



# 'Out of hours' orthopaedics in an Irish regional trauma unit and the impact of COVID-19

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## Abstract

**Introduction** MRHT is the regional trauma service for the Midlands, providing 24/7 orthopaedic cover. 'Out of hours' surgery is reserved for those occasions where waiting for the next operating list during normal working hours would result in an unacceptable outcome for the patient.

**Aims** To identify how many 'out-of-hours' surgeries were performed and what proportion of the total workload was made up by these cases.

Secondly, to identify the impact of COVID-19 on our workload as an acute trauma service.

**Methods** We performed a retrospective analysis of all operations performed in the emergency orthopaedic theatre between January 2017 and October 2020. Included were all emergency orthopaedic procedures performed after 6 p.m. and before 8 a.m.

We compared this to the total number of trauma surgeries performed in the same time period to calculate the percentage of our total operations.

**Results** There were a total of 7615 orthopaedic trauma operations performed in the 193 weeks. 164 of these were 'out-of-hours'. This represents 2.2% of the total operations performed and is equal to 0.84 cases per week.

55 of the 164 (33.5%) were performed in children under the age of 18.

62 were performed between 6 and 8 p.m., 61 between 8 and 10 p.m., 31 between 10 p.m. and midnight, and the remaining 10 were performed between midnight and 3 a.m.

**Conclusion** Surgery out of hours has been associated with increased complications, and so decisions to perform emergency surgery should not be made lightly. However, sometimes they are unfortunately necessary and are some of the most important operations we can perform as orthopaedic surgeons.

**Keywords** Orthopaedics · Out of hours · Safety · Surgery · Trauma

## Introduction

Midland Regional Hospital Tullamore is the regional trauma unit for the midlands of Ireland, providing 24/7 orthopaedic services for its patients. As the referral centre for Mullingar and Portlaoise Hospitals also, the orthopaedic department serves a large population of at least 300,000 from Offaly, Laois, Westmeath, and Longford [1]. The hospitals also see frequent attendees from neighbouring counties, and in combination, the three emergency departments see over 100,000 attendances per year [1, 2].

The orthopaedic service in MRH Tullamore see all of the orthopaedic patients for this area, including all children aged 3 years and above, which can add a significant workload to the department particularly in the summer months. With a large catchment area and 3 busy emergency departments, the orthopaedic service is understandably a very busy one.

A result of providing a 24/7 emergency orthopaedic service is the need to perform surgery on patients outside of normal working hours. Surgery after hours has been linked to an increase in both intra-operative and post-operative morbidity and mortality due to both surgical and anaesthetic complications.

The effects of performing out of hours surgery are felt by all members of the theatre team, not just the surgeons. Anaesthetists, nursing staff, and radiographers are also

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involved in these cases, furthering the possibility of personnel fatigue and burn-out being of significance in the care of these patients.

In order to evaluate the impact of 'out-of-hours' surgery within our department, we decided to perform an analysis of the theatre records for emergency orthopaedic surgery over a 4-year period. We looked at both the number of 'out of hours' surgeries performed, and what proportion of the total number of surgeries performed this equated to, in order to better understand the demands of 'out-of-hours' surgery in our department.

## Materials and methods

MRH Tullamore has an emergency orthopaedic theatre with a scheduled trauma list every day including weekends. All after hours orthopaedic cases are also performed in this theatre exclusively.

By assessing the theatre logs available in our institution, we performed a retrospective analysis of all operations performed in the emergency orthopaedic theatre in Midlands Regional Hospital Tullamore between 25/01/17 and 08/10/2020, and identified all of those performed 'out of hours'.

### Inclusion and exclusion criteria

We included all emergency orthopaedic procedures performed after 6 p.m. and before 8 a.m. and classed these as 'out-of-hours'. Excluded were any elective cases, any cases performed between 8 a.m. and 6 p.m., or any cases that were performed after 6 p.m. as a continuation of the scheduled operating list for that day (Table 1).

### Outcomes

Our primary outcome was to identify how many cases are performed 'out-of-hours', and what proportion of the department's total workload is made up of these cases.

Our secondary objective was to compare the influence of area-wide lockdowns as a result of COVID-19 on the total number of out of hours orthopaedic operations performed at our institution compared to 'pre-COVID'.

