Rutter's article argued that this has had a direct impact on cancer detection rates. Before COVID-19, the average number of cancers detected per week in the UK was 677. During the COVID era, this has dropped by 58% to only 283. This means we are currently missing up to 394 cancer diagnoses per week. Although the average of this decrease in detection was 58%, the actual proportion of these 'missing diagnoses' was shown to vary by tumour type from only 12% in pancreaticobiliary cancers up to as high as 72% for colorectal cancers. This decrease in detection has not only led to an immediate decrease in surgical work but will also likely contribute to a subsequent increase in complications later down the line.

Of the 529 surgeries which were carried out between March and August 2020 at JCUH, fifty percent of these were unplanned procedures requiring urgent or emergency intervention. Although the absolute number of emergency surgeries in this time period has not risen, it's worth noting that the six month post-COVID-19 window used in this study is a relatively short time frame for the development of certain emergency presentations. It is also fair to assume that the elective surgeries carried out in the six months before the pandemic have likely played a role in mitigating a surge in emergencies in the six

months after. It would certainly be interesting however to see whether reassessing this data in an additional six to twelve months' time would show an increase in the proportion of unplanned and emergency procedures that has not been captured in this initial data set.

We must also bear in mind that the effects of the COVID-19 pandemic are likely to continue well into 2021 and with the second peak of the virus resulting in an even higher daily death rate than that seen in the first peak, the worst affected hospitals have already begun to shut down their elective surgical lists for a second time¹⁰. This, coupled with the 70% decrease in surgeries carried at JCUH over the last six months, means that the surgical waiting list will only continue to grow leading to inevitable delays in the treatment of certain surgical conditions. When we factor in the shocking decrease in cancer detection rates reported by Rutter, et al. it is very possible that our figures are actually an underestimation of the impact COVID-19 has had, and that more complications can be expected to arise from these delayed surgeries.

With that in mind, although not directly assessed in this audit, it is well documented that urgent and emergency surgeries generally require a longer recovery time, a prolonged hospital stay, and have a greater rate of morbidity and mortality compared to standard elective procedures^{11,12}. Any increase in the proportion of unplanned operations could therefore impact service provision both in terms of cost and complication but also overall patient wellbeing.

CONCLUSION

The COVID-19 pandemic has caused a marked decrease in the number of surgeries being carried out at JCUH. This is due to a combination of factors including staffing issues, reduced investigation, patient reluctance, and national mandates requesting the cessation of non-urgent procedures. Although this has mainly affected elective operations in the first instance, it is likely to have a larger impact in the future as cancer detection rates have gone down and the surgical waiting lists only continue to grow. If we reassess the data in another six to twelve months' time, it is very possible that these delays will lead to an increase in urgent and emergency surgeries and cause more complications than was captured in this initial audit.

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