

## Original Research Article

# Impact of COVID-19 on surgical services in a District General Hospital in the United Kingdom: benefits versus drawbacks

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## ABSTRACT

**Background:** COVID-19 outbreak led to significant changes in health services worldwide. This study aimed to assess the impact of this outbreak on the surgical services in a small District General Hospital and to highlight any benefits that we can take forward.

**Methods:** Data were collected retrospectively comparing the surgical service activity during the two months (April and May 2020) around the peak of COVID-19 first wave in the UK and the similar two-month period the year before when activity was at its usual pre-COVID level. A short questionnaire on the use and satisfaction of remote consultation was circulated to all hospital consultants.

**Results:** The total number of patients presenting to the emergency department in all specialities almost halved during the COVID-19 crisis. The number of emergency surgical admissions decreased. All elective lists were cancelled and more patients were managed conservatively. In April and May 2020, 156 patients had outpatient surgical consultations. Only 14 of them were face-to-face, whereas the rest were done either by telephone or video calls. This is compared to 472 patients who had face-to-face consultations in April and May 2019. The results of the questionnaire showed that over 90% of the consultants felt telemedicine consultations were satisfactory and that they would have an important role in the future.

**Conclusions:** COVID-19 had serious impacts on surgical services regarding cancellation of elective lists and prolongation of waiting time. Despite these drawbacks, the increased confidence with telemedicine services was a significant benefit.

**Keywords:** COVID-19, Laparoscopic surgery, Open appendicectomy, CT chest, Telemedicine consultation

## INTRODUCTION

The outbreak of coronavirus disease started on 31 December 2019 in China and was then called COVID-19 on 11 February 2020 by the World Health Organization (WHO).<sup>1</sup> This novel viral disease has rapidly spread to most countries of the world and was declared as a pandemic disease by the WHO on 11 March 2020.<sup>2</sup>

On 23 March, the UK government imposed a nationwide lockdown to limit the spread of the disease and social

distancing measures were also implemented.<sup>3</sup> This pandemic situation mandated the National Health Service (NHS) take unprecedented measures for rapid redirection of services to manage the crisis. To reduce the risk of infection, create more bed capacity and release healthcare staff, all routine face-to-face consultations and elective surgical lists were cancelled.<sup>4</sup>

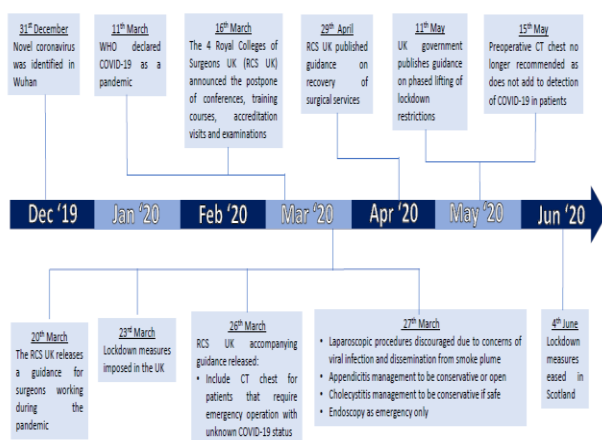
National COVID-19-specific guidelines were launched through various agencies with day-by-day updates to set protocols to deal with this novel disease.<sup>5</sup> Within regions,

hospital networks were developed to separate COVID-19 (red) from non-COVID-19 (green) cases.<sup>6</sup> Our hospital was classified as a green site i.e., it received all cases but those who were confirmed to have COVID-19 were sent to a different hospital in the region for continued management.

In common with healthcare facilities nationwide, the internal hospital structure was re-organized to contain the viral risk. Wards and clinical teams were reassigned and divided into red zones (potentially infected) and green zones (clean areas). Hospital visiting was stopped. The use of PPE (personal protective equipment) and hand sanitizers were adopted, and social distancing was encouraged. Changes to the management of surgical emergencies included the routine use of CT chest scanning for any emergency scan,<sup>7</sup> COVID testing before the theatre where possible and the increased use of conservative measures for conditions such as appendicitis<sup>8</sup> to decrease virus exposure and spread. Laparoscopic surgery, an aerosol-generating procedure, was discouraged for this reason also.<sup>9</sup> All elective cases were cancelled and cancer patients were diverted to the regional centre.