**Table 2** Results

Age	3–10	33	20.12%
	Under 18	23	14.02%
	18–65	62	37.80%
	Over 65	49	29.88%
Sex	Male	104	63.41%
	Female	60	36.59%
Reason	Fracture	70	42.68%
	Aspiration/Washout	71	43.29%
	Traumatic wound	17	10.37%
	Dislocation	6	3.66%
	Other*	3	1.83%
Time	1800–2000	62	37.80%
	2000–2200	61	37.20%
	2200–0000	31	18.90%
	0000–0300	10	6.10%

\*Other = 2 × haematoma 1 × fasciotomy

## Results

We collected all data pertaining to acute trauma operations performed in MRHT between 25/01/17 and 8/10/2020. Data from a total of 193 weeks has been included.

There were a total of 7615 acute trauma operations performed in the specified time frame. Of these, 164 were 'out-of-hours' cases. This equates to 2.2% of the total cases, or 0.84 cases per week.

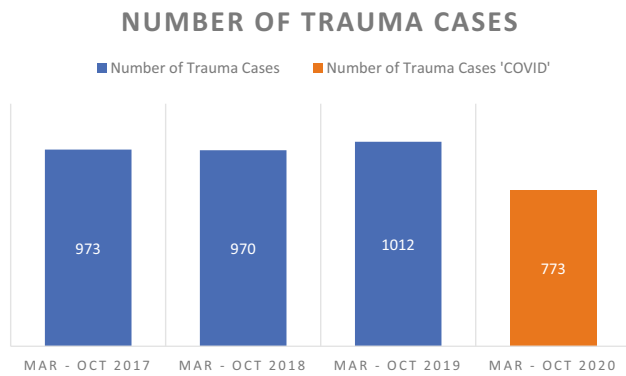
These cases were then assessed on an individual basis where the patients' age, sex, reason for surgery, and time of surgery were recorded. These results are displayed in Table 2.

### The impact of COVID-19

We also performed an analysis of the volume of trauma operations performed in our institution between the first lockdown, which was announced on 16th March 2020, and 16th October 2020, a period of 7 months. Between these dates, there were widespread lockdowns of varying degrees of restrictions in response to the COVID-19 pandemic. These restrictions varied from the public being

**Table 1** Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
All emergency orthopaedic procedures performed after 6 p.m. and before 8 a.m	Cases performed after 6 p.m. as continuation of the scheduled operating list Any elective cases performed

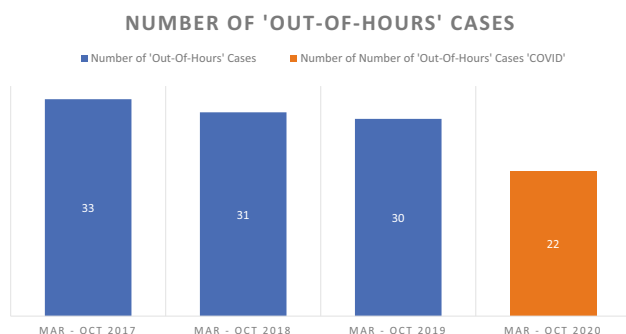


**Fig. 1** Number of trauma cases before and during ‘COVID’

permitted only to travel between 5 and 20 miles from their home, to all normal activities resuming with social distancing in place [3, 4].

In this 7-month period, we performed a total of 773 acute trauma operations. In order to remove any potential bias associated with the time of year, we took the same 7-month period of March to October in 2017, 2018, and 2019 for comparison. The total number of acute trauma operations for these 7 months in each of these years was 973, 970, and 1012 respectively. This shows a 200+ case reduction during COVID restrictions, which equates to a 22% reduction in trauma operations performed in Tullamore (Fig. 1).

Similarly, there was a significant reduction in the number of out of hours cases performed over the same time period. In the years preceding COVID, the ‘out-of-hours’ cases were 33, 31, and 30 between March and October in 2017, 2018, and 2019 respectively. However, in 2020, ‘during COVID’, there were only 22 ‘out-of-hours’ operations performed. This highlights a 30% reduction in ‘out-of-hours’ cases, with the average number falling from 0.86 to 0.63 cases per week (Fig. 2).



