

## Original Article

Dan Med J 2022;69(8):A11210831

# The first COVID-19 lockdown's impact on hand injuries at a Danish accident and emergency department

Emil Ainsworth Jochumsen, Jens Lauritsen, Anders Lorentsen &amp; Søren Larsen

Department of Orthopaedic Surgery, Odense University Hospital, Denmark

Dan Med J 2022;69(8):A11210831

**ABSTRACT**

**INTRODUCTION.** During the lockdown of the COVID-19 pandemic in Denmark in March 2020, the trauma Accidents and Emergency (A&E) Department of Odense University Hospital, Denmark, experienced a marked decline in visits. We had the impression that the decline in visits for non-severe injuries was larger than that for severe injuries.

**METHODS.** We analysed the incident rate ratio (IRR) between the first month of the lockdown with the IRR recorded in the month leading up to the lockdown. We then compared this IRR with the IRR for the equivalent periods of 2019. The outcomes were: diagnoses (or diagnosis groups), activity during injury (ADI), mechanisms of injury, age group and gender. Secondly, certain specific diagnoses (or diagnosis groups) were analysed by ADI and mechanism of injury.

**RESULTS.** We observed a significant reduction by 30.6% of all hand injuries in 2020. The non-severe injuries had a significant IRR reduction of 58.7% and the severe injuries a reduction of 15.3%, which was non-significant. The IRR in 2020 was significantly lower in 2020 for the age groups: 0-14, 15-17 and 25-49 years. The relative reduction in IRR was markedly larger for men (40.8%) than for women (22.3%), although this difference was not significant.

**CONCLUSION.** We observed a greater reduction in non-severe injuries than in severe injuries compared with 2019. Further studies are needed to fully examine the cause of this phenomenon. The reduction may be caused, in part, by a more restrictive attitude towards seeking medical help at a trauma A&E during the first COVID-19 lockdown.

**FUNDING.** none

**TRIAL REGISTRATION.** not relevant.

In early 2020, most of the world, including Denmark, was struck by the first wave of the COVID-19 pandemic. To reduce the transmission rate of COVID-19, an unprecedented emergency lockdown was issued on 13 March 2020 in Denmark. The Danish lockdown restrictions included closing all public and private educational facilities, schools, day-care facilities and publicly accessible cultural institutions. Furthermore, working from home was made mandatory for non-essential public employees and working at home (where possible) was also introduced for privately employed people. Additionally, access to public transportation was restricted to ensure social-distancing measures; bars, restaurants, large in-doors shopping facilities and non-healthcare-related services, e.g. hairdressers, were temporarily closed and a ban was introduced on public gatherings exceeding ten people [1].

During this period, the Accidents and Emergency Department (A&E) at Odense University Hospital (OUH), Odense, Denmark, maintained regular staff and capacity. The staff noticed a marked drop in visits after the lockdown was imposed. The impression of the staff was; A) that there was a reduction in the number of injury-related visits at the A&E during the COVID-19 lockdown and B) that a higher proportion of these visits were due to severe injuries (than before the lockdown). A significantly reduced number of visits caused by non-traumatic conditions was reported, such as chronic obstructive pulmonary disease (COPD) exacerbations and urinary tract infections during the first COVID-19 lockdown of 2020 [2].

To examine if this experienced proportional shift in injury severity at our A&E was true, we chose hand injuries to study: 1) Was there an actual decrease in the number of injuries? And 2) were a larger proportion of these injuries severe?

Thus, the aim of this study was to examine the impact of the COVID-19 lockdown on hand injury-related visits in the A&E at the OUH during the first wave of the COVID-19 pandemic in 2020.

