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## ■ GENERAL ORTHOPAEDICS

# Paediatric orthopaedics in lockdown

## A STUDY ON THE EFFECT OF THE SARS-COV-2 PANDEMIC ON ACUTE PAEDIATRIC ORTHOPAEDICS AND TRAUMA

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### Aims

To determine the impact of COVID-19 on orthopaedic admissions and fracture clinics within a regional integrated care system (ICS).

### Methods

A retrospective review was performed for all paediatric orthopaedic patients admitted across the region during the recent lockdown period (24 March 2020 to 10 May 2020) and the same period in 2019. Age, sex, mechanism, anatomical region, and treatment modality were compared, as were fracture clinic attendances within the receiving regional major trauma centre (MTC) between the two periods.

### Results

Paediatric trauma admissions across the region fell by 33% (197 vs 132) with a proportional increase to 59% (n = 78) of admissions to the MTC during lockdown compared with 28.4% in 2019 (N = 56). There was a reduction in manipulation under anaesthetic (p = 0.015) and the use of Kirschner wires (K-wires) (p = 0.040) between the two time periods. The median time to surgery remained one day in both (2019 IQR 0 to 2; 2020 IQR 1 to 1). Supracondylar fractures were the most common reason for fracture clinic attendance (17.3%, n = 19) with a proportional increase of 108.4% vs 2019 (2019 n = 20; 2020 n = 19) (p = 0.007). While upper limb injuries and falls from play apparatus, equipment, or height remained the most common indications for admission, there was a reduction in sports injuries (p < 0.001) but an increase in lacerations (p = 0.031). Fracture clinic management changed with 67% (n = 40) of follow-up appointments via telephone and 69% (n = 65) of patients requiring cast immobilization treated with a 3M Soft Cast, enabling self-removal. The safeguarding team saw a 22% reduction in referrals (2019: n = 41, 2020: n = 32).

### Conclusion

During this viral pandemic, the number of trauma cases decreased with a change in the mechanism of injury, median age of presentation, and an increase in referrals to the regional MTC. Adaptions in standard practice led to fewer MUA, and K-wire procedures being performed, more supracondylar fractures managed through clinic and an increase in the use of removable cast.

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### Introduction

The World Health Organization (WHO) declared the outbreak of SARS-CoV-2 virus (and the resulting disease, COVID-19) a global pandemic on the 11 March 2020. On 16 March 2020, the UK government implemented measures to reduce the potential spread of the virus and subsequent pressure of resources within the NHS. These included

social distancing and advice to avoid busy public venues. A national lockdown was subsequently issued on the 23 March 2020, which lasted until 10 May in England and involved only being allowed to leave the home for four reasons: to shop for essential items, for one form of exercise per day for one hour, for medical or care needs, and for travelling to work if working from home was not possible.

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All nonurgent elective surgical procedures were postponed or cancelled on 15 April to mitigate the possible increase in demand for critical care beds and enable increased numbers of staff to contribute to the response. Concurrently, routine outpatient clinical appointments were either deferred or their mode of delivery was changed where possible. Updated guidelines from the British Society for Children's Orthopaedic Surgery (BSCOS)<sup>1</sup> were used to guide fracture management including the use of removable casts, where safe, to reduce reattendance and footfall within hospitals.

There was a perceived risk to children as lockdown commenced from both accidental and nonaccidental injury (NAI). Known risk factors for NAI include increased social isolation, financial uncertainty, and loss of support networks. All of these were more prevalent due to prolonged school and nursery closures, potential job losses, and enforced isolation.<sup>2,3</sup> The spring of 2020 has been the sunniest across the UK since records began in 1929<sup>4</sup> and with a significant rise in sales of trampolines and outdoor play equipment, there was a concern that accidental injuries would also rise.<sup>5</sup>

Our children's hospital is one of only five standalone paediatric major trauma centres (MTC) in the UK and operates a networked service with the surrounding district general hospitals (DGHs) which make up our integrated care system (ICS). This service covers a population of over half a million children. Prior to the pandemic, consultants from the MTC provided outreach paediatric elective clinics. The DGHs would usually manage all paediatric trauma patients presenting to them with the exception of open fractures, complex elective or trauma cases and patients under two years old (for anaesthetic reasons). To help ease pressure on adult services, from 16 April local DGHs transferred paediatric patients requiring operative intervention to the MTC.