Within the operating theatre, extended protocols, particularly around intubation and extubation of patients to minimize the risk of spread of the virus, along with the use of PPE were implemented.

The need to assess patients with urgent and semi-urgent conditions led to the rapid roll-out and use of virtual consultation technology (video consultation). While this had been available previously, it had not been widely adopted until this time. This was used in conjunction with telephone consultations to triage patients and initiate treatment where possible. Also, morbidity and mortality, audit and quality improvement meetings were conducted using online platforms instead of face-to-face meetings. Figure 1 summarizes the COVID-19 timeline for surgical services during the first wave in the UK.



**Figure 1: COVID-19 timeline for surgical services during the first wave in the UK.**

This study aimed to assess the impact of the COVID-19 outbreak on various aspects of the surgical service in this small District General Hospital and the effect on patient care, to highlight any benefits that we can take forward after the outbreak is over and to focus on the lessons learnt during this crisis.

## METHODS

This retrospective observational study was conducted in a District General Hospital in the UK during the first wave of the COVID-19 outbreak.

Routinely collected audit data for the surgical service was examined for the months of April and May 2020 (peak of COVID-19 in the UK) and for a similar two-month period in 2019 (when activity was at its usual pre-COVID level). The study only examined the available data and did not examine individual patient information. Under the terms of the NHS health research authority, this study comprises either service evaluation or audit and does not require specific ethical review.

The study included all emergency and elective surgical admissions during the selected study periods. No patients were excluded from the study.

Available data included: number of surgical admissions, number of operations performed, length of hospital stay (LOS), number of GP referrals to surgery, number of major trauma cases presented to the Accident and Emergency Department (A and E), number of surgical endoscopies, number of High Dependency Unit (HDU) admissions, number of patients managed conservatively for common acute surgical conditions (appendicitis, diverticulitis and cholecystitis), number of COVID swabs done, number of positive COVID patients detected, number of CT chest, abdomen and pelvis (CT CAP) done to diagnose COVID, and number of patients reviewed in the clinic either face-to-face, through phone clinics or video consultations.

Data were compared between the given periods. Numbers and causes of deaths were recorded.

A short questionnaire (appendix 1) on the use and satisfaction of the telemedicine consultation was circulated to all hospital consultants (other specialties included).

All data were recorded on an excel sheet using Microsoft Excel 2016®.

## RESULTS

The total number of patients presented to the A and E in all specialities was 4513 in April and May 2019 compared to 2529 in the same two months in 2020, whereas the total number of emergency surgical admissions in April and May 2019 was 290 including 34

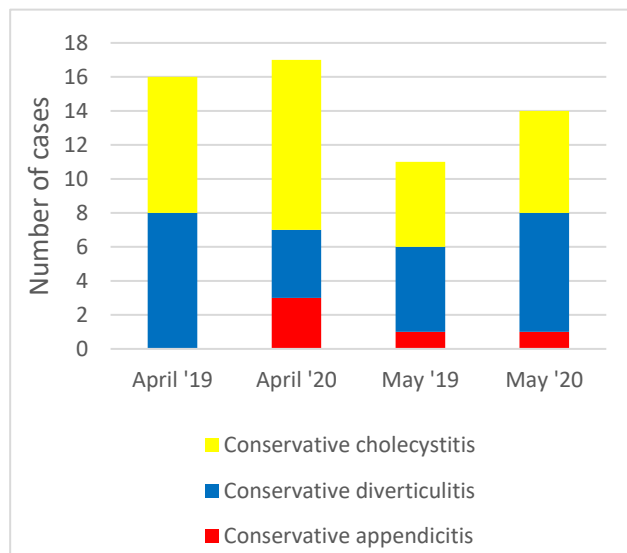
trauma admissions compared to 211 surgical admissions in 2020 including 16 trauma patients. Table 1 summarizes the demographic data.

The total number of emergency surgical GP referrals in 2019 was 84 compared to 76 patients in 2020.

