The Epidemiology of Fractures and Muskulo-Skeletal Traumas During COVID-19 Lockdown: A Detailed Survey of 17,591 Patients in a Wide Italian Metropolitan Area

Andrea Dolci, MD¹, Giuseppe Marongiu, MD¹, Lorenzo Leinardi, MD¹, Massimo Lombardo, MD², Giuseppe Dessì, MD³, and Antonio Capone, MD, PhD¹

Abstract

Introduction: On 9 March 2020 the Italian Government declared a national lockdown to curb the spread of Covid-19. The aim of our study was to analyze the effects of such intervention on the traumatological emergency service, with particular emphasis on variations in trauma incidence and patients’ characteristics. Materials and Methods: An observational analysis was performed. Medical records were collected from 3 different trauma centers within a wide metropolitan area, and compared between 2 time periods: the full Italian lockdown period and the same period from the past year. The study population included all patients who were admitted to the Emergency Department (ED). For those who accessed for orthopedic reasons, the analyzed variables included the date of ED admission, age, gender, after visit discharge or hospitalization, place where the injury occurred, traumatic mechanism, diagnosis, relationship with sport activity, and time from injury/symptoms debut to ED access. Results: A total of 17,591 ED accesses and 3,163 ED trauma visits were identified. During the lockdown, ED trauma visits decreased by -59.8%, but required patient’s hospitalization significantly more frequently. The rate of ED trauma admissions in the elderlies significantly increased, together with the proportion of fragility fractures such as hip fractures. Road accident traumas (-79.6%) and sport-related injuries (-96.2%) significantly dropped. Admissions for less-severe reasons such as atraumatic musculoskeletal pain significantly decreased (-81.6%). Conclusions: The lockdown reduced the pressure on the Health System in at least 2 ways: directly, by curbing viral transmission and indirectly, by more than halving the ED trauma visits. Nonetheless, we observed an increased proportion of traumas in older patients, requiring hospitalizations, while the rate of less-severe cases decreased. This analysis may raise awareness of the effects of a lockdown on trauma services and may be helpful for those ones around the world who are now facing the emergency.

Keywords
COVID-19, pandemic, trauma, injury, lockdown, emergency

Submitted September 03, 2020. Accepted October 20, 2020.
outbreaks in the world, with nearly 270,000 confirmed cases and more than 35,000 deaths up to date (September 2, 2020). After the first person-to-person transmission on February 21, in Codogno, Lombardy, an infection chain led to a rapid spread of the virus. Within 24 hours, 36 new cases emerged in Lombardy and Veneto, leading the Italian Government to extraordinary measures. To contain the emerging threat, on February 23, the Government established a “red zone” of 11 towns and put them on lockdown, trying to minimize the likelihood that infected people came into contact with not infected ones. Despite this move, new cases kept raising and went from 1577 on March 1, to 7375 in just a week. Mathematical models predicted that if this trend continued, the number of patients requiring Intensive Care Unit (ICU) hospital treatment would have increased so much, that the number of ICU inpatients beds would have quickly reached saturation, picturing a dramatic scenario. For this reason, in order to curb the transmission and to avoid the National Health System (NHS) from collapsing, the Government increasingly extended the red zone. Eventually, on March 9, 2020, the entire country was declared under lockdown. Movement of individuals was limited in the whole Italian national territory unless strictly motivated by health or work reasons. Schools, universities, law courts stopped their activity. Museums, cinemas, theaters, and any other cultural, social, or recreational meeting place had to stay closed. Any private or public gathering, including sports events, mass, and funerals, was forbidden. Most shops had to stay closed. Only essential services such as supermarkets, pharmacies, or banks stayed open, although ensuring that customers would observe a minimum distance of 1 meter from each other and use face masks.

Over the course of the outbreak, the Italian NHS adopted many extensive organizational rearrangements, in order to face the worsening emergency state. Non-emergency procedures as elective surgeries were canceled or postponed. Many medical doctors, including Orthopedics, and nurses shifted in emergency departments, medical wards or COVID dedicated ICUs. Specific pathways and dedicated operating rooms were created for COVID patients. Certain hospitals were converted to COVID+ hubs and others were identified as COVID-free hubs.

