


# Impact of COVID-19 on access and availability of radiological imaging and surgical intervention at the East Midlands Major Trauma Centre: An ICON Trauma Study

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Dear Editor

The novel coronavirus SARS-CoV-2 disease (COVID-19) was declared a pandemic in March 2020. There became an urgent necessity to redistribute resources, optimize care flow pathways and reorganize staff, systems and space within all UK hospitals<sup>1</sup>. Major trauma services adjusted to reduced access to CT and had to restructure operative flow due to limited intensive care beds. Current best practice, as outlined by the Royal College of Radiologists, recommends CT to be available within 15 minutes of a major trauma admission<sup>2</sup>. The National Emergency Laparotomy Audit (NELA) suggests a door to theatre time for immediate surgery as less than 2 hours and 2–6 hours for urgent surgery<sup>3</sup>. Additionally, the Trauma Audit and Research Network (TARN) advises that time to theatre should be less than 60 minutes for injuries with significant haemorrhage<sup>4</sup>.

The Impact of COVID-19 on Major Trauma workload (ICON Trauma) initiative was extended to investigate the availability and timeliness of CT and emergency operating during the COVID-19 national lockdown<sup>5</sup>.

An observational study from the East Midlands Major Trauma Centre (EM-MTC) compared two cohorts of patients admitted over a 10-week period during COVID-19 (March–May 2020) and the same time period in 2019 (March–May 2019). Hospital record data were collated to a secure online platform (REDCap Cloud; <https://www.redcapcloud.com>) and analysed using STATA<sup>®</sup> v16 (StataCorp, College Station TX, USA). Variables included demographics, time to CT and surgery, management approaches, and operative characteristics. Data normality was assessed by visualizing distribution plots, with non-parametric data presented as median (i.q.r.) values. Statistical comparison was undertaken using Mann–Whitney U, Fisher's exact and  $\chi^2$  tests as appropriate, and  $P < 0.050$  was deemed statistically significant.

Of 642 patients, 405 were admitted in 2019 and 237 in 2020, representing a 41.5 per cent absolute reduction in trauma admissions during the COVID-19 period (Table 1). No statistical differences were noted between arrival in the emergency

department and time to CT, with a median of 42 minutes from admission. Within subgroup analysis of surgical patients, there were significant differences in the time to surgery ( $P = 0.019$ ) and duration of surgery ( $P = 0.014$ ). We found a 31.2 per cent increase in patients operated on within 24 hours of admission and a 42.9 per cent reduction in surgery lasting more than 120 minutes during the COVID-19 pandemic. There was more than a twofold increase in night-time operations occurring between 22.00 and 08.00 hours during COVID-19. No differences in type or time of surgery, surgical approach or level of postoperative care were observed.

The EM-MTC was able to make early preparations in 2020, anticipating the expected disruptions of COVID-19. The present results show a significant reduction in major trauma admissions, similar to observations reported elsewhere<sup>5</sup>. Interestingly, there was no difference in time to radiological imaging when 2020 was compared with 2019. This was achieved by streamlining CT scanning for COVID-suspected and non-suspected patients, and facilitated by having two CT rooms within the emergency department and 24-hour reporting availability.

Overall, during the COVID-19 pandemic, most medical and surgical specialties reported a decreased workload. In addition, there was a curtailing of the elective workload to free up bed availability for patients with COVID-19<sup>6</sup>. The unintended beneficial consequence from a trauma perspective was the prompt availability of theatre spaces and personnel, potentially explaining the shorter duration to surgical intervention during the 2020 period. Additionally, the presence of a 24-hour dedicated trauma surgeon, supported by senior surgical trainees, encouraged single-stage definitive operations with a shift towards quicker surgical technique. Importantly, having this dedicated workforce ensured more operations were undertaken overnight (22.00 to 08.00 hours) during the COVID-19 period than in 2019.