66 surgical inpatients were swabbed (131 swabs) for COVID-19. Only one patient tested positive and was then immediately sent to the local COVID unit.

During the study period, 30 patients had CT CAP, three for cancer staging, and 27 to screen for COVID disease (that was not detected in any scan). This compared to 14 patients having CT CAP for all surgical reasons in 2019.

More patients with appendicitis were treated by conservative measures (antibiotics) during the study period than previously, whereas similar numbers of cases of diverticulitis and cholecystitis presented and were managed conservatively in both periods (Figure 2).



**Figure 2: Conservative management of appendicitis, diverticulitis and cholecystitis in 2019 and 2020.**

In 2020 during the two-month study period, 36 emergency surgical procedures were carried out; in 2019 the figure was 43. The types of procedures are shown in Figure 3. The emergency surgical endoscopic activity was similar in both years (45 versus 48; 2019 versus 2020). In 2019, there were 430 elective endoscopies and 63 elective surgical cases during March and April. This gives some indication of the lost activity during the cessation of elective surgery and endoscopy in 2020.

Overall, the number of surgical deaths for these two months was 4 (1.3%) in 2019 compared to 8 (3.8%) in 2020. Causes of death are summarized in Table 2.

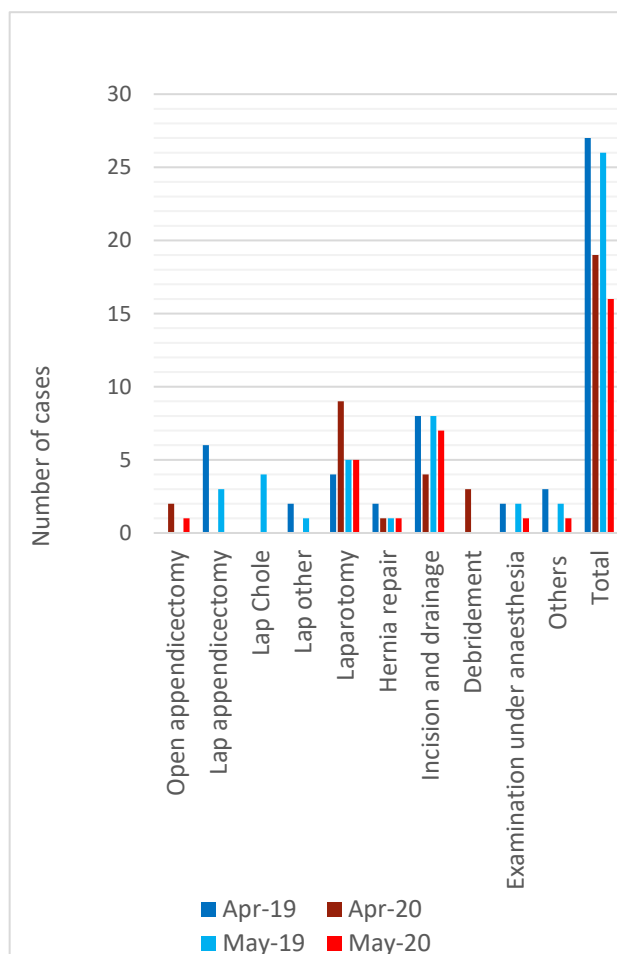
The number of surgical patients who required admission to the HDU in 2019 and 2020 was 24 in both years.

Over the two months around the peak of the COVID-19 crisis (April and May 2020), 156 patients had outpatient consultations. Of these, 123 were by phone, 19 by video consultation (Near-Me Programme) and 14 were face-to-face consultations. This is compared to 472 patients who had face-to-face consultations in April and May 2019. There were no telephone or video consultations during this period. The time slots allocated for all forms of consultations were the same.

A questionnaire to assess the consultants' response to these innovative ways of working produced 29 responses over various specialities. 82.7% of consultants used either telephone or video consultation or both. Only 8.3% felt dissatisfied with these consultations. Over 90% of consultants felt consultations were satisfactory using these remote ways of working.

Half of the consultants (52%) felt that telephone and video consultation would have an important role in the future for outpatient consultations.

None of the patients who underwent phone or videos consultations had a complaint about it, although technical issues occurred in 18 consultations (12.7%).