**Fig. 2** ‘Out-of-hours’ cases pre and during COVID

## Discussion

At 2.2%, or 0.84 cases per week, the proportion of ‘out of hours’ surgery in our busy orthopaedic department is thankfully not a significant one. However, it does represent an important cohort of our patients. These patients have urgent and or severe injuries or illnesses that may lead to a significant morbidity or mortality. As such, these operations are often the most important that we perform as a department. Recognition and prompt-decision making in relation to these cases is extremely vital in ensuring best care for these patients, and as such, it is an important topic to highlight to a wider audience.

The study covers almost 4 years of operating in a busy trauma unit, and as such, it provides us with data which is less susceptible to the fluctuations in seasonal workloads seen in both the summer and winter months [5, 6] and gives more longitudinal data which adds to the robustness of the results.

Due to the volume of patients requiring emergency operations in this institution, there is a large sample size included in this study. This compliments the extensive timeline of data collected and again adds to the strength of the results produced.

There is a wealth of evidence to suggest operating late at night is associated with increased morbidity and mortality [7–11]. It is difficult to attribute these complications to one particular factor. On one hand, it can be argued that a patient undergoing surgery at night for an emergent and time-dependent condition is likely to have more complications as a result of this. However, this link has been observed in both emergency and elective patients undergoing out-of-hours surgery, and therefore, we cannot dismiss this increased morbidity as solely patient related. We must accept that personnel factors, or at the very least a variable combination of these factors, are at play [12–15].

In the orthopaedic world, the vast majority of the patients undergoing surgery after 6 p.m. are those with neurovascular compromise or active infection, or those who have sustained an injury which predisposes them to these issues. As such, delaying their surgery would directly result in an increased risk of morbidity or mortality directly related to these issues.

On a positive note, our study shows that 75% of these ‘out of hours’ operations are performed before midnight. This is likely to minimize the influence of personnel fatigue becoming a factor in the patient care. In emergency scenarios such as these, being able to minimise the number of uncontrollable factors at play is likely to result in improved outcomes.

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## The impact of COVID-19

With respect to the COVID data we obtained, the 22% fall in acute trauma operations performed is compared to 3 previous years of data from the same time period. As such, it is protected from comparison to a particularly busy year and adds robustness to the reliability of these results.

In our institution, we have been fortunate to retain a dedicated orthopaedic trauma theatre throughout much of the COVID period. As such, we can attribute any reduction in volume directly to a reduction in patients requiring surgical intervention, likely as a result of the lockdowns imposed by the Irish government as a result of COVID-19.

However, this study is a retrospective analysis of theatre logs, and a limitation of this paper is that it does not include the patient specific reasons for each of these operations being performed. As such, we are unable to identify if these operations were as a result of a direct threat to life or limb, or if they were performed ‘out of hours’ in order to prevent these sequelae from occurring while waiting for the next scheduled operating list.

Similarly, because it is retrospective, we as authors were unable to control the data collection and instead must rely on others for accurate records being kept. This is mitigated by the fact that time stamps are available for all entries in the theatre logbook, but it does not account for patients not being entered and/or being entered incorrectly. A retrospective study is typically predisposed to selection bias, but due to the rigid format of recordkeeping in the logbook, the simple inclusion and exclusion criteria applied, and the large sample size; it is believed that this risk has been minimized.

## Conclusion

Midland Regional Hospital Tullamore provides 24/7 orthopaedic services to a large proportion of the Irish population. Fortunately, only 2.2% of the orthopaedic trauma operations performed in this institution are performed ‘out of hours’, but when they are, they require a vast array of on-call medical professionals to perform these procedures. These operations are not only associated with increased

morbidity and mortality, but also with increased personnel fatigue and risk of staff burn-out. This out-of-hours work is not a significant proportion of the operating burden in this hospital, but it is often the sickest and most vulnerable patients who require these interventions, and as such, the significance of the patient factors makes these procedures some of the most important that we perform as orthopaedic surgeons.

## Declarations

**Ethical approval** This research is a systematic evaluation as defined by the RCP (UK) guidelines. As per the HSE Research Ethics Committee, ethical approval is not required for systematic evaluations. <https://www.hse.ie/eng/services/list/5/publichealth/publichealthdepts/research/rec.html>.

**Location** The work was carried out by all authors at Department of Orthopaedics, Midland Regional Hospital Tullamore.

**Conflict of interest** The authors declare no competing interests.

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