Since social distancing strategies was adopted, the $R_0$ (basic reproductive rate) began decreasing and, on day 28 from the institution of the national lockdown, $R_0$ finally reached $<1$. The lockdown phase, also called “Phase 1,” ended on May 3, after 55 days. Hereafter, restriction measures were progressively relieved and “Phase 2” began. Such measures effectively curbed viral transmission and allowed the NHS to cope with the massive load of COVID patients. However, other indirect effects of the lockdown possibly helped to relieve the pressure on the NHS. Limited movements of individuals and a higher-sedentary lifestyle, could have played a role by reducing the incidence of traumas and their weight on the Emergency Departments (EDs). Aim of our study was: 1) to evaluate the impact of the Italian lockdown on the traumatological service in a wide metropolitan area, 2) to evaluate any variation in patients and traumas characteristics related to the lockdown. A cohort study was conducted.

Materials and Methods

Emergency Departments databases and trauma registries from 3 Trauma centers were reviewed and compared between 2 periods: the full Italian lockdown period (from 10 March 2020 to 3 May 2020, from now on referred to as Lockdown period) and the same period from the past year (from 10 March 2019 to 3 May 2019, from now on referred to as 2019* period).

All 3 Trauma centers are located in Cagliari, the capital city of Sardinia, and together they cover a catchment area of more than 560,000 inhabitants. They are the Marino Hospital (Level I Trauma Centre), the Trauma unit at Santissima Trinità Hospital (Level I Trauma Centre), and the Trauma Unit at Azienda Ospedaliera Brotzu (AOB) (Hub, specialized in polytraumas). Following Regional directives, on the beginning of March 2020, the Santissima Trinità Hospital was converted into a COVID hub. For this reason, over the course of the lockdown, the full load of trauma patients was redirected to Marino Hospital and AOB Trauma unit only, except in cases of confirmed COVID-19 positiveness.

The study population included all patients who were admitted to the ED and required the visit of an Orthopedic and Traumatology consultant. Inpatients admitted for elective surgery were excluded. Any trauma patient admitted to the ED twice or more during the time intervals, was counted separately for each episode. Inpatients who were transferred from a Trauma unit to another within the analyzed hospitals were counted only once. The total number of ED admissions in the 2 analyzed periods was collected to calculate the rate of admissions for orthopedic and trauma reasons only.

Quantitative variables included the age and date of ED admission. Qualitative variables included age group, gender, whether the patient was discharged after the ED trauma visit or hospitalized, the place where the injury occurred, traumatic mechanism, diagnosis, relationship with sport activity, and time from injury/symptoms debut to ED access (> or < than 48 hours).

The population was categorized into 6 age groups: pediatric (<14 years), adolescence-youth (15 to 24 years), young adult (25 to 44 years), adults (45 to 64), early elderly (65 to 79 years), and late elderly (> 80 years).

Since there was high data variability, we classified places, traumatic mechanisms, and diagnoses into sub-groups.

Places were classified into: (1) home; (2) sports facility (e.g. gyms, fields, courts, swimming pools, etc.), (3) workplace, (4) shop, (5) residential/nursing home, (6) school, (7) street (roads and sidewalks), (8) outdoor—meant as any outdoor place which was off limit during the lockdown—(e.g. parks, beaches, trails, etc.) and (9) place n/a (always related to atraumatic mechanisms).

Traumatic mechanisms were classified into: (1) fall from standing position, (2) fall from height, (3) blunt and/or strain trauma, (4) road accident trauma, (5) wound trauma,
Table 1. ED Overall Visits, After Orthopedic Visit Result (Discharge or Hospitalization), Time From Injury/Symptoms to ED Access, Age Groups.