**Figure 3: Emergency surgical procedures in 2019 and 2020.**

**Table 1: Demographic and admission data for patients admitted from 01 April to 31 May 2019 and 01 April to 31 May 2020.**

Data	April 2019	May 2019	Total 2019	April 2020	May 2020	Total 2020
Number of surgical admissions	156	134	290	95	116	211
Mean age of admitted surgical patients in years (range)	59 (12-94)	57 (10-92)	58 (10-94)	58 (11-98)	58 (18-96)	58 (11-98)
Number of males:females	79: 77	69: 65	148: 142	47: 48	57: 59	104: 107
Mean LOS for surgical patients in days (range)	5 (1-29)	4 (1-47)	4.5 (1-47)	4 (1-23)	4 (1-15)	4 (1-23)
Number of GP referrals to surgery	45	39	84	38	38	76
Number of major trauma cases presented to the A and E	17	17	34	4	12	16
Total number of A and E attendances (all specialities)	2289	2224	4513	1157	1372	2529
Number of COVID-19 swabs for surgical patients (%)*	N/A	N/A	N/A	49 (51.6)	82 (70.7)	131 (62.1)
Number of CT CAP for surgical patients (%)*	5 (3.2)	9 (6.7)	14 (4.8)	18 (18.9)	19 (16.4)	37 (17.5)
Number of emergency surgical operations (%)*	29 (18.6)	27 (20.1)	56 (19.3)	19 (20)	16 (13.6)	35 (16.6)
Number of emergency surgical endoscopies (%)*	24 (15.4)	21 (15.7)	45 (15.5)	28 (29.4)	20 (17.2)	48 (22.7)
Number of surgical HDU admissions (%)*	12 (7.7)	12 (9)	24 (8.2)	14 (14.7)	10 (8.6)	24 (11.4)
Number of surgical inpatient mortality (%)*	0 (0)	4 (3)	4 (1.4)	3 (3.2)	5 (4.3)	8 (3.8)

\* Percentage calculated from admissions of the month.

**Table 2: Causes of death-surgical inpatients.**

Month	2019	2020
April	Number of deaths: 0	Number of deaths: 3 Causes: acute pneumonia, myocardial infarction, duodenal perforation
May	Number of deaths: 4 Causes: haemorrhagic pancreatitis, poly-trauma, metastatic pancreatic cancer, necrotizing pancreatitis.	Number of deaths: 5 Causes: cholangio-carcinoma, acute liver failure, pancreatitis, myocardial infarction (2)

## DISCUSSION

The COVID-19 pandemic has had major effects on surgical practice all over the world.<sup>5</sup> This has mandated the evolution of different strategies to be implemented by

different hospitals to mitigate the impact of COVID-19 on surgical services.<sup>6</sup> Our hospital was no exception. However, as a smaller hospital offering a wide variety of services, we are better placed to understand the effects on the whole hospital as well as on the general surgical service in particular.

Our records showed that the total number of patients presenting to the A and E was almost halved from 2019 to 2020; the number of acute surgical admissions and GP referrals during the COVID-19 period also reduced. Emergency surgical and endoscopic procedures did not materially change during the pandemic peak. However, the complete cancellation of elective surgery during the crisis had a profound impact with prolongation of the waiting list time.

A UK study has reported that admissions were significantly lower during the lockdown period.<sup>10</sup> A significant decrease in emergency activity has also been reported by the NHS of England.<sup>11</sup> Due to the small size of our hospital and the small population it serves, the total number of surgical admissions did not change

materially, whereas the total number of acute patients presenting to the A and E department decreased markedly.