## METHODS

This study is a retrospective register study based on A&E data from the Accident Analysis Group (AAG), Department of Orthopaedic Surgery, OUH (in Danish language: Ulykkes Analyse Gruppen). The AAG collects data from all trauma A&E visits at the OUH, which has a service area accounting for approx. 5% of the Danish population (~ 290,000 people) and receives approx. 50,000 visits annually [3]. Mechanism of injury, activity during injury (ADI) and location of the injury incident were recorded by the secretary staff upon entry registration. Diagnoses were recorded by the treating medical staff. Diagnoses were coded in accordance with the tenth version of the International Classification of Diseases (ICD-10). The A&E of the OUH meets the UK criteria for a “Major Trauma Centre”.

We chose hand injuries as a proxy for several reasons: 1) to allow for presentation of more detailed data regarding the types of injury, 2) the distinction between severe and non-severe injuries was deemed less complicated within this group, 3) hand injuries account for a large proportion of all injuries at the A&E of the OUH (25-30%) with a wide distribution of mechanisms of injury, ADI, age and gender [4].

The COVID-19 lockdown period was defined as the period from 12 March 2020 to 8 April 2020. The period prior to the lockdown was defined as the period from 13 February 2020 to 11 March 2020. Two equivalent periods from 2019 (from 14 February 14 to 13 March and from 14 March to 13 April 13) were defined as control periods. The slight discrepancies in dates were introduced to account for differences in the number of weekend days in each period and for the leap year. Hand injuries were defined as diagnoses (principal and secondary) coded DS6- and DS525, DS525A, -B and -C. Certain diagnoses were grouped, by prevalence or clinical relevance, to make the data more presentable. Contusions, sprains and superficial lesions were defined as “non-severe injuries”. All other diagnoses were defined as “severe injuries”. For each period, we also included the total of all injuries (DS diagnosis codes).

The data were analysed with Numbers 10 for MacOS Catalina. The statistical calculations were based on the assumption of a constant patient population throughout all four periods. We calculated incidence rate ratios (IRRs) before and after the COVID-19 lockdown, covering the corresponding periods of 2019 for: diagnoses (or diagnosis group), mechanisms of injury, ADI, age-groups and gender. The outcome of this study was the comparison of IRRs for 2020 and 2019 for the aforementioned parameters. Additionally, changes in IRRs for injury mechanisms and ADIs were analysed for selected groups. IRR were calculated as follows:

$IRR = (n1/\sim 290,000 \text{ people}/4 \text{ weeks})/(n2/\sim 290,000 \text{ people}/4 \text{ weeks})$

n1 = Number of cases, lockdown period (or 2019 control equivalent)

n2 = Number of cases, pre-lockdown period (or 2019 control equivalent)

