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CE-RESEARCH LETTER TO THE EDITOR

Smart-working policies during COVID-19 pandemic: a way to reduce work-related traumas?

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Abstract

Eighth of March 2020, the Italian government introduced a national lockdown to counter the exponential increase in the number of COVID-19 cases; this decision avoided putting a strain on the health system. During the lockdown all non-essential services were stopped and a "stay at home" order was imposed. The purpose is to evaluate the impact of COVID-19 lockdown on Emergency Department (ED) visits due to work-related traumas in the Lombardy region. We performed a retrospective analysis on trauma admissions to the ED registered through the regional portal (EUOL), from 1st January 2019 to 31st December 2019 and from 1st January 2020 to 31st December 2020. The number of ED admissions for traumatic injury and work-related traumas dropped by 32% between 2019 and 2020. A remarkable reduction of work-related traumas was recorded during the two pandemic waves, from March to June and in October and November. The percentage of patient in critical condition in ED slightly raised. These results are probably a consequence of the unprecedented measures imposed by the Italian government to cope with the spread of COVID-19, with important implications for work contexts. This analysis should be considered to optimise the organisation of the emergency system in other critical scenarios. We speculate that the different epidemiology of occupational injuries during the lockdown period is a consequence of smart-working policies that can be held responsible for the drastic reduction of work-related traumas.

Keywords Traumatic occupational injuries · Trauma · Lockdown · emergency department

Lombardy was the first Italian region to report a case of Coronavirus Disease 2019 (COVID-19) on the 20th of February. The Italian government decided to introduce a national lockdown on 8th of March to reduce the exponential increase in the number of COVID-19 cases and to avoid adding strain to health system. During the lockdown, all non-essential services were stopped and a "stay at home" order was imposed [1]. Therefore, during that period, the number of trauma admissions into the Emergency Department (ED) decreased in Italy, and similarly in other countries where that measures were imposed [2, 3]. Moreover, as reported in countries with similar lockdowns [4, 5], recorded work-related traumas were lower. In fact, the reduction of trauma hospitalisations during this period was associated with a reduction of sports-related injuries [6], injuries related to road traffic accident [2] and injuries occurring in educational [3, 7] and occupational settings [3].

In the Lombardy region, the Regional Emergency-Urgency Agency (*AREU, Agenzia Regionale Emergenza Urgenza*) coordinates and provides pre-hospital Emergency Medical Services (EMS) in the region [8, 9]. During the pandemic, the system implemented several measures to cope with the different needs required by the population due to COVID-19, including the reorganisation of the system and the different use of available resources [9–11].

With this letter we would like to address the change in the epidemiology of work-related traumas by analysing the

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impact of COVID-19 lockdown on admission to the Emergency Department (ED) for traumatic occupational injuries in the Lombardy region. Indeed, these data should be useful to organise the system according to the needs during catastrophic events, such as the first pandemic outbreak.

We performed a retrospective analysis of admissions to ED registered on the regional online portal called EUOL (*Emergenza e Urgenza OnLine*), from 1st January 2019 to 31st December 2019 and from 1st January 2020 to 31st December 2020. The study was conducted according to the principles of the declaration of Helsinki and was approved by the AREU Data Protection Officer (DPO) in June 2021. We performed the analysis on the data of patients registered on EUOL who were admitted to the ED (i) for trauma and (ii) for work-related trauma. All data were analysed using STATA. Categorical variables are presented as number and percentage; the z-ratio test was used to locate differences between 2019 and 2020.

Table 1 shows ED admission for trauma and work-related traumas in both 2019 and 2020. During 2020, the total number of admissions to the ED decreased by 32% compared to 2019, for both causes. The number of ED admissions for trauma also decreased significantly from 532,256 in 2019 to 333,095 in 2020 (37%, Table 1). A significant reduction of almost 30% was observed for work-related traumas in 2020 (48,216) compared to 2019 (70,525).

Fig. 1 shows the number of monthly diagnoses for work-related traumas, between 2019 and 2020.

This figure shows that in 2020 the *nadir* of work-related traumas was achieved in April. After that, admissions for work-traumas increased again. There is a significant and remarkable reduction for work-related traumas from March to June and in October–November. No differences were found before pandemic (January and February), in summer and in December.