|                        | 2019* | Lockdown | trend % | 2019* | Lockdown | Δ     | P value |
|------------------------|-------|----------|---------|-------|----------|-------|---------|
| **CATEGORIES**         |       |          |         |       |          |       |         |
| ED OVERALL VISITS      | 12.743| 4.848    | -62.0%  | 82%   | 81%      | -1.0  | < 0.001 |
| Not Orthopedic reason  | 10.487| 3.941    | -62.4%  | 18%   | 19%      | +1.0  | 0.1     |
| Orthopedic reason      | 2.256 | 907      | -59.8%  | 83%   | 76%      | -7.2  | 0.04    |
| ED ORTHOPAEDIC VISITS  |       |          |         |       |          |       |         |
| Not-Hospitalized       | 1.868 | 686      | -63.3%  | 83%   | 76%      | -7.2  | < 0.001 |
| Hospitalized           | 388   | 221      | -43.0%  | 17%   | 24%      | +7.2  | < 0.001 |
| **TIME FROM INJURY/SYMPTOMS TO ED ACCESS** | |          |         |       |          |       |         |
| Early (<48 h)          | 2.080 | 885      | -57.5%  | 92%   | 98%      | +5.4  | 0.2     |
| Delayed (>48 h)        | 176   | 22       | -87.5%  | 8%    | 2%       | -5.4  | < 0.001 |
| **AGE GROUPS**         |       |          |         |       |          |       |         |
| 0-14                   | 139   | 57       | -59.0%  | 6%    | 6%       | +0.1  | 0.9     |
| 15-24                  | 272   | 34       | -87.5%  | 12%   | 4%       | -8.3  | < 0.001 |
| 25-44                  | 471   | 147      | -82.8%  | 21%   | 16%      | -4.7  | 0.007   |
| 45-64                  | 648   | 277      | -57.3%  | 29%   | 31%      | +1.8  | 0.4     |
| 65-79                  | 415   | 207      | -50.1%  | 18%   | 23%      | +4.4  | 0.01    |
| 80+                    | 311   | 185      | -40.5%  | 14%   | 20%      | +6.6  | < 0.001 |

Comparison of the number of cases and rate between the analyzed periods.

(6) aggression, (7) atraumatic etiology (e.g. atraumatic musculoskeletal pain, atraumatic tendon lesions) and (8) other.

Diagnoses were classified into general and specific. General diagnoses included only the injury type (e.g. fracture, blunt and/or strain, dislocation, wound, amputation, polytrauma, tendon lesion, musculoskeletal pain). Specific diagnoses included the injury type and the anatomical areas (e.g. proximal femoral fracture, ankle blunt and/or strain trauma, shoulder dislocation). Patients with more than 1 fracture were grouped into multiple fractures and each fracture was listed. For practical reasons, polytrauma and wounds were not sub-grouped. In “other” we included a small variety of diagnoses that were not assignable to any other group (e.g. casting intolerance or breakage, infections, internal fixation intolerance, etc.).

**Statistical Analysis**

Data were extracted on Microsoft Excel sheets. A descriptive analysis of variables differences was conducted. Age was expressed as the mean ± standard deviation (SD). Qualitative variables were reported using the number of cases (absolute values – unweighted data) and rates (percentual – weighted data). The absolute values variation was reported in percentage (trend %) and the rate variation in percentual points (p.p.) difference (Δ). The data obtained were statistically analyzed using χ² test, with a 95% confidence interval (CI). We considered a 2-tailed 𝑝-value of ≤ 0.05 significant and of ≤ 0.001 highly significant. Data were analyzed using Microsoft Excel software.

**Results**

A total of 17,591 patients medical records were analyzed. Considering any medical reason, during the Lockdown period 4,848 patients were admitted at the EDs, registering a decrease of -62,0% compared to 2019* period.

A total of 3,163 ED visits for orthopedic and trauma reasons were identified: 2,256 in 2019* vs 907 in the Lockdown period (-59,8%), representing the 19% of the total of ED visits (+1% from 2019*). Patients’ mean age registered a mean increase of +6.5 years, going from a mean of 51 years (range 1-103) in the 2019*, to a mean of 57.5 years (range 2-100) in the Lockdown. Gender did not significantly change: females were 56.1% in 2019* and 59.7% in the Lockdown (p = 0.06).

Hospitals for trauma reasons also decreased, going from 388 in 2019* to 221 in the Lockdown. However, the hospitalization rate registered a highly significantly increase from 17% to 24% (p < 0.001).

Delayed ED presentations dropped (-87.5%) and their rate decreased from 8% to 2% of all orthopedic and trauma visits (p < 0.01). No COVID+ patients required traumatological assistance during the Lockdown period.

Injury rate in the <14 years (p = 0.9) and in the 45-64 years (p = 0.9) age groups did not significantly change between the analyzed periods. Among the 15-24, and 25-44 years age groups instead, we registered a significant decrease of injury rate (p < 0.001 and p = 0.007), while in the 65-79 years (p = 0.01) and > 80 years (p < 0.001) groups it significantly increased. These data are showed in Table 1.