It was reported that the mean length of hospital stay was shorter during the crisis (4 days compared to 5 days), which is a similar finding to ours (4 days versus 4.5 days).<sup>10</sup>

A study from Singapore showed fewer older patients being admitted during the lockdown.<sup>12</sup> This was not our experience in our study. The same study from Singapore reported a smaller number of trauma cases during lockdown which is similar to our findings where the number of trauma cases was almost halved.<sup>12</sup>

At the beginning of the crisis, guidelines for routine CT scanning of the chest along with CT abdomen for surgical patients as a screening test for COVID-19 were rolled out by the Royal College of Surgeons.<sup>7</sup>

There was some initial evidence that pulmonary changes would be visible on the chest slices included in upper abdominal CT for patients previously undiagnosed with COVID-19.<sup>13</sup> In our study, 30 patients had this routine CT CAP for this purpose and none of them showed any signs of COVID disease. Subsequent reports indicated that CT chest has about 54% sensitivity in asymptomatic patients who tested positive for COVID-19 and the Italian Society of Oncological Surgery (SICO) reported that chest CT scan should be excluded from screening investigations because of the non-specificity of signs in COVID-19 pneumonia.<sup>14,15</sup> A UK-wide audit confirmed that CT chest has low sensitivity for detection of COVID-19 in the pre-operative patients.<sup>16</sup> Following this guidance, we stopped screening acute surgical admissions requiring CT abdomen with CT chest examination.

In terms of the surgical procedures, the principle of triaging the urgency of surgical procedures and considering non-surgical management was adopted. Generally, surgical procedures were discouraged during the COVID-19 outbreak due to the risk of spreading the infection during intubation and extubation, and also because of the higher risk of morbidity and mortality for postoperative patients contracting the virus.<sup>17</sup>

Appendicectomy is a standard surgical management for appendicitis and is usually recommended within 48 hours of presentation.<sup>18</sup> However, during the COVID-19 outbreak, the management guidelines of acute appendicitis altered to give non-operative management the first-line role where appropriate, sparing the operative management as a second line if required<sup>8</sup> where antibiotics are considered to be safe for management of uncomplicated appendicitis but surgery was still required in a second line capacity.<sup>8,19</sup>

Laparoscopic surgery is an aerosol-generating procedure that could potentially spread the virus through

pneumoperitoneum and vapour produced by cautery devices.<sup>6</sup> Thus, the protocol during the COVID-19 pandemic was to avoid laparoscopy and utilize open procedures if surgery could not be avoided. However, the Society of American Gastrointestinal and Endoscopic Surgeons has suggested that there is no evidence of spread of COVID-19 through laparoscopy.<sup>20</sup> This is different from the advice by the Intercollegiate General Surgery Guidance in the UK.<sup>21</sup>

In our study, seven patients with appendicitis were managed conservatively and two had open appendicectomy. Trials have shown that between 10 and 27.3% of conservatively managed cases of appendicitis will require appendicectomy within one year.<sup>8,22</sup>

A study done by Spinelli and Pellino reported that open appendicectomy has good outcomes compared to laparoscopic surgery in terms of the duration of the procedure and the length of hospital stay, and that open surgery is a good substitute for laparoscopic appendicectomy during COVID-19 crisis.<sup>23</sup>

Surgical deaths we encountered during the pandemic came from untreatable surgical and medical catastrophes and patients with life-ending conditions. This is undoubtedly due to our place as a “non-COVID” hospital. A study from Italy reported that the morbidity and mortality rate was about 95% among the surgical patients who contracted the virus.<sup>17</sup>

During the COVID-19 outbreak, there has been an increase in the use of virtual clinics in the UK especially after the release of the NHS new information governance guidance for their use.<sup>2,3,25</sup> It has been reported that the quality of care using telemedicine is no less than face-to-face consultations with the single exception of physical examination.<sup>24</sup>

Near-Me video consulting has been used for video consultations all over Scotland. The numbers of using Near-Me consultations have gone up from around 300 Near-Me consultations a week before March 2020, to nearly 17,000 a week by June 2020 across Scotland.<sup>26</sup>

Our experience during the pandemic was that telemedicine consultations were rapidly adopted and well received by consultants and patients.