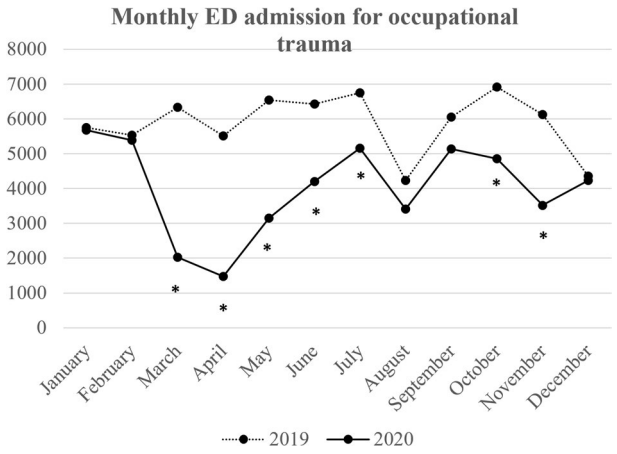

Fig. 1 Number of patients admitted to Emergency Departments for work-related trauma in 2019 (dashed line) and 2020 (continuous line). $^{*}P < 0.0001$

The number of patients admitted to hospitals with yellow or red code, resulting in hospitalisation or death were 1232 and 1017 for 2019 and 2020, respectively, and the percentage of patients with work-related trauma in critical clinical condition with an unfavourable outcome (hospitalisation or death) on the total of ED admission (Table 1) increased slightly (1.7% versus 2.1%, OR 1.12 [1.11–1.32], $P < 0.0001$).

Table 2 shows number of patients (and their percentages) admitted for work-related trauma arrived on foot or by ambulance into ED.

Table 1 Total, trauma and work-related trauma admissions to the Emergency Department (ED) in 2019 and 2020

	Total number of ED admission		ED admission for trauma (% out of total admissions)		ED admission for work-related (% out of total admissions for trauma)	
SOREU	2019	2020	2019	2020	2019	2020
Laghi	624,835	440,291	90,268 (14.4)	61,890 (14.1)	11,462 (12.7)	8,598 (13.9)
Alpi	1,026,176	694,702	155,485 (15.2)	96,953 (14.0)	23,714 (15.3)	16,450 (17.0)
Pianura	567,545	393,341	86,233 (15.2)	50,030 (12.7)	14,570 (16.9)	9,963 (19.9)
Metropolitana	1,297,406	872,058	200,270 (15.4)	124,222 (14.2)	20,779 (10.4)	13,205 (8.0)
Total lombardy	3,515,962	2,400,392	532,256 (15.1)	333,095 (13.9)	70,525 (13.3)	48,216 (14.5)

Table 2 Patients who arrived at the emergency department of foot or by ambulance, and their percentage, out of the total number of work-related trauma

	Ambulance		Walk-in		Other	
SOREU	2019 (%)	2020 (%)	2019 (%)	2020 (%)	2019 (%)	2020 (%)
Laghi	1,481 (13.2)	1,192 (14.4)	9,562 (85.1)	7,077 (85.4)	419 (3.7)	329 (3.8)
Alpi	2,263 (9.5)	1,711 (10.4)	21,232 (89.5)	14,578 (88.6)	219 (0.9)	161 (1.0)
Pianura	1,784 (12.7)	1,431 (14.9)	11,152 (79.4)	7,612 (79.3)	1,634 (11.2)	920 (9.2)
Metropolitana	4,596 (22.9)	2,965 (23.2)	15,364 (76.7)	9,629 (75.3)	819 (3.9)	611 (4.6)
Total lombardy	10,124 (14.7)	7,299 (15.5)	57,310 (83.0)	38,896 (82.5)	3,091 (4.4)	2,021 (4.2)