Early robust restructuring of staff, space and services in the COVID-19 period allowed the EM-MTC to maintain excellence in patient care. Improvements to the major trauma pathway have

Table 1 Comparison of 2019 and 2020 cohorts

|   | 2019 cohort (n = 405)     | 2020 COVID-19 cohort (n = 237) | P                   |
|---|---------------------------|--------------------------------|---------------------|
| Age (years) <sup>*</sup>                | 40 (24–59)                | 46 (28–60)                     | 0.050**             |
| Sex ratio (F : M)                       | 120 : 285                 | 62 : 175                       | 0.347††             |
| Time to CT (min) <sup>*</sup>           |                           |                                |                     |
| From arrival in ED <sup>†</sup>         | 42 (24–112)               | 42 (24–75)                     | 0.259**             |
| From CT decision <sup>†</sup>           | 28 (16–70)                | 32 (17–77)                     | 0.667**             |
| Definitive management                   |                           |                                |                     |
| Conservative                            | 274 (67.7)                | 175 (73.8)                     |                     |
| Interventional radiology                | 2 (0.5)                   | 0 (0)                          | 0.112††             |
| Surgical <sup>§</sup>                   | 129 (31.9)                | 62 (26.2)                      |                     |
| COVID-19 diagnosis                      |                           |                                |                     |
| Negative                                | 405 (100)                 | 233 (98.3)                     | 0.018 <sup>§§</sup> |
| Positive                                | 0 (0)                     | 4 (1.7)                        |                     |
| Type of primary surge                   | n = 129                   | n = 62                         |                     |
| General and vascular surgery/laparotomy | 14 <sup>#</sup><br>(10.9) | 9<br>(15)                      | 0.145††             |
| Thoracic surgery/thoracotomy            | 3<br>(2.3)                | 2<br>(3)                       |                     |
| Neurosurgery                            | 15<br>(11.6)              | 3<br>(5)                       |                     |
| Orthopaedic/spinal                      | 81<br>(62.8)              | 33<br>(53)                     |                     |
| Other <sup>¶</sup>                      | 16<br>(12.4)              | 15<br>(24)                     |                     |
| Primary surgical approach               |                           |                                |                     |
| Open                                    | 126<br>(97.7)             | 60<br>(97)                     | 0.728 <sup>§§</sup> |
| Laparoscopic converted to open          | 1<br>(0.8)                | 0<br>(0)                       |                     |
| Laparoscopic                            | 2<br>(1.6)                | 2<br>(3)                       |                     |
| Time to primary surgery (h)             |                           |                                |                     |
| <24                                     | 65 (50.4)                 | 41<br>(66)                     | 0.019††             |
| 24 to <48                               | 42 (32.6)                 | 16<br>(26)                     |                     |
| 48 to <72                               | 11 (8.5)                  | 4 (6)                          |                     |
| ≥72                                     | 11 (8.5)                  | 1 (2)                          |                     |
| Time of primary surgery                 |                           |                                |                     |
| 0800–18.00 hours (day)                  | 93 (72.1)                 | 41 (66)                        | 0.058††             |
| 18.00–22.00 hours (evening)             | 21 (16.3)                 | 6 (10)                         |                     |
| 22.00–08.00 hours (night)               | 15 (11.6)                 | 15 (24)                        |                     |
| Duration of primary operation (min)     |                           |                                |                     |
| <30                                     | 4 (3.1)                   | 6 (10)                         | 0.014††             |
| 30–60                                   | 18 (14.0)                 | 8 (13)                         |                     |
| 61–90                                   | 21 (16.3)                 | 16 (26)                        |                     |
| 91–120                                  | 24 (18.6)                 | 15 (24)                        |                     |
| >120                                    | 62 (48.1)                 | 17 (27)                        |                     |
| Postoperative level of care             |                           |                                |                     |
| Ward (level 1)                          | 92 (71.3)                 | 44 (71)                        | 0.788 <sup>§§</sup> |
| HDU (level 2)                           | 5 (3.9)                   | 1 (2)                          |                     |
| ICU (level 3)                           | 32 (24.8)                 | 17 (27)                        |                     |

Values in parentheses are percentages unless indicated otherwise;

\* values are median (i.q.r.). ED, emergency department; HDU, high dependency unit. <sup>†</sup> 2019, n = 296; 2020, n = 151. <sup>‡</sup> 2019, n = 231; 2020, n = 117. <sup>§</sup> Includes patients who had interventional radiological embolization before surgery (2 in 2019, 1 in 2020). <sup>¶</sup> Includes plastic, oral and maxillofacial, and ear, nose and throat surgery. <sup>#</sup> Includes one patient who underwent laparotomy and thoracotomy. <sup>\*\*</sup> Mann-Whitney U test; <sup>††</sup>  $\chi^2$  test; <sup>†††</sup>  $\chi^2$  test for trend; <sup>§§</sup> Fisher's exact test.

become ingrained into daily practice and optimized for future outbreaks.

## Collaborators

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