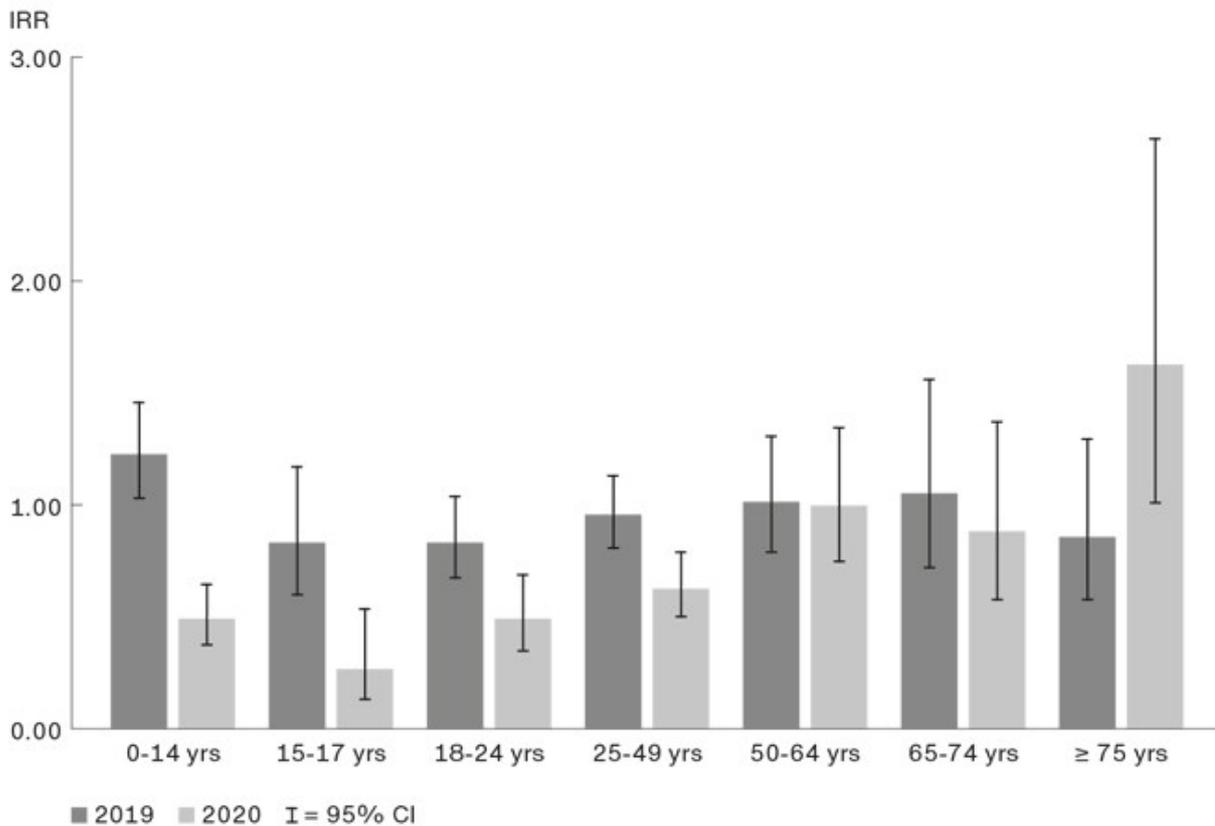
In our understanding, no relevant changes occurred in the size of the patient population between the four periods. Statistical significance was defined as non-overlapping of the 95% confidence interval for the compared IRRs. The data were anonymised. The study was approved by the Board of Scientific Studies of the Department of Orthopaedic Surgery at the OUH.

*Trial registration:* not relevant.

## RESULTS

This study included 2,706 hand injuries in 2,541 patients out of a total of 8,922 injuries in 7,639 patients. A statistically significant IRR reduction of 30.6% was recorded for all hand injuries in 2020. The age distribution for all four periods is shown in **Figure 1**. The IRR was significantly lower in 2020 for the following age groups: 0-14, 15-17 and 25-49 years. We observed no signs of a statistically significantly lower IRR for ages older than 49 years. An increase was recorded in IRR for patients older than 75 years; 68.1% of the injuries (all periods total) for this age group was caused by “Fall or jump of less than 1 m”, with a relative increase in IRR of 159.7% during the lockdown. Among people older than 75 years, 49.3% of the ADIs (all periods total) occurred while “Staying at home”. Here, we observed a relative IRR increase in 91.0% during the lockdown.

**FIGURE 1** Incidence rate ratio (IRR)<sup>a</sup> by age in 2020 and 2019.



CI = confidence interval; IRR = incidence rate ratio.  
 a) Incidence rate = n/290,000 persons/4 wks.

A decrease was recorded in the number of visits for men and women, but the relative reduction in IRR was markedly larger for men (40.8%) than for women (22.3%). The IRR for the following ADIs were markedly further reduced for men than for women: “Play”, “Sports and Exercise”, “Entertainment” and “Work-related”. We observed an increase in “do-it-yourself (DIY)-related” injuries solely among men.

Table 1 presents the IRR for hand injury diagnoses in 2019 and 2020. We observed a significant reduction in IRR for non-severe injuries of 58.7%, and a non-significant reduction of 15.3% for severe injuries. The ADI for the non-severe injuries was generally similar to the distribution presented for all hand injuries in Table 2.

