



## ■ GENERAL ORTHOPAEDICS

# Has COVID-19 affected the number and severity of visits to a traumatology emergency department?

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## Aims

To assess the impact of the declaration of the state of emergency due to the COVID-19 pandemic on the number of visits to a traumatology emergency department (ED), and on their severity.

## Methods

Retrospective observational study. All visits to a traumatology ED were recorded, except for consultations for genitourinary, ocular and abdominal trauma and other ailments that did not have a musculoskeletal aetiology. Visit data were collected from March 14 to April 13 2020, and were subsequently compared with the visits recorded during the same periods in the previous two years.

## Results

The number of visits dropped from a mean of 3,212 in 2018 to 2019 to 445 in 2020. Triage 1 to 3 level visits rose from 21.6% in 2018 to 2019% to 40.4% in 2020, meaning a reduction in minor injury visits and an increase in major ones. There was a relative reduction of 13.2% in femoral fractures in the elderly. The rate of justified visits rose from 22.3% to 48.1%.

## Conclusion

A marked drop in the total number of visits to our traumatology ED was observed, as well as a relative increase in major injury visits and a relative fall in the minor ones.

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## Introduction

In late December 2019, an outbreak of a new coronavirus was recorded in Wuhan, China, named “severe acute respiratory syndrome from coronavirus 2” (SARS-CoV-2), and which was the cause of the coronavirus disease 19 (COVID-19).<sup>1</sup> On March 11 2020, the World Health Organization (WHO) declared the disease to be a pandemic; by then, 118,319 people were infected worldwide.<sup>2</sup> A month later, 1,492,680 new cases had been reported, of whom 95,398 died.<sup>3</sup>

This disease poses a challenge to public health due to its route of transmission and high rate of contagion.<sup>4</sup> Research is ongoing worldwide on its treatment and prevention.<sup>5</sup> Furthermore, the effectiveness of public health interventions to stop the progression of this disease has been demonstrated<sup>6</sup> and governments the world over have

implemented measures. In Spain, a state of emergency was declared on 14 March 2020.<sup>7</sup> Nevertheless, by 7 July 2020, 252,130 cases and 28,392 deaths had been reported in Spain (a case mortality rate of 11.3%).<sup>8</sup> Hospital emergency units in the country were overwhelmed during the pandemic.

Figures for 2007 indicate that 26,265,096 emergencies were attended, a rate that had risen by 23.2% between 2001 and 2007. An emergency is defined as an urgent situation that immediately endangers the life of the patient or the function of some organ.<sup>9</sup> However, many emergency department (ED) visits are considered unjustified.<sup>10,11</sup> During the state of emergency, one might expect the level of attention in the ED of some specialties to decrease.

The objective of the study was to determine the number of visits, and to assess their

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severity, recorded at a traumatology ED during the state of emergency declared by the Spanish government due to the COVID-19 pandemic.

## Methods

All visits to the traumatology ED from 14 March 2020 (the date of the beginning of complete lockdown due to COVID-19) until 13 April 2020 (when the complete lockdown was partially lifted in Catalonia) for musculoskeletal disorders, burns, and thoracic or cranial trauma were included ( $n = 445$ ).

These visits were subsequently compared with those seen ( $n = 6,424$ ) during the same period in the previous two years. Exclusion criteria were visits with genitourinary, ocular, and abdominal trauma, as well as other ailments that did not have a musculoskeletal aetiology. The study complied strictly with the ethical principles of biomedical research, and its protocol was approved by an independent Clinical Research Ethics Committee, Fundació Unió Catalana d'Hospitals (CEI 20/35). The requirement for informed consent was waived by the Ethics Committee.

Demographic data (sex and age) of patients consulting the emergency service, level of triage (according to the Andorran Triage Model),<sup>12</sup> and diagnosis were extracted from electronic medical records using a customized data-collection form. Hospitalization/non-hospitalization, and whether the visit was considered justified or unjustified were also recorded. The primary outcome was the total number of visits to a traumatology ED. Secondary outcomes were the number of visits for major and minor injuries.