Road accident traumas and atraumatic etiology cases registered the most significant decrease during the Lockdown. Road accident traumas drastically dropped (-79.6%) and their proportion highly significantly decreased from 11% to 6% (p < 0.001). Likewise, atraumatic aetologies cases highly significantly decreased (-80.8%) and their proportion went from 9% to 5% (p < 0.001). All fall-related traumas proportionally increased highly significantly (p = 0.004). We also registered
a significant drop in aggression-related cases (-86.8%; p = 0.01). The rate of wound and blunt and/or strain traumatic mechanisms remained relatively stable (p = 0.07). Finally, we registered a highly significant decrease in sport-related injuries (-96.2%), which proportionally dropped from 13% to 1% (p < 0.001).

As expected, during the Lockdown no traumas occurred at school (p = 0.07), sports facilities (p < 0.001) and in all those places that became off-limits (outdoor) (p = 0.007). Homes and streets were the 2 most frequent places for injury occurrence in both analyzed periods. Street injuries dropped (-81.3%) and their rate highly significantly decreased by 15p.p. (p < 0.001). Home injuries cases, despite decreasing (-31.3%) in the Lockdown, showed a proportional increase from 42% to 71% (+29.6, p < 0.001). Among them, the most significantly decreased were backpain (p = 0.02) and shoulder pain (p = 0.01). Finally, we observed that polytraumas went from 10 to 6 cases, but their proportion remained stable during the Lockdown (p = 0.4). These data are showed in Table 3.

**Discussion**

The COVID-19 Lockdown, which was declared in Italy from 9 March 2020, inevitably changed the behavior of an entire population, confining people in the domestic environment, interrupting sports activities and reducing road traffic. Moreover, many extensive organizational rearrangements of healthcare system were made, and hospitals were converted to COVID+ hubs and others were identified as COVID-free hubs in the entire national territory. The purpose of our survey was to evaluate whether the COVID-19 Lockdown has affected the incidence of traumatic events and fractures in the population of a wide metropolitan area by monitoring the number of visit performed by orthopedic consultants in the Emergency Department of the Cagliari Metropolitan Area.

Table 2. Traumatic Mechanisms, Sport-Relationship of the Injuries and Place Where They Occurred.

| TRAUMATIC MECHANISMS | CASES 2019* | Lockdown | trend % | 2019* | Lockdown | △ | P value |
|----------------------|-------------|----------|---------|-------|----------|---|--------|
| Fall from standing position | 1,292 | 599 | -53.6% | 57% | 66% | +8.8 | 0.004 |
| Blunt and/or Strain trauma | 303 | 127 | -58.1% | 13% | 14% | +0.6 | 0.7 |
| Road accident trauma | 245 | 50 | -79.6% | 11% | 6% | -5.3 | < 0.001 |
| Attraumatic etiology | 214 | 41 | -80.8% | 9% | 5% | -5.0 | < 0.001 |
| Fall from height | 83 | 55 | -33.7% | 4% | 6% | +2.4 | 0.004 |
| Wound trauma | 79 | 29 | -63.3% | 4% | 3% | -0.3 | 0.7 |
| Aggression | 38 | 5 | -86.8% | 2% | 1% | -1.1 | 0.01 |
| Other | 2 | 1 | -50.0% | 0% | 0% | +0.0 | 0.9 |

**SPORT-RELATED**

| CASES | 2019* | Lockdown | trend % | 2019* | Lockdown | △ | P value |
|-------|-------|----------|---------|-------|----------|---|--------|
| No | 1,970 | 896 | -54.5% | 87% | 99% | +11.5 | 0.002 |
| Yes | 286 | 11 | -96.2% | 13% | 1% | -11.5 | < 0.001 |