**TABLE 1** Distribution of hand and finger injuries.

Injury	Control <sup>a</sup> , n		2019, IRR <sup>b,c</sup> (95% CI)	Pre-lockdown <sup>d</sup> , n	Lockdown <sup>e</sup> , n	2020, IRR <sup>b,c</sup> (95% CI)
	"pre-lockdown"	"lockdown"				
Non-severe	308	292	<i>0.95</i> (0.81-1.11)	288	126	0.44 (0.35-0.54)
Wound: ± nail damage	259	232	<i>0.90</i> (0.75-1.07)	234	207	0.88 (0.73-1.07)
Scaphoid fracture	1	5	<i>5.00</i> (0.58-42.80)	7	5	0.71 (0.23-2.25)
Non-scaphoid carpal fracture	2	2	<i>1.00</i> (0.14-7.10)	2	2	1.00 (0.14-7.10)
1st metacarpal fracture	1	3	<i>3.00</i> (0.31-28.84)	2	0	0.00
2nd-4th metacarpal fracture	9	10	<i>1.11</i> (0.45-2.73)	7	7	1.00 (0.35-2.85)
5th metacarpal fracture	20	19	<i>0.95</i> (0.51-1.78)	17	9	0.53 (0.24-1.19)
1st finger fracture	16	8	<i>0.50</i> (0.21-1.17)	16	11	0.69 (0.32-1.48)
2nd-5th finger fracture	49	59	<i>1.20</i> (0.82-1.76)	51	39	0.76 (0.50-1.16)
Dislocated finger	6	8	<i>1.33</i> (0.46-3.84)	6	4	0.67 (0.19-2.36)
1st MCP ligament rupture	2	2	<i>1.00</i> (0.14-7.10)	2	0	0.00
2nd-5th MCP/IP ligament rupture	6	10	<i>1.67</i> (0.61-4.59)	3	8	2.67 (0.71-10.05)
Nerve lesion	3	1	<i>0.33</i> (0.03-3.20)	2	0	0.00
Tendon lesion excl. mallet finger	4	1	<i>0.25</i> (0.03-2.24)	2	1	0.50 (0.05-5.51)
Mallet finger	12	18	<i>1.50</i> (0.72-3.11)	9	3	0.33 (0.09-1.23)
Traumatic amputation, 2nd-5th finger	3	4	<i>1.33</i> (0.30-5.96)	1	3	3.00 (0.31-28.84)
Distal radius fracture	54	57	<i>1.06</i> (0.73-1.53)	64	54	0.84 (0.59-1.21)
Subtotal	447	439	<i>0.98</i> (0.86-1.12)	425	353	0.83 (0.72-0.96)
Other: < 5 cases	2	6	<i>3.00</i> (0.61-14.86)	1	5	5.00 (0.58-42.80)
Total hand injuries	759	743	<i>0.98</i> (0.88-1.08)	715	489	0.68 (0.61-0.77)
All injuries incl. hand injuries	2,313	2,540	<i>1.10</i> (1.04-1.16)	2,545	1,524	0.60 (0.56-0.64)

CI = confidence interval; IP = interphalangeal; IRR = incidence rate ratio; MCP = metacarpophalangeal.

a) The corresponding 4 wks of 2019.

b) Incidence rate = n/290,000 persons/4 wks.

c) Italics indicate highest numerical value of IRR.

d) 13 Feb 2020-11 Mar 2020.

e) 12 Mar 2020-8 Apr 2020.