The variables selected to define a visit as justified or unjustified were level of triage (1, 2, or 3), diagnosis of fracture or dislocation and hospital admission. Visits of patients presenting these three variables were considered justified.

**Statistical analysis.** Continuous variables were summarized using median and minimum-maximum range (MMR). Categorical variables were summarized using absolute values and relative frequency. We tested for significant differences between the 2018 to 2019 and 2020 periods. The Mann-Whitney U test was used for continuous variables. The  $\chi^2$  test was used to compare categorical variables. No missing data were reported in this paper. A two-sided  $\alpha$ -level of 0.05 was considered statistically significant. Data were analyzed using IBM SPSS Statistics v.25 (IBM, Armonk, New York, USA).

## Results

A fall in visits of 86.1% was observed between the two periods, from an annual average of 3,212 in 2018 to 2019, to 445 in 2020. The median age was 43 years (1 to 108) in 2018 to 2019, and 49 years (6 months to 101 years) in 2020. Regarding the sex of patients, 50.7% of

visits were made by females in 2018 to 2019, and 44.3% in 2020 ( $p = 0.011$ ).

Regarding triage, there was an increase in emergency visits (levels 1 to 3) and a decrease in non-emergency visits (levels 4 to 5). Triage levels 1 to 3 accounted for 21.5% of visits in 2018 to 2019, and 40.4% in 2020 ( $p < 0.001$ ).

In relation to diagnosis, results were classified according to aetiology (trauma or non-trauma). In 2018 to 2019, on average there were 1740 (54.2%) trauma visits and 1472 (45.8%) non-trauma visits. In 2020, 298 (67.0%) visits were trauma-related and 147 (33.0%) were not ( $p < 0.001$ ). Regarding hospitalizations, an average of 472 (14.7%) patients were admitted in 2018 to 2019, while 94 (21.1%) were admitted in 2020; ( $p < 0.001$ ).

There were relative increases in visits for major injuries in 2020: rises of 6.0% in traumatic brain injuries, 5.1% in femoral fractures, and 3.2% and 2.0% in upper and lower limb fractures, respectively. There was a relative reduction in the number of femoral fractures in the elderly (20.7%), and no patients with multiple injuries were observed. Visits for minor injuries also presented a relative decrease, and there were falls of 13.7% in painful disorders (the most common diagnosis in both periods) and of 6.5% in contusions. Table I shows diagnostic frequencies according to the study period.

The rates of justified visits rose from 22.3% (1,433 out of 6,424) in 2018 to 2019, to 48.1% (214 out of 445) in 2020; ( $p < 0.001$ ). Sorting by sex, females made 12.3% fewer non-justified visits in 2020 than males. Sorting by median age, patients with justified visits in both periods were older; and in 2020 the median age was higher, at 56 years (6 months to 101 years); ( $p < 0.001$ ).

## Discussion

During the state of emergency declared due to the COVID-19 pandemic, the total number of visits to our traumatology ED fell significantly. A relative increase in severe visits and a relative reduction in non-severe ones were observed. The proportion of justified visits also rose, and a relative reduction of 20.7% in femoral fractures in the elderly was found.

Previous infectious disease outbreaks had been reported to affect ED volumes. Studies of the impact of the Middle East respiratory syndrome (MERS) outbreak on emergency care in South Korea found a decrease in the number of ED visits,<sup>13,14</sup> and other studies of the SARS outbreak and its impact on ED visits in Canada and Taiwan, respectively, also recorded reduced ED visit volumes.<sup>15,16</sup>

It is important to analyze the factors that may have accounted for these decreases. First of all, due to the complete nature of the lockdown, only essential services (fire department, police, pharmacies, hospitals, and supermarkets) were operative, and only justified motor