**PLACES**

| CASES | 2019* | Lockdown | trend % | 2019* | Lockdown | △ | P value |
|-------|-------|----------|---------|-------|----------|---|--------|
| Home | 942 | 647 | -31.3% | 42% | 71% | +29.6 | < 0.001 |
| Street | 635 | 119 | -81.3% | 28% | 13% | -15.0 | < 0.001 |
| Sports facility | 252 | | -100.0% | 11% | 0% | -11.2 | < 0.001 |
| Place n/a | 173 | 35 | -79.8% | 8% | 4% | -3.8 | < 0.001 |
| Workplace | 120 | 70 | -41.7% | 5% | 8% | +2.4 | 0.01 |
| Outdoor | 63 | | -100.0% | 3% | 0% | -2.8 | 0.007 |
| School | 28 | | -100.0% | 1% | 0% | -1.2 | 0.07 |
| Residential/nursing home | 24 | 20 | -16.7% | 1% | 2% | +1.1 | 0.01 |
| Shops | 19 | 16 | -15.8% | 1% | 2% | +0.9 | 0.03 |

Comparison of the number of cases and rate between the analyzed periods.
This analysis highlighted a general decrease in ED trauma visits by -59.8% over the course of the lockdown (Figure 1).

This finding gives the opportunity to do multiple observations. During the lockdown, no inward and outward movement of any person within the national territory was allowed, including movements between neighboring towns. Several checkpoints were installed across the roads and strict action was taken against those who violated the prohibition. As a matter of fact, from day 1, streets became almost desertic.

Indeed, as observed in this analysis, there was a statistically significant reduction of injuries occurred in the streets during the Lockdown (-81.3%). Road accident traumas, the 3rd most

Table 3. General Diagnosis, Specific Diagnosis and Fractures.

| GENERAL DIAGNOSIS               | CASES 2019* | Lockdown trend % | PROPORTION % 2019* | Lockdown trend % | △    | P value |
|---------------------------------|------------|-----------------|--------------------|-----------------|------|---------|
| Blunt and/or strain             | 835        | 307             | -63.2%             | 37%             | 34%  | -3.2    | 0.2    |
| Upper limb fracture             | 523        | 222             | -57.6%             | 23%             | 24%  | +1.3    | 0.5    |
| Lower limb fracture             | 360        | 201             | -44.2%             | 16%             | 22%  | +6.2    | <0.001 |
| Musculoskeletal pain            | 163        | 30              | -81.6%             | 7%              | 3%   | -3.9    | <0.001 |
| Wound/amputation                | 119        | 43              | -63.9%             | 5%              | 5%   | -0.5    | 0.5    |
| Dislocation                     | 75         | 21              | -72.0%             | 3%              | 2%   | -1.0    | 0.1    |
| Vertebral fracture              | 70         | 25              | -64.3%             | 3%              | 3%   | -0.3    | 0.6    |
| Pelvic fracture                 | 31         | 20              | -35.5%             | 1%              | 2%   | +0.8    | 0.1    |
| Tendon lesion                   | 31         | 9               | -71.0%             | 1%              | 1%   | -0.4    | 0.4    |
| Multiple fracture               | 23         | 16              | -30.4%             | 1%              | 2%   | +0.7    | 0.09   |
| Other                           | 16         | 7               | -56.3%             | 1%              | 1%   | +0.1    | 0.9    |
| Polymyopathia                   | 10         | 6               | -40.0%             | 0%              | 1%   | +0.2    | 0.4    |

SPECIFIC DIAGNOSIS (TOP 10 of 2019*)

Not hospitalized
1. Distal radius fracture        | 177        | 90              | -49.2%             | 9%              | 13%  | +3.6    | 0.9    |
2. Ankle blunt and/or strain trauma | 177 | 71              | -59.9%             | 9%              | 10%  | +0.9    | 0.9    |
3. Knee blunt and/or strain trauma | 149 | 34              | -77.2%             | 8%              | 5%   | -3.0    | 0.5    |
4. Hand blunt and/or strain trauma | 129 | 43              | -66.7%             | 7%              | 6%   | -0.6    | 0.7    |
5. Finger phalanx fracture        | 101        | 18              | -82.2%             | 5%              | 3%   | -2.8    | 0.9    |
6. Wound                         | 92         | 25              | -72.8%             | 5%              | 4%   | -1.3    | 0.7    |
7. Proximal humeral fracture      | 81         | 27              | -66.7%             | 4%              | 4%   | -0.4    | 0.9    |
8. Wrist blunt and/or strain trauma | 62 | 13              | -79.0%             | 3%              | 2%   | -1.4    | 0.5    |
9. Foot blunt and/or strain trauma | 60 | 46              | -23.3%             | 3%              | 7%   | +3.5    | 0.8    |
10. Backpain                     | 60         | 20              | -66.7%             | 3%              | 3%   | -0.3    | 0.8    |