**TABLE 2** Distribution of activities during injury.

Activity	Control <sup>a</sup> , n		2019, IRR <sup>b,c</sup> (95% CI)	Pre-lockdown <sup>d</sup> , n	Lockdown <sup>e</sup> , n	2020, IRR <sup>b,c</sup> (95% CI)
	"pre-lockdown"	"lockdown"				
Hobbies	18	15	<i>0.83</i> (0.42-1.65)	10	22	2.20 (1.04-4.65)
DIY	36	37	<i>1.03</i> (0.65-1.63)	44	59	1.34 (0.91-1.98)
Gardening	10	18	<i>1.80</i> (0.83-3.90)	6	13	2.17 (0.82-5.70)
Shopping	5	5	<i>1.00</i> (0.29-3.45)	3	7	2.33 (0.60-9.02)
Playtime	46	76	<i>1.65</i> (1.15-2.38)	42	48	1.14 (0.76-1.73)
Work-related	115	114	<i>0.99</i> (0.77-1.28)	109	72	0.66 (0.49-0.89)
Cooking	56	40	<i>0.71</i> (0.48-1.07)	45	29	0.64 (0.40-1.03)
Staying at home	92	77	<i>0.84</i> (0.62-1.13)	119	98	0.82 (0.63-1.08)
Personal hygiene	6	4	<i>0.67</i> (0.19-2.36)	3	3	1.00 (0.20-4.95)
Cleaning and maintenance	13	21	<i>1.62</i> (0.81-3.23)	9	17	1.89 (0.84-4.24)
Sport and exercise	115	90	<i>0.78</i> (0.59-1.03)	92	10	0.11 (0.06-0.21)
Transport	31	39	<i>1.27</i> (0.79-2.03)	38	18	0.47 (0.27-0.83)
Educational	73	85	<i>1.16</i> (0.85-1.59)	79	0	0.00
Entertainment	25	21	<i>0.84</i> (0.47-1.50)	19	2	0.11 (0.02-0.45)
Other	73	66	<i>0.90</i> (0.65-1.26)	57	46	0.81 (0.55-1.19)
Total	714	708	<i>0.99</i> (0.89-1.10)	675	444	0.66 (0.58-0.74)

CI = confidence interval; DIY = do-it-yourself; IRR = incidence rate ratio.

a) The corresponding 4 wks of 2019.

b) Incidence rate = n/290,000 persons/4 wks.

c) Italics indicate highest numerical value of IRR.

d) 13 Feb 2020-11 Mar 2020.

e) 12 Mar 2020-8 Apr 2020.

A 20.8% IRR reduction was recorded for distal radius fractures, and these fractures were mainly caused by "Fall of less than 1 m". The vast majority of the distal radius fractures were unspecified, thus limiting further assessment of these types of injuries.

For fifth metacarpal bone fractures, we observed a relative IRR reduction of 44.2%. Fifth metacarpal fractures caused by "Impact or direct hit" were reduced by 74.6%. However, the number of fractures of the fifth metacarpal bone caused by other mechanisms remained largely unaffected.

## DISCUSSION

In this study, we found a marked reduction in hand injuries during the COVID-19 lockdown with a disproportionately larger reduction of non-severe injuries than of severe injuries. We also observed a significant reduction in the number of all injuries recorded during the COVID-19 lockdown. We observed this reduction despite the fact that no restrictions were imposed on patients' access to medical help at the A&E of the OUH during the period.

As expected, we observed a very drastic reduction of educational, entertainment- and sports-related injuries during the first COVID-19 lockdown. Conversely, an increase was observed in injuries related to part-time activities and DIY projects, albeit the increase was not significant. Similar results have been reported elsewhere and were explained by people having more spare time to dedicate to such activities during the lockdown [5-7]. A reduction was recorded in the number of transport-related injuries. This may be explained by fewer travel activities related to work and leisure activities during the lockdown. Another study reported greater reductions in all travel-related injuries [8]. It should be noted that while restrictions were placed on public transportation, no formal restrictions were imposed on free movement and traffic in Denmark.

Interestingly, the amount of "Laceration, stab and bite injuries" generally remained unaffected by the COVID-19 lockdown as shown in **Table 3**. This may imply that 1) these types of injuries are generally considered severe and require emergency treatment and 2) these types of injuries were poorly prevented by the lockdown restrictions.