The aim of this multicentre study was to further our understanding of the effect of a population-wide lockdown on the rates, mechanisms, and types of injury seen within a paediatric ICS while also examining how the delivery of an outpatient trauma service has changed during this time.

## Methods

Data was collected from a paediatric MTC as well as the four networked DGHs which make up our ICS. This was performed retrospectively for both the period of lockdown (24 March 2020 to 10 May 2020 and the corresponding dates in 2019 as a control). For the MTC, data for hospital admissions and new fracture clinic referrals were collected and for the DGHs, data for hospital admissions and transfers.

Electronic trauma handover lists, patient records, and theatre lists were used to identify patients in each hospital. Patients transferred for care at the MTC were

identified and records were combined to prevent duplication of entries.

All patients attending the MTC emergency department (ED) during the two time periods were identified using the electronic patient records. Digital notes for all patients who were referred to fracture clinic were then reviewed to determine the mechanism of injury and their outcome.

All patients admitted under orthopaedics were included in this study. Patients who were seen and discharged from ED or only discussed verbally with the orthopaedic team were not included unless they subsequently attended a fracture clinic at the MTC. All fracture clinic referrals from ED were identified and reviewed. Exclusion criteria included duplications, ED return clinic episodes, failure to attend fracture clinic, no clinic letter available for review, admissions, referrals to other specialties, and those already known to the orthopaedic service.

Demographic data were collected along with type of injury, mechanism of injury, treatment given, time to theatre (if relevant), and whether there was any concern regarding NAI. For fracture clinic patients, the same data were collected along with mode of fracture clinic, outcome of fracture clinic, and whether self-removable casting techniques (Soft Cast; 3M, Maplewood, Minnesota, USA) were utilized.

Injury patterns were analyzed by zone of injury: shoulder and humeral shaft, supracondylar fracture, other elbow injuries, forearm, wrist, spine, pelvic and hip, femur/thigh, knee, tibia/leg, ankle, and foot.

Mechanism of injury was recorded in detail and then subcategorised into one of the following: fall from standing height, fall from play equipment/height, fall from furniture, trampoline related, non-traumatic/infection, sports, fall from bike/scooter/rollerblades/skateboard, road traffic collision (RTC), laceration, kick/punch, or unknown.

Treatment given was subcategorised into type of surgery performed, application of cast in plaster room or nonoperative management.

Referral data for potential safeguarding concern was collected separately and was obtained from the regional safeguarding department.

**Statistical analysis.** Data were checked for normal distribution with the D'Agostino and Pearson normality test. Data are presented as mean (range) for normally distributed data and median (interquartile range (IQR)) for non-normally distributed data. The differences between the groups for continuous data were compared using the independent-samples *t*-test for normally distributed data and the Mann-Whitney U test for non-normally distributed data. Fisher's Exact test was used to compare two groups of categorical data, and Z-score test to compare two population proportions. All analyses were completed on GraphPad Prism v. 8.4.2 (San Diego, California, USA). Results were considered significant for  $p < 0.05$ .

**Table I.** Demographics in 2019 versus lockdown.

Characteristic	2019	Lockdown	p-value
Total admissions, n	197	132	N/A
Median age, yrs (IQR)	9 (5 to 13)	7 (4 to 11)	< 0.001*
Sex M:F (%)	127:70 (64:36)	84:48 (64:36)	0.397†
Surgery, n (%)	153 (77.6)	95 (72.0)	0.607†
Nonoperative, n (%)	44 (22.3)	37 (28.0)	0.243†
Median time to surgery, days (IQR)	1 (0 to 2)	1 (1 to 1)	0.873*

\*Mann-Whitney U test.