**Table I.** Diagnoses per year.

Main diagnosis	2018 to 2019 (n = 3,212*)	2020 (n = 445)	Relative reduction (%)	p-value†
<b>Non-traumatic, n (%)</b>				
Painful disorder	1147 (35.7)	98 (22.0)	91.5	< 0.001
Soft tissue damage	846 (26.3)	112 (25.2)	86.7	< 0.608
Control visit	43 (1.4)	12 (2.7)	72.1	< 0.033
Burn	17 (0.5)	4 (0.9)	76.5	< 0.387
Surgical-site infection	5 (0.2)	1 (0.2)	80.0	0.736
<b>Traumatic, n (%)</b>				
Contusion	570 (17.7)	50 (11.2)	91.2	< 0.001
<b>Fracture, n (%)</b>				
Upper extremity	198 (6.2)	42 (9.4)	78.8	0.008
Lower extremity	103 (3.2)	23 (5.2)	77.7	0.033
Proximal femur‡	29 (0.9)	23 (5.2)	20.7	< 0.001
Rib	28 (0.9)	4 (0.9)	85.7	0.954
Spine	26 (0.8)	7 (1.6)	73.1	0.110
Facial fracture	17 (0.5)	4 (0.9)	76.5	0.334
Pelvis fracture	14 (0.4)	3 (0.7)	78.6	0.489
<b>Traumatic brain injury, n (%)</b>	125 (3.9)	44 (9.9)	64.8	< 0.001
<b>Dislocation, n (%)</b>	32 (1.0)	12 (2.7)	62.5	0.003
<b>Legal injury report, n (%)</b>	9 (0.3)	6 (1.3)	33.3	0.002
<b>Multiple injuries, n (%)</b>	3 (0.1)	0 (0.0)	0.0	0.519

\*Mean value.

†Chi-squared test.

‡≥ 65 years of age.

vehicle movements were permitted. Two immediate consequences can be inferred: the incidence of both motor vehicle accidents and occupational accidents (two of the main causes of ED visits) fell dramatically. Since indoor and outdoor sports were also forbidden (though not sporting activities at home), the incidence of sports-related injuries also fell. As regards the fall in the number of proximal femoral fractures in the elderly, an explanation might be the high mortality rate observed in the population over 65 years old due to the COVID-19 pandemic in Catalonia, both at home and in care facilities.<sup>17</sup>

Various explanations can be put forward for the major fall in trivial visits. Firstly, the general public were aware of the critical situation facing the EDs, and therefore decided not to go to hospital. Secondly, and not incompatible with the first, was the fear of becoming infected. For whatever reason, the general public decided to stay at home. We hope that this trend may lead to a more rational and appropriate use of emergency services in the near future. A progressive increase in the number of visits is expected in the post-emergency period (due to traffic, sport, etc...), but we trust that there will be fewer consultations for unimportant pathologies. If this turns out to be the case, the realization among the general public that hospital EDs should deal only with severely injured patients will be a positive outcome of the pandemic.

Our study has some limitations. Firstly, the screening of the different variables was carried out by searches of our traumatology ED database. In this scenario, an

undetermined number of patients may have been misdiagnosed, because other specialties may have attended patients with trauma lesions as a secondary diagnosis. However, all cases included were reliably diagnosed. Secondly, our study infers that the fall in proximal femoral fractures in the elderly was caused by the rise in the mortality in this age group, both at home and at care facilities, but we are unable to confirm this. Normally, elderly people fall and suffer fractures in their homes or nursing homes, and this situation did not change during the lockdown. We need to wait for future information from the Spanish Statistical National Institute to define the real mortality during the state of emergency due to the COVID-19 pandemic in this population. With this information at hand, more accurate studies of the impact of COVID-19 pandemic on traumatology EDs can be carried out.



### Take home message

- The total number of visits to a traumatology emergency department fell notably during the state of emergency imposed due to the COVID-19 pandemic.

- Major injury visits presented a relative increase, while minor injury visits presented a relative decrease.

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