**TABLE 3** Distribution of mechanism of injury.

Mechanism	Control <sup>a</sup> , n		2019, IRR <sup>b,c</sup> (95% CI)	2020, IRR <sup>b,c</sup> (95% CI)		
	"pre-lockdown"	"lockdown"		Pre-lockdown <sup>d</sup> , n	Lockdown <sup>e</sup> , n	
Fall or jump < 1 m	211	188	<i>0.89</i> (0.73-1.08)	212	143	0.67 (0.55-0.83)
Fall or jump ≥ 1 m	11	18	1.64 (0.77-3.46)	10	11	1.10 (0.47-2.59)
Impact or direct hit	162	188	<i>1.16</i> (0.94-1.43)	143	54	0.38 (0.28-0.52)
Laceration, stab and bite	190	187	0.98 (0.80-1.20)	175	153	0.87 (0.70-1.09)
Compression or crush	83	66	0.80 (0.58-1.10)	90	56	0.62 (0.45-0.87)
Foreign body	4	10	2.50 (0.78-7.97)	4	10	2.50 (0.78-7.97)
Acute overstraining	45	49	1.09 (0.73-1.63)	39	16	0.41 (0.23-0.73)
Other: < 10 cases	8	2	0.25 (0.05-1.18)	2	1	0.50 (0.05-5.51)
Total	714	708	0.99 (0.89-1.10)	675	444	0.66 (0.58-0.74)

CI = confidence interval; IRR = incidence rate ratio.

a) The corresponding 4 wks of 2019.

b) Incidence rate = n/290,000 persons/4 wks.

c) Italics indicate highest numerical value of IRR.

d) 13 Feb 2020-11 Mar 2020.

e) 12 Mar 2020-8 Apr 2020.

We also observed changes in age and gender demographics during the lockdown. The greatest reduction was observed among the younger patients, which might be explained by the closure of schools, sports clubs and other leisure time institutions. The reduction gradually declined with increasing age. This may be explained by the lockdown restrictions possibly having a more limited impact on the activities among the elderly and that injuries among the elderly are caused by accidents that were not prevented by the COVID-19 lockdown. In any case, similar observations have been reported by other authors [7, 8]. If indeed true, the increase in hand injuries among patients older than 75 years was unexpected. Our data suggest that the injuries occurred while staying at home, with increases in "familiar" injury mechanisms and ADIs. Possibly social distancing enforced a greater level of self-reliance among the elderly, which may have led to a higher frequency of accidents.

A markedly larger reduction of male compared to female visitors was recorded. Other authors have reported similar findings [9]. This was partly caused by a larger reduction in work-related injuries among men than among women. This might be caused by gender differences in occupations and the effect of the lockdown on those occupations. We also observed a greater reduction in injuries occurring during "Sports and exercise" and "Play". This may be explained by the fact that, in Denmark, men are traditionally more involved in team or club

sports and less in individual sports than women are. Team sports would naturally be affected more by the lockdown restrictions. Finally, the reduction in “Entertainment”-related injuries may have been caused by a decrease in night life violence following the closure of bars and clubs. The decrease in fifth metacarpal bone fractures caused by direct hits seems to support this.

The data for this study could have been increased by extending the observation periods. Restrictions (and people’s attitude towards them) changed during the course of the lockdown, which might potentially complicate the interpretation of the results. A multi-centre study would alleviate this, but it is beyond the original size and scope of this study. A separate study of all injuries at the A&E during the COVID-19 lockdown would also be of interest, but this was also beyond the scope of the present study.

The decline in the number of visits at our A&E might simply have conferred a subsequent increase in referrals to the department’s outpatient clinic; merely shifting the burden. An analysis of outpatient referrals and visits in the months during and after the lockdown, comparing these data with those of the previous year, was, however, deemed too inaccurate to evaluate this potential outcome properly. Our outpatient clinic observed no immediate increase in referrals during the initial month of the COVID-19 lockdown. The changes caused by the cessation of the lockdown occurred gradually. Due to these factors, studying data from the out-patient clinic would require longer observation periods, which we estimate would impose too great a risk of confounding.