†Fisher's Exact test.

**Table II.** Mechanism of injury.

Mechanism	2019, n (%) (n = 197)	Lockdown, n (%) (n = 132)	p-value*
Fall involving play apparatus/equipment/height (excluding trampoline)	38 (19.3)	24 (18.2)	0.527
Fall from standing	29 (14.7)	15 (11.4)	0.331
Non-traumatic/infection	27 (13.7)	22 (16.7)	0.528
Sport	23 (11.7)	3 (2.3)	0.002
Bike/scooter/rollerblades	20 (10.2)	14 (10.6)	0.161
Other	16 (8.1)	10 (7.6)	0.839
Fall from furniture	14 (7.1)	18 (13.6)	0.058
Trampoline	13 (6.6)	14 (10.6)	0.387
RTC	6 (3.1)	0 (0.0)	0.085
Laceration	6 (3.1)	10 (7.6)	0.042
Punch/kick	5 (2.5)	1 (0.8)	0.408
NAI	0 (0.0)	1 (0.8)	> 0.99

\*Fisher's Exact test.

NAI, non-accidental injury.

## Results

**Regional: admissions.** Across the region, acute paediatric orthopaedic admissions fell by 33% during lockdown (197 in 2019 vs 132 in lockdown). Of the 132 patients admitted during lockdown, 59% (n = 78) of all patients either presented to the MTC or had their care transferred. This was a 39.3% (n = 12) increase on 2019. The operative rate did not significantly change between the two periods with 77.6% (n = 153) undergoing surgery during 2019 compared with 72% (n = 95) for lockdown. No delays to surgery were encountered with a median time to surgery from date of injury of one day for both time periods (2019 IQR 0 to 2, 2020 IQR 1 to 1).

There was a significant difference in the age of patients requiring admission between the two timepoints. The median age during 2019 was 9 years (IQR 5 to 13) compared with 7 years for lockdown (IQR 3.75 to 11; p < 0.001, Mann-Whitney U test). Similar proportions of male and female patients were observed in both time periods (Table I).

**Mechanism.** Total numbers and proportions for mechanism are demonstrated in Table II. In 2019, fall from a height, including falls while on play equipment, accounted

**Table III.** Admission by anatomical region.

Anatomical region*	2019, n (%) (n = 197)	Lockdown, n (%) (n = 132)
Wrist	44 (22.3)	16 (12.1)
Forearm	31 (15.7)	18 (13.6)
Supracondylar	24 (12.2)	16 (12.1)
Hand	14 (7.1)	7 (5.3)
Femur	13 (6.6)	7 (5.3)
Tibia	13 (6.6)	7 (5.3)
Other elbow	7 (3.6)	12 (9.1)
Ankle	7 (3.6)	6 (4.6)
Foot	5 (2.5)	5 (3.8)
Shoulder	4 (2.0)	2 (1.5)
Spine	3 (1.5)	1 (0.8)
Pelvic/hip	3 (1.5)	2 (1.5)
Knee	2 (1)	9 (6.8)

\*Infections are excluded from this table

for the greatest proportion of injuries. Despite a proportional increase in this mechanism the overall numbers reduced. During the lockdown period there was a decrease in sporting injuries (p < 0.001, Fisher's Exact test) and an increase in lacerations (p = 0.031, Fisher's Exact test) observed when compared with the 2019 period. Due to the reported increase in sales of trampolines this mechanism was assessed separately. Similar numbers of injuries from trampolines were observed in 2019 and lockdown.

**Anatomical region.** Numbers and proportions of injuries by anatomical region are demonstrated in Table III. Injuries to the forearm, wrist and elbow were the three most common locations in both groups. There was no observed change in the frequency of supracondylar fractures during lockdown compared with 2019. Infection and atraumatic pathology remained a large proportion of our admissions accounting for 13.7% (n = 27) in 2019 across the region and 18.2% (n = 24) in lockdown, which were similar between the time periods.