Discussion

We assessed the impact of lockdown on ED presentations for work-related trauma in the Lombardy region. Our study found that since February 2020, when non-pharmacological interventions to control the spread of COVID-19 were implemented [1], the number of ED accesses decreased by 30% compared to 2019. This reduction can be related to two aspects. The first is the closure of many work activities during the lockdown. During lockdown many industries have reduced their production, and many workers received a sort of compensation similar to unemployment, while keeping their jobs. Another condition resulting from the lockdown was smart working, which allowed many workers to continue working while staying at home. Both conditions contributed to a significant reduction in road traffic, resulting in fewer accidents. It should be noted that accidents occurring on the way to work are defined by Italian law as work-related trauma. ED visits have decreased dramatically: during the lockdown, all non-essential services were interrupted and the central government imposed a "stay at home" order. This may have led to a reduction in ED visit. These data were discussed by Stirparo et al. [9].

In the ED, the number of accesses for work-related traumas decreased compared to 2019, while the proportion of ED visits for work-related traumas out of total traumatic injuries increased slightly. Other studies from United Kingdom, Ireland [3] and the Netherlands [6] reported a marked reduction in trauma-related admissions during lockdown. Moreover, our results showed that a higher percentage of work-related trauma patients were in a critical clinical conditions, resulting in a higher rate of hospitalisation or death, in 2020 than in 2019.

These findings have important implications for public health. Indeed, reduced demand for trauma services during the national lockdown may have important impact on allocation of resources and organisation of trauma centres during the lockdown periods. In this regard, six "highly specialised trauma centres" (CTS—centro trauma di alta specializzazione) and "local trauma centres with neurosurgery (CZT—centro trauma zonale con neurochirurgia) were active in the Lombardy region in 2019 [12]. During the first lockdown, the number of centres was reduced by the local health authority to ensure an adequate centralisation of COVID-19 patient. The regional health government decided to reorganise the clinical and surgical activities for emergency time-related diseases to continue treating life-threatening patients during the COVID-19 outbreak. The time-related pathologies involved were: stroke, major trauma, neurosurgical emergencies, cardio surgery, vascular surgery and emergency interventional cardiology. Each hub hospital was selected as a reference for one or more of the above-mentioned diseases. The aim of this model was to centralise medical expertise and technology in the hub-and-spoke network and to direct all patients who needed these services to this central site in order to achieve better efficiency. The reorganisation was based on hub-and-spoke networks; indeed, each hub hospital is connected to a pre-established network of spoke hospitals and surgeons or medical staff from spoke hospitals would have to travel to hub hospitals to perform procedures. Therefore, there are more changes in the ED department and in the Emergency Medical Service (EMS) [8–10, 13–15].

Figure 1 shows the number of work-related trauma diagnoses made by ED in the Lombardy region, with the absolute monthly number reported for 2019 (dashed line) and 2020 (continuous line). Each month was correlated with a different mandatory restriction imposed by the Central Government. The general lockdown started from 8 March 2020 to 18 May 2020; during this period, the central government imposed the closure of activities, and the data show the greatest reduction in work-related trauma diagnoses in the month of March, April and May (− 63%). From June to September (− 20%), a gradual reopening of productive activities took place, but smart working was still mandatory for many categories of workers. During the second wave, from October to December 2020, we recorded another strong reduction in work-related traumas; in October and November there was a more pronounced reduction, but during in December, due to the Christmas holiday, the restriction was reduced, indeed, in December the number remained the same in both 2019 and 2020. We can consider the smart working as an important public health tool for the prevention of work-related traumas, as the reduction is not only linked to the months

of the outbreak but also to different seasons, in which only smart working was implemented in the Lombardy region.

This study has some limitations: we did not analyse the location of the traumas, nor demographic data. However, this study analysed work-related trauma data in Lombardy, a region with a population of approximately ten million people, and thus contributes data to a field where there is a paucity of evidence at present.

In conclusion, the unprecedented measures imposed by the Italian government to address the spread of COVID-19 had important implications for workplaces, changing the epidemiology of work-related traumas during the COVID-19 lockdown period, with a marked reduction in work-related injuries. Smart-working policies can be held responsible for this drastic reduction and these data may be used to organise the system in case of further emergency scenarios.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Human and animal rights statement and Informed consent The study was conducted according to the principles of thedeclaration of Helsinki and was approved by the AREU Data Protection Officer (DPO) in June 2021

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