Hospitalized
1. Proximal femoral fracture      | 123        | 97              | -21.1%             | 32%             | 44%  | +12.2   | 0.8    |
2. Proximal humeral fracture      | 25         | 13              | -48.0%             | 6%              | 6%   | -0.6    | 0.8    |
3. Malleoli fracture              | 25         | 9               | -64.0%             | 6%              | 4%   | -2.4    | 0.8    |
4. Distal radius fracture         | 16         | 9               | -43.8%             | 4%              | 4%   | -0.1    | 0.8    |
5. Femoral diaphysis fracture     | 15         | 8               | -46.7%             | 4%              | 4%   | -0.2    | 0.8    |
6. Wound                         | 13         | 7               | -46.2%             | 3%              | 3%   | -0.2    | 0.8    |
7. Lumbar vertebrae fracture      | 18         | 13              | -27.8%             | 5%              | 6%   | +1.2    | 0.8    |
8. Pelvic fracture                | 17         | 1               | -94.1%             | 4%              | 0%   | -3.9    | 0.8    |
9. Tibial and/or fibular diaphysis fracture | 13 | 2              | -84.6%             | 3%              | 1%   | -2.4    | 0.8    |
10. Proximal tibial fracture      | 10         | 2               | -80.0%             | 3%              | 1%   | -1.7    | 0.8    |

FRACTURES (TOP 10 of 2019*)

1. Distal radius fracture         | 193        | 99              | -48.7%             | 20%             | 21%  | +1.6    | 0.5    |
2. Proximal femoral fracture      | 123        | 97              | -21.1%             | 13%             | 21%  | +8.3    | <0.001 |
3. Proximal humeral fracture      | 106        | 40              | -62.3%             | 11%             | 9%   | -2.2    | 0.7    |
4. Finger phalanx fracture        | 102        | 20              | -80.4%             | 10%             | 4%   | -6.2    | 0.003  |
5. Malleoli fracture              | 75         | 32              | -57.3%             | 8%              | 7%   | -0.8    | 0.8    |
6. Metatarsal fracture            | 59         | 20              | -66.1%             | 6%              | 4%   | -1.7    | 0.8    |
7. Lumbar vertebrae fracture      | 55         | 16              | -70.9%             | 6%              | 3%   | -2.2    | 0.3    |
8. Metacarpal fracture            | 53         | 15              | -71.7%             | 5%              | 3%   | -2.2    | 0.2    |
9. Pelvic fracture                | 30         | 20              | -33.3%             | 3%              | 4%   | +1.2    | 0.08   |
10. Proximal tibial fracture      | 19         | 2               | -89.5%             | 2%              | 0%   | -1.5    | 0.052  |

All others                       | 159        | 114             | -28.3%             | 16%             | 25%  | +8.3    | 0.052  |

Overall fractures                | 974        | 463             | -52.5%             | 100%            | 100% |        |
common reason for ED trauma admission of 2019*, highly significantly dropped. This result is in line with other literature reports.\textsuperscript{14}

The strict rules of the Italian lockdown forced people to a high-sedentary lifestyle and a less-risky behaviors. As sports facilities closed and outdoor areas became off-limits, sports injuries highly significantly decreased (-96.2\%). Only 11 patients requested ER trauma visit for sport-related injuries, occurred while exercising at home. Among sports injuries, the most common overall was knee blunt and/or strain trauma, the rate of which indeed significantly reduced. Moreover, ED trauma admissions significantly decreased in the adolescence-youth and young adult age groups (15 to 44 years), which are likely the most sport active populations.

"Io resto a casa"—"Stay home"—was the so-called name given to the Government ordinance that put Italy in lockdown. Not surprisingly we observed a significant increase in home injury rate compared to 2019*. In the COVID era, people became used to concepts such as home-schooling and smart-working, as houses turned into schools for children and workplaces for adults. Among the home injuries, we observed an increased rate of polytraumas and multiple fractured patients. An explanation could be that since many repairmen stopped working, some people found themselves performing odd jobs and repairs at home on their own, perhaps without expertise or safety measures. Moreover, at home people spent more time in activities such as cleaning and cooking,\textsuperscript{15} which could explain the increased rate of finger sub-amputations.