**Surgical treatment for admissions.** Manipulation under anaesthetic (MUA) with application of cast and MUA with insertion of Kirschner-wires (K-wires) were the two most common procedures performed in both periods, though significantly fewer of these procedures (MUA p = 0.015, MUA + K-wire p = 0.040, Z test) were performed during lockdown. There was an increase in manipulations taking place in the plaster room during lockdown versus 2019 (p < 0.001, Z test). The majority of these procedures were undertaken in a single DGH, with only two being performed at the MTC. Table IV summarizes the management of inpatient admissions during the two time periods.

**Referrals to safeguarding.** There was a reduction in referrals to safeguarding between the two time periods. There were 32 new safeguarding referrals for all causes during lockdown compared with 41 new referrals during the same time period in 2019. Suspected physical abuse was the leading cause of referral during both time periods

accounting for 41.5% (n = 17) of referrals in 2019 and 40.6% (n = 13) during lockdown. There was one patient admitted as potential NAI during lockdown and zero during the same period of 2019.

**MTC results: results for fracture clinic.** During lockdown, attendance to ED fell by 61% to 3,065 patients from 7,840 in 2019. For both time periods musculoskeletal pathology accounted for 22% of attendances (1,734 in 2019 vs 673 in lockdown), which also decreased by 61%.

Fracture clinic referrals decreased from 266 to 121 during the two time periods. In total, 26 patients were excluded from the 2019 data analysis (10 DNAs, 10 already currently under orthopaedics with same injury, five ED returns clinic, and one was for a plastic surgery clinic) and eleven in the lockdown group (five already under orthopaedics with same injury, three admitted directly from ED, two elective patients and one ED returns clinic). This left 240 referrals in 2019 and 110 in lockdown for analysis.

Patients seen in 2019 were older than those patients seen in lockdown (median age 11 years (IQR 6 to 13) in 2019 vs 8 years (IQR 3 to 11) in lockdown, p < 0.001, Mann-Whitney U test). Prior to our clinic adaptations for COVID-19, all patients would have a face-to-face consultation at their first fracture clinic appointment. This decreased to 82.7% (n = 91; p < 0.001, Fisher's Exact test) during lockdown, where the remainder had a telephone consultation. No consultations were performed via webcam.

There was a significant change in cast immobilization practice during the lockdown period, with 69.1% (n = 65) of patients being advised to self-remove their cast, compared to only 3.6% (n = 4) of cases in 2019 (p < 0.001, Fisher's Exact test). No significant difference was found in the time to first fracture clinic appointment (p = 0.060, Mann-Whitney U test), or admission rate (p = 0.440, Fisher's Exact test) (Table V).

**Mechanism.** A summary of mechanisms and proportions is demonstrated in Table VI. Sporting injuries were the most common cause for necessitating a fracture clinic appointment in 2019 with a significant decrease seen in lockdown (p < 0.001, Fisher's Exact test). The leading cause of injury during lockdown was a fall from play apparatus including trampolines or from a height which accounted for 29.1% (n = 32) of attendances. Injury caused while using a bicycle, scooter, rollerblades or skateboard also significantly increased in lockdown (p = 0.002, Fisher's Exact test). Trampoline accidents attending fracture clinic lockdown were similar between the two time periods.

**Anatomical region.** Total numbers and proportions for anatomical region for patients seen in fracture clinic are demonstrated in Table VII. The proportion of supracondylar fractures seen in clinic increased by 108.4% compared with 2019 (p = 0.007, Z test). Supracondylar and wrist fractures were the most frequently seen injuries in