A qualitative interview study done by the Royal National Orthopedic Hospital (RNOH) showed that the telephone consultations were broadly acceptable, however, they were described as being ‘impersonal’. Before COVID-19, 7% of consultations were delivered virtually, whereas during the COVID-19 crisis this figure rose to 80%. The satisfaction of clinicians with this medium also increased from 50 to 78%.<sup>27</sup>

Studies have shown that video consultations have high satisfaction rates among patients and clinicians compared to face-to-face consultations.<sup>28</sup> However, some clinicians showed some concerns about technical and clinical quality.<sup>29</sup>

Video consultations were deemed inappropriate for severely ill patients, when a full physical examination or interventional procedures are required, or when comorbidities (e.g., confusion) interfere with the patient's ability to use technology or understand what is being said.<sup>24</sup> Video consultations have been reported to supplement and not to replace, telephone consultations.<sup>30</sup>

During the COVID-19 era, most of the morbidity and mortality, audit and quality improvement meetings were run through an on-line platform to abide with the social distancing measures.<sup>31</sup> Our hospital experience has shown great success, and more learning events were held to discuss various topics compared to the pre-COVID time.

This study was limited by being done in a single District General Hospital with a small number of patients and limited resources. However, our situation provides a unique snapshot of the impact of the pandemic on a smaller hospital and its services. While the worst effects of the pandemic will be seen in large centers, the effects are still felt in smaller units. Thus, more studies are needed to compare services in different settings to help surgical and other services face any future pandemics or similar catastrophes.

## CONCLUSION

COVID-19 had serious impacts on surgical services regarding cancellation of elective lists and prolongation of waiting time. The impact on endoscopic services was particularly evident. Besides all of these drawbacks, there are still some benefits. We started to gain confidence with telemedicine services that will continue to be used in the future, which will save time and cost for the transport of patients. This will decrease the risk of nosocomial infections and may ease waiting times in general. CT chest is not to be used for COVID-19 screening of preoperative patients. All staff, patients and visitors are more aware of the importance of good hygiene by frequent hand washing and using sanitizers. The use of online platforms for holding scientific meetings showed success and will likely be used in the future.

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**APPENDIX**

**Questionnaire for outpatient consultations during COVID-19 pandemic.**

We would be grateful if you could answer a few questions about your experience using telephone and video (Near-Me) for outpatient consultations in the last 3 months (i.e., during the COVID pandemic)

1. In the last 3 months, have you used a telephone or Near-Me for outpatient consultations:
  - a) Telephone
  - b) Video (Near-me)
  - c) Both telephone and video (Near-Me)
  - d) Neither
  
2. If you have not used these technologies, is there a specific reason for this?
  
3. How satisfactory did you feel your consultations using telephone and/or Video (Near-Me) were?
  - a) Very unsatisfactory
  - b) Unsatisfactory
  - c) Neither satisfactory nor unsatisfactory
  - d) Satisfactory
  - e) Very satisfactory
  
4. Did your consultations by telephone and/or video (Near-Me) affect the length of time you spend in the consultation when compared to the conventional face-to-face appointment?
  - a) Much more time needed- It was very slow
  - b) More time needed- It was a bit slower
  - c) About the same amount of time- There was no real difference
  - d) A bit less time- It was a bit faster
  - e) Much less time- It was much faster
  
5. Do you think you will use the telephone and/or video (Near-Me) in the future?
  - a) Much less or will stop
  - b) Less than at present
  - c) More than now
  - d) Much more than now- Would prefer to do it this way
  
6. If you plan to continue using telephone/video consultations, how will you select patients for these types of consultations? (Please select all answers that apply).

**Table 3: Parameters for selecting patients for telephone/video consultations.**

Variables	Yes	No	May be	N/A
<b>Plan to see all patients face-to-face</b>				
<b>At referral vetting as seems appropriate to me</b>				
<b>Only for specific conditions or fixed criteria e.g., condition X must be face-to-face, condition Y telephone etc.</b>				
<b>Urgent Referrals only</b>				
<b>Return Patients only</b>				
<b>Geographical/age criteria</b>				
<b>Other (please specify)</b>				



7. Are there any ways you think that the current telephone/video consultations can be improved?

8. Did any patient complain about using telephone/video for consultations?

- a) Yes
- b) No

Any specific issues highlighted by patients?

9. Which speciality do you work in? Please select the nearest description.

- a) Accident and Emergency
- b) Anaesthetics
- c) General medicine (Including subspecialties)
- d) General surgery
- e) Obstetrics and Gynaecology
- f) Ophthalmology
- g) Orthopaedics
- h) Paediatrics
- i) Psychiatry
- j) Radiology