COVID-19 appears to most severely affect the elderly and the frails with comorbidities.\textsuperscript{16} Although isolation has saved many lives, on the other hand it represented a serious health concern for the elderly, for the increased risk of cardiovascular, neurocognitive, mental health problems.\textsuperscript{17} Alone and vulnerable in this situation, there was also a reliable heightened risk for injuries. In our analysis, we reported a significant increase of ED trauma admissions among the elderly (> 65years). We observed a statistically significant increase in fragility fractures rate, such as distal radius fractures and proximal femoral fractures. Vertebral fractures rate remained stable. We also noticed a significant increment of trauma rate among residential/nursing homes. The pediatric population (<14 years), on the other hand, seemed not to be significantly affected by the lockdown and the rate of ED trauma accesses stayed equal to 2019*.

We observed a significant increase in fall from height rate. One of them, a fall from 5 meters, was a suicidal attempt. According to the Brain Research Foundation, the economic and social consequences of the pandemic may have a strong impact on mental health. For this reason, they instituted the COVID-19 Suicides Observatory. From the beginning of March, 41 suicides and 28 attempts were reported in Italy.\textsuperscript{18} Whether our case was related to COVID-19 was not determined, but this issue calls for public attention and healthcare workers’ awareness, including Orthopedics. Social-distancing may also increase the risk of family violence and worldwide reported cases of domestic violence dramatically raised.\textsuperscript{19} However, our analysis showed a significant reduction in aggression-related injuries.

Another interesting finding of our analysis is the highly statistically relevant variation in hospitalization rate after ED trauma admission. This may be explained by the increase of patients’ mean age (+6.5 years), the increased rate of elderly ED trauma accesses, the decrease of admissions for less-severe cases, and by the distribution of traumas rate toward surgery-requiring cases, such as proximal femoral fracture.
which was the most represented diagnosis among the Hospitalized group. Another study conducted by Nunez et al reported similar results.20

Diagnostics such as atraumatic musculoskeletal pain (back, shoulder pain, knee pain, hip pain) in 2019* counted for the 6.7% of all ED trauma visits, while in the Lockdown counted for the 3%. This difference was highly statistically significant. Crowding is a well-known major issue for many EDs worldwide. Since Italian emergency service offers a free of charge immediate assistance, every year many patients un-appropriately flood the EDs with nonurgent problems.21

The global awareness of the risks of contagion in hospitals might have inhibited patients from referring to ED for minor problems. This said, reduced mobility caused by less physical activity and long hours sitting due to smart working adoption, perhaps could have been the predisposing factors to increased backpain cases.22 A reliable explanation could be that the tendency to overuse the ED, for unjustified nonurgent accesses, decreased and patients referred to the emergency service more properly in the lockdown. This theory could also be supported by the highly significant decrease of ED delayed accesses rate during the Lockdown period (from 8% to 2%), although the fear of contagion might still have played a role.

The limitation of the current study is its retrospective design. Strengths are that it analyzed the full Italian lockdown period, collecting various quantitative and qualitative data, from 3 different trauma centers (2 level-I trauma centers and 1 HUB), with large sample size.

Conclusions

The pandemic reshaped our lives in many different ways, bringing up new challenges and redefining roles. The Italian NHS is facing the biggest challenge in its history and every single citizen plays a crucial role in the COVID-19 fight. Whether working in hospitals or staying at home, only through cooperation and solidarity we will overcome this major challenge. The lockdown resulted in an effective move because it reduced the pressure on the NHS in at least 2 ways: directly, by curbing viral transmission and indirectly, by more than halving the ED trauma visits. Nevertheless, from an orthopedic and traumatological perspective, it’s necessary to take into account an increased rate of surgery-requiring traumas in older patients, while the rate of accesses for non-emergent and less-severe cases decreased. This analysis may raise awareness of the effects of a lockdown on trauma services and may be helpful for those ones around the world who are facing the emergency or will in the future. Finally, it should make us reflect upon the correct use of emergency services and reconsider a reinforcement of the public health outpatient settings.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Supplemental Material

Supplemental material for this article is available online. For all specific diagnoses results please refer to the online supplementary table (Table 4).