**Table IV.** Management of inpatient admissions, using Z test to compare proportions.

Surgery	2019, n (%) (n = 197)	Lockdown, n (%) (n = 132)	p-value*
MUA in theatre	53 (26.9)	22 (16.8)	0.015†
MUA+ K-wire	47 (23.9)	21 (16.0)	0.040†
ESIN	13 (6.6)	6 (4.6)	0.218
Wound management	13 (6.6)	12 (9.2)	0.200
ORIF	11 (5.6)	8 (6.1)	0.429
Nail bed repair	4 (2)	4 (3.1)	0.281
Spica application	3 (1.5)	3 (2.3)	0.309
Incision + drainage	3 (1.5)	1 (0.8)	0.268
Joint washout	2 (1.0)	7 (5.3)	0.010†
Rigid intramedullary nail	1 (0.5)	0 (0)	0.206
External-fixator application	1 (0.5)	1 (0.8)	0.386
Surgical management of SCFE	1 (0.5)	2 (1.5)	0.174
Aspiration	1 (0.5)	0 (0)	0.206
Manipulation in plaster room	0 (0.0)	12 (9.2)	< 0.001†
Other	0 (0.0)	8 (6.1)	< 0.001†
Nonoperative	44 (22.3)	25 (18.8)	0.230

\*Z test.

†Statistically significant.

ESIN, elastic stable intramedullary nail; MUA, manipulation under anaesthesia; ORIF, open reduction internal fixation; SCFE, slipped capital femoral epiphysis.

**Table V.** Demographics and fracture clinic outcome.

Category	2019 (n = 240)	Lockdown (n = 110)	p-value
Median age, yrs (IQR)	11 (6 to 13)	8 (3 to 11)	< 0.001*
Median time to fracture, days (IQR)	1 (1 to 2)	1 (1 to 3)	0.060*
<b>Initial consultation mode, n (%)</b>			
Face to face consultation	240 (100)	91 (82.7)	< 0.001†
Phone consultation	0 (0)	19 (17.3)	< 0.001†
<b>Outcome, n (%)</b>			
Discharged	40 (16.7)	49 (44.5)	< 0.001†
Follow-up	193 (80.8)	60 (54.5)	< 0.001†
Admitted	6 (2.5)	1 (0.9)	0.440†
<b>Follow-up mode, n (%)</b>			
Follow-up F2F	193 (100)	20 (33.3)	< 0.001†
Follow-up phone	0 (0)	40 (66.6)	< 0.001†
Cast removal at home	4 (3.6)	65 (69.1)	< 0.001†
Follow-up appt cast removal	108 (96.4)	29 (30.9)	< 0.001†

\*Mann-Whitney U test.

†Fisher's Exact test.

F2F, face-to-face; IQR, interquartile range

fracture clinic during lockdown. There was also a proportional increase in tibial fractures (p = 0.008, Z test) and proportionally fewer knee injuries seen during lockdown (p = 0.031, Z test).

**Table VI.** Mechanism of injury in fracture clinic.

Mechanism	2019, n (%)	Lockdown, n (%)	p-value*
Sport	82 (34.2)	5 (4.6)	< 0.001
Fall from standing	42 (17.5)	24 (21.8)	0.378
Fall involving play apparatus/equipment/height (excluding trampoline)	35 (14.6)	20 (18.2)	0.430
Fall from furniture	20 (8.3)	9 (8.2)	> 0.99
Bike/scooter/rollerblades	19 (7.9)	22 (20.0)	0.002
Trampoline	14 (5.8)	12 (10.9)	0.123
Punch/kick	12 (5.0)	5 (4.6)	> 0.99
Other	10 (4.2)	8 (7.3)	0.296
Non traumatic/infection	4 (1.7)	5 (4.6)	0.146
RTC	2 (0.8)	0 (0)	> 0.99
Laceration	0 (0)	0 (0)	N/A
NAI	0 (0)	0 (0)	N/A

\*Fisher's Exact test.

NAI, nonaccidental injury; RTC, road traffic collision

**Table VII.** Injury type by anatomical region.

Fracture clinic injuries	2019, n (%)	Lockdown, n (%)	p-value*
Wrist	55 (22.9)	18 (16.4)	0.081
Hand	35 (14.6)	13 (11.8)	0.242
Ankle	30 (12.5)	12 (10.9)	0.334
Foot	23 (9.6)	10 (9.1)	0.441
Other elbow	22 (9.2)	13 (11.8)	0.221
Supracondylar	20 (8.3)	19 (17.3)	0.007
Knee	19 (7.9)	3 (2.7)	0.031
Tibia	10 (4.2)	12 (10.9)	0.008
Shoulder/humerus	10 (4.2)	1 (0.9)	0.053
Forearm	6 (2.5)	3 (2.7)	0.452
Infection/atraumatic	4 (1.7)	4 (3.6)	0.127
Pelvic/hip	4 (1.7)	1 (0.9)	0.291
Femur	2 (0.8)	1 (0.9)	0.472
Spine	0 (0)	0 (0)	N/A

\*Z test.