Hampton et al. reported a proportional increase in injuries requiring surgical treatment [5]. This may be interpreted as similar to our observation of a proportional increase in severe hand injuries. It may be discussed whether this proportional reduction in non-severe injuries might also have been caused, in part, by patients being more reluctant towards seeking medical help at hospitals during the COVID-19 pandemic. Such a behaviour may be due to a fear of contracting COVID-19 or possibly patients wishing not to burden the public healthcare system in a time of crisis. Other authors have suggested similar theories [5, 9]. Thus, reducing the amount of visits for non-severe injuries may potentially be possible by encouraging patients to adopt a more restrictive attitude towards seeking help at a trauma A&E.

Even if the first COVID-19 lockdown actually “improved” the patients’ injury triage skills, it remains unknown if such a phenomenon may be reproduced during other circumstances. It should also be noted that a more restrictive attitude towards seeking medical help may potentially result in an increased risk of missing severe injuries. Whereas this risk should not be neglected, it seems reasonable to expect an inverse co-relation between injury severity and patient’s inclination towards seeking medical help. However, the data of the present study are too limited to examine this question adequately.

## CONCLUSION

We observed a general reduction in most types of hand injuries at the A&E of the OUH during the first wave of the COVID-19 pandemic. Injuries among the elderly, laceration, stab and bite-injuries were unaffected by the COVID-19 lockdown restrictions. The reduction in non-severe injuries was proportionally larger than that of severe injuries. This may be caused by several factors. It may have been caused, in part, by a more restrictive attitude towards visiting the A&E among patients.

**Correspondence** *Anders Lorentsen*. E-mail: anders.lorentsen@rsyd.dk

**Accepted** 9 June 2022

**Conflicts of interest** none. Disclosure forms provided by the authors are available with the article at [ugeskriftet.dk/dmj](https://ugeskriftet.dk/dmj)

Cite this as Dan Med J 2022;69(8):A11210831

## REFERENCES

1. Regeringen. Pressemøde i Spejlsalen om COVID-19. <https://www.regeringen.dk/nyheder/2020/pressemoeede-i-spejlsalen-om-covid-19/> (23 Mar 2020).
2. Bogh SB, Fløjstrup M, Nissen SK et al. Nationwide study on trends in unplanned hospital attendance and deaths during the 7 weeks after the onset of the COVID-19 pandemic in Denmark. *BMJ Qual Saf.* 2021;30(12):986-95.
3. Ulykkes Analyse Gruppen. <https://www.ouh.dk/wm140123> (22 November 2021).
4. Jørgensen HR, Elberg JJ, Larsen CF. Hand injuries. Case material from 2 casualty departments at Odense and Aabenraa. *Ugeskr Læger.* 1987;149(15):1017-20.
5. Hampton M, Clark M, Baxter I et al. The effects of a UK lockdown on orthopaedic trauma admissions and surgical cases: a multicentre study. *Bone Joint Open.* 2020; 1(5):137-43.
6. Welman T, Hobday D, El-Ali K et al. The COVID-19 pandemic: the effect on hand trauma in Europe's busiest major trauma centre. *J Plast Reconstr Aesthet Surg.* 2021;74(3):644-710.
7. Crenn V, El Kinani M, Pietu G et al. Impact of the COVID-19 lockdown period on adult musculoskeletal injuries and surgical management: a retrospective monocentric study. *Sci Rep.* 2020;10(1):22442.
8. Maryada VR, Mulpur P, Guravareddy et al. Impact of COVID-19 pandemic on orthopaedic trauma volumes: a multi-centre perspective from the State of Telangana. *Indian J Orthop.* 2020;54(suppl 2):368-73.
9. Sugand K, Park C, Morgan C. Impact of the COVID-19 pandemic on paediatric orthopaedic trauma workload in central London: a multi-centre longitudinal observational study over the "golden weeks". *Acta Orthop.* 2020;91(6):633-8.