References

1. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395(10223):497-506. doi:10.1016/S0140-6736(20)30183-5
2. Coronavirus Study Group of the International Committee on Taxonomy of Viruses. The species severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. Nat Microbiol. 2020;5(4):536-544. doi:10.1038/s41556-020-0452-z
3. WHO Director-General’s opening remarks at the media briefing on COVID-19—11 March 2020. Accessed April 26, 2020. https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19—11-march-2020
4. WHO Coronavirus Disease (COVID-19) Dashboard. Accessed September 2, 2020. https://covid19.who.int
5. Coronavirus Update (Live): 26,093,528 cases and 864,563 deaths from COVID-19 virus pandemic—worldometer. Accessed September 2, 2020. https://www.worldometers.info/coronavirus/?utm_campaign=homeAdUOA
6. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? Lancet. 2020;395(10231):1225-1228. doi:10.1016/S0140-6736(20)30627-9
7. Salute M della. Covid-19—Situazione in Italia. Accessed May 26, 2020. http://www.salute.gov.it/Portale/nuovocoronavirus/dettagliContenutiNuovoCoronavirus.jsp?lingua=italiano&id=5351&area=nuovoCoronavirus&menu=nuovo
8. Gazzetta Ufficiale. Accessed May 26, 2020. https://www.gazzettaufficiale.it/eli/id/2020/02/23/20A01228/sg
9. Gazzetta Ufficiale. Accessed May 26, 2020. https://www.gazzettaufficiale.it/eli/id/2020/03/09/20A01558/sg
10. Placella G, Salvato D, Delmastro E, Bettinelli G, Salini V. CoViD-19 and ortho and trauma surgery: the Italian experience. Injury. Published online April 15, 2020. doi:10.1016/j.injury.2020.04.012
11. Giordano G, Blanchini F, Bruno R, et al. Modelling the COVID-19 epidemic and implementation of population-wide interventions in Italy. Nat Med. Published online April 22, 2020. 26(6):855-860. doi:10.1038/s41591-020-0883-7
12. Gazzetta Ufficiale. Accessed May 26, 2020. https://www.gazzettaufficiale.it/eli/id/2020/04/27/20A02352/sg
13. Popolazione residente al 1° gennaio. Accessed May 29, 2020. http://dati.istat.it/Index.aspx?DataSetCode=DCIS_POPRES1
14. Oguzoglu U. COVID-19 lockdowns and decline in traffic related deaths and injuries. Published online 2020:19
15. Saha S, Dutta DT. A study on the psychological crisis during the lockdown caused due to Covid-19 pandemic. Afr J Biol Sci. 2020;3(2):41-49.
16. Liu K, Chen Y, Lin R, Han K. Clinical features of COVID-19 in elderly patients: a comparison with young and middle-aged patients. *J Infect*. 2020;80(6):e14-e18. doi:10.1016/j.jinf.2020.03.005

17. Armitage R, Nellums LB. COVID-19 and the consequences of isolating the elderly. *Correspondence*. 2020;5(5):E256. Published March 19, 2020. doi:https://doi.org/10.1016/S2468-2667(20)30061-X

18. Osservatorio suicidi e tentati suicidi Covid-19. Fondazione BRF. Accessed June 1, 2020. https://www.fondazionebrf.org/osservatorio-suicidi-covid-19/

19. Campbell AM. An increasing risk of family violence during the Covid-19 pandemic: strengthening community collaborations to save lives. *Forensic Sci Int Rep*. 2020;2:100089. doi:10.1016/j.fsir.2020.100089

20. Nuñez JH, Sallent A, Lakhani K, et al. Impact of the COVID-19 pandemic on an emergency traumatology service: experience at a tertiary trauma centre in Spain. *Injury*. 2020;51(7):1414-1418. Published online May 13, 2020. doi:10.1016/j.injury.2020.05.016

21. Moskop JC, Sklar DP, Geiderman JM, Schears RM, Bookman KJ. Emergency department crowding, part 1—concept, causes, and moral consequences. *Ann Emerg Med*. 2009;53(5):605-611. doi:10.1016/j.annemergmed.2008.09.019

22. Cofano F, Tartara F, Zenga F, Penner F, Lanotte M, Garbossa D. Letter: back pain and accesses to emergency departments during COVID-19 lockdown in Italy. *Neurosurgery*. 2020;87(2):E211. Published online May 1, 2020. doi:10.1093/neuros/nyaa174