## Discussion

As the worldwide impact of COVID-19 developed, it was clear that our usual way of working had to change. Although children were not being affected in the same numbers or degree as the adult population, the risk of disease spread among staff and patient families remained a concern. NHS England issued a guideline stating "the elective component of our work may be curtailed, and resources diverted to areas of greater need. However, non-elective patients will continue to need high quality care and we need to ensure that they receive the care that is appropriate. We should seek the best local solutions to continue the proper management of unwell neonates and children while protecting resources for the response to coronavirus."<sup>6</sup> This led to the cancellation of nonurgent elective work, clinics were completely restructured and visitors to the hospital were restricted to a single accompanying adult.

Demand was felt likely to be far higher in adult services<sup>6</sup> and a plan was formulated to assist with this response as a dedicated children's hospital. Specific additional measures were required to manage paediatric patients who still required surgery for orthopaedic trauma. The British Orthopaedic Association published updated Standards for Trauma, alongside paediatric specific trauma guidance release by BSCOS and Alder Hey Children's Hospital.<sup>1</sup> Although we implemented elements of these guidelines and regularly reviewed our practice, certain aspects of patient management did not change. These guidelines advocated the increased use of conservative measures and manipulation of fractures in ED. However, we did not experience a reduction in rate of operative management overall. In our region there has been limited uptake of manipulation in the ED and with a corresponding increase in the capacity of available emergency

theatre lists, we continued to perform the majority of our manipulations in theatre.

There has, however, been a significant reduction in the number of both MUA + cast and MUA + K-wires performed across the region and a significant increase in the use of a manipulation in the plaster room. These figures are partially skewed by the uptake of plaster room manipulations in one DGH in the majority, although adoption of the BSCOS/Alder Hey guidelines is likely to have affected decision making to some degree to avoid theatre and in particular avoid aerosol generating procedures (AGPs) where possible.<sup>7</sup> These guidelines accepted that corrective surgery may be required for these patients and were written when the full effect of the pandemic on NHS services was unknown. Longer term follow-up and review is required to assess whether patients who would have ordinarily had surgical management require corrective surgery as a result of a change in practice.

Globally, paediatric cases of COVID-19 have made up a minority of cases, contributing to between 1% and 5% of total numbers.<sup>8</sup> There have been no positive tests for COVID-19 within our paediatric orthopaedic patients and low rates of positive tests were seen across Sheffield Children's NHS Foundation Trust, with only seven children testing positive as of 12 June 2020. Transmission rates of child to child and child to adults are low<sup>8</sup> and as a result, we have not had the same bed pressures that our DGHs have encountered. This has allowed us to transfer all regional paediatric trauma cases requiring surgery to our care, enabling us to provide the same high standard of surgical treatment where required, without any delay to theatre.

There was a 33% decrease in admission rates during the lockdown period, compared to 56% in the adult population.<sup>9</sup> This may represent a lack of paediatric comprehension of the lockdown rules, continued high

numbers of fractures sustained following a fall from a standing height and the fact the children have continued to use high-risk play equipment. Indeed, there was a significant increase in bicycle/scooter/roller-skate/skateboard injuries attending fracture clinic but many of these injuries were minor and did not require admission or surgical management.

There was a significant decrease in the age of patients admitted across the region between the two time periods. This is likely due to the ban on team sports and the limiting of outdoor activity. We know from previous epidemiological studies that sporting injuries are usually sustained by older children<sup>10</sup> and this corresponds with the reduction seen in our data.

Supracondylar fractures made up a significantly greater proportion of the injuries seen in fracture clinic during lockdown. This may be partly due to uptake of the BSCOS/Alder Hey guidelines for these injuries during COVID-19, with the recommendation for Gartland 2 injuries to be managed nonoperatively.<sup>1</sup> There is also established evidence to show that the rates of supracondylar fractures increase during school holidays and the most common mechanism is a fall from play equipment.<sup>11</sup>

There was no increase in trampoline related injuries that required orthopaedic input. This is despite the four-fold increase in the value of trampoline sales compared with 2019,<sup>5</sup> and the 42% increase in the sale of outdoor play equipment since last year. This conflicts with the data from Broomhill Hospital, where there was a 500% increase in trampoline-related injuries when they examined the injury rates during early lockdown.<sup>12</sup>

Rates of patients admitted with infection remained constant. This is reassuring as early during lockdown there was a concern that parents were delaying seeking medical assistance with non-COVID-19 related problems, resulting in increased morbidity.<sup>13</sup>

Despite the concerns at the start of lockdown, this region has seen a reduction in referrals to safeguarding. The authors acknowledge that the reasons for this could be multifactorial. There may be fewer incidences occurring due to all members of the family being at home during lockdown resulting in fewer occasions where an offending adult is left with a child alone. It may be that the incidence of abuse has remained constant or indeed increased as per the initial concerns at the start of lockdown and these children have not been able to be identified due to not being seen in school, nursery, or by other family or friends. Whichever of these it is, it remains vitally important that we as orthopaedic surgeons remain vigilant over this as a potential cause of injury and refer on to safeguarding where needed.

Fracture clinic has undergone significant changes during lockdown. The use of reinforced soft casting techniques has enabled parents to safely remove casts at home, avoiding unnecessary journeys to hospital where

possible. The accompanying adult was shown how to do this at time of cast application as well as given the link to the BSCOS online video,<sup>14</sup> and written instructions for removal of soft cast. This meant that a significant proportion of follow-up could take place over the phone while maintaining the option for the patient to attend in person if there were any concerns. Ongoing review of these patients is required to ensure no deleterious effect of these methods, but such treatment is well established as being safe and cost effective<sup>15</sup> and these changes in practice may drive an improvement in patient care and experience for the future.

This study does have limitations. The study includes a relatively small numbers of patients but by performing a multicentre study to include all hospitals within the ICS we believe adequate numbers have been included to achieve our aim of demonstrating the effects the UK lockdown has had on the paediatric orthopaedic trauma workload. The retrospective nature of the study leads to potential difficulties in the data collection, however, given hospital records are stored electronically in each unit we believe this possibility to be small and our dataset to be complete. This multicentre study examines the changes in trauma workload throughout a single region within the UK. However, we anticipate similar trends will have been experienced in paediatric orthopaedic departments throughout the country.

We reviewed the practice and management of paediatric orthopaedic trauma during the lockdown period of the SARS-CoV-2 pandemic. Low levels of COVID-19 were documented within the entire paediatric hospital population. The low levels of COVID-19 in paediatric inpatients, measures taken to reduce footfall and keep necessary patient contact to a minimum, and utilization of paediatric MTC theatre space to relieve DGHs of paediatric trauma have reduced the pressure on local hospitals treating adults.

We identified changes in mechanisms of injury, anatomical regions and median age of affected patients with an increase in the proportion of tibial fractures and a reduction in knee injuries. Increased trampoline sales have not caused significant changes to our workload and while we remain vigilant, the early concerns over increased incidences of NAI have not transpired.

Significant changes to standard practice were required in order to maintain appropriate trauma management. The guidelines for paediatric trauma management generated by BSCOS and Alder Hey hospital were adopted resulting in a significant decrease in both the number of MUAs and MUA+ K-wire procedures performed and a significant increase in the proportion of supracondylar fractures treated nonoperatively through fracture clinic.

Ongoing review is required to assess the impact of any changes in practice as a result of COVID-19.

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