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Who was at risk of trauma-related injuries during the COVID-19 pandemic? A retrospective study from a level 1 trauma centre in Switzerland

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Summary

INTRODUCTION: During the first wave of the COVID-19 pandemic, increasingly strict restrictions were imposed on the activities of the Swiss population, with a peak from 21 March to 27 April 2020. Changes in trauma patterns during the pandemic and the lockdown have been described in various studies around the world, and highlight some particularly exposed groups of people. The objective of this study was to assess changes in trauma-related presentations to the emergency department (ED) during the first wave of the COVID-19 pandemic, as compared to the same period in the previous year, with a particular focus on vulnerable populations.

MATERIALS AND METHODS: All trauma-related admissions to our ED in the first half of 2019 and 2020 were included. Patient demographics, trauma mechanism, affected body region, injury severity and discharge type were extracted from our hospital information system. Trauma subpopulations, such as interpersonal violence, self-inflicted trauma, geriatric trauma and sports-related trauma were analysed.

RESULTS: A total of 5839 ED presentations were included in our study, of which 39.9% were female. Median age was 40 years (interquartile range: 27–60). In comparison to 2019, there was a 15.5% decrease in trauma-related ED presentations in the first half of 2020. This decrease was particularly marked in the 2-month March/April period, with a drop of 36.8%. In 2020, there was a reduction in injuries caused by falls of less than 3 metres or by mechanical force. There was a marked decrease in sports-related trauma and an increase in injuries related to pedal cycles. Geriatric trauma, self-harm and assault-related injuries remained stable.

CONCLUSION: This study described changes in trauma patterns and highlighted populations at risk of trauma during the pandemic in Switzerland in the context of previous international studies.These results may contribute to resource management in a future pandemic.

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Introduction

During the COVID-19 pandemic, unprecedented restrictions on population mobility were implemented worldwide [1], and these resulted in important changes in the behaviour of the general population. Numerous publications in different countries have found heterogeneous changes in the number and composition of patients presenting to emergency departments (EDs) [2–6]. A reduction in the incidence of road traffic accidents has been reported, with inconsistent results for pedal cycle accidents [7–9]. There have been alarming reports of increases in domestic [8, 10, 11] and interpersonal violence [12–14]. Some studies have shown an increase in geriatric trauma and associated morbidity [15, 16].

For the Swiss population, a previous study conducted in our ED focusing on major trauma showed a reduction in the number of severely injured patients, although the severity of trauma increased [17]. However, to the best of our knowledge, there have been no studies in the general Swiss trauma population that have included minor trauma patients. The Swiss population has several specific characteristics, such as a high life expectancy and a high proportion of trauma related to snow sports [18, 19]. In Switzerland, the restrictions included bans on large gatherings and the closure of non-essential businesses and services, including schools. Restrictions peaked from 21 March to 27 April 2020 and were then gradually eased [20].

Better understanding of the impact of the pandemic may enable clinicians and healthcare institutions to improve resource allocation and emergency management in the hospital, as well as to guide prevention programmes targeted at vulnerable populations (e.g. preventing falls in the elderly, psychological support, prevention of road traffic accidents).

The objective of this study was to assess changes in trauma-related ED presentations during the first wave of the COVID-19 pandemic, as compared to the same period in the previous year, with a particular focus on vulnerable patient populations.

Materials and methods

Study design, setting and population

A descriptive, retrospective, single-centre analysis was conducted in our ED, one of the largest in Switzerland, treating about 55,000 patients per year. On admission to our ED, a diagnosis group is recorded for each patient according to the chief complaint e.g. "trauma", "gastrointestinal" or "respiratory". All patients presenting to our ED between 1 January and 30 June in 2019 and in 2020 with "trauma" as their chief complaint were included in the analysis. Patients under 16 years of age and those with missing data were excluded from the analysis.

Study data and definitions

All patient information was documented in the clinical information system (E.care ED, Mesalvo Turnhout BV, Turnhout, Belgium). Data were fully anonymised prior to analysis. Data were coded by two independent, trained physicians who manually reviewed the medical records and extracted the following data: age, sex, injured body region, injury severity and trauma mechanism (i.e. the cause). The severity was assessed according to the international Injury Severity Score (ISS) and the Abbreviated Injury Scale (AIS) [21, 22]. The trauma mechanism was extracted from the medical history or the documented diagnosis on discharge, as recorded in the clinical information system. Causal relationships with sports or snow sports were additionally assessed as binary variables. Any discrepancies in the classification of the trauma mechanism or the severity of the trauma were discussed by the reviewers and agreement was reached. Missing trauma mechanisms were classified as "unknown".

Statistical analysis

The chi-squared test was used to compare the observed frequencies of parameters e.g. trauma mechanism between the different time periods. Non-normally distributed data were assessed using the Wilcoxon rank-sum test; medians and interquartile ranges (IQRs) were determined. The statistical analysis was performed using STATA® 16.1 (StataCorp, The College Station, Texas, USA). Supplementary information on the statistical analysis can be found in the appendix.

Outcome

To compare the data before and during the pandemic, we analysed the total number of patients admitted in the first half of 2019 (2019 H1) compared to the first half of 2020 (2020 H1). As the most severe restrictions were in force in March and April 2020, each six-month period was divided into three two-month periods, so the second period in 2020 had the most severe restrictions. As trauma related to sports (especially snow sports) was very frequent in our centre, we performed a subgroup analysis of this population.

Ethics

The study was classified as a quality evaluation study by the ethics committee of the canton of Bern, Switzerland, and informed consent was waived (KEK-2023-00145).

Results

During the study period, we registered 46,029 consultations in our emergency department (2019: 24,522; 2020: 21,507). Overall, 6316 patients were treated with "trauma" as the chief complaint. We excluded 234 cases due to incomplete documentation and 243 patients whose trauma was not recent. A total of 5839 trauma-related consultations were included in the analysis, representing 12.7% of all ED admissions. In 2019 H1, 3163 consultations were included (12.9% of all ED admissions) and in 2020 H1, 2676 consultations (12.4% of all ED admissions). 39.9% of the patients were female and the median age was 40 (IQR: 27–60) years. The demographic characteristics of the study population did not differ significantly between 2019 and 2020 (table 1).

In both study periods, the most common site of injury was the upper extremities, with 38.8% of cases (35.4% in females, 41.1% in males), followed by the lower extremities (28.5%; 31.9% in females and 26.3% in males) and the head (25.2%; 23.3% in females and 21.5% in males) (figure 1). In 71.2% of the cases, patients were discharged home, while 24.1% were admitted for inpatient treatment. Trauma-related death occurred in 0.1% of the cases (table 2).

In 2020 H1, 2676 patients were treated in our ED, corresponding to a 15.5% decrease compared to 2019 H1. This decrease was particularly marked in the 2-month March/April period, with a decrease of 36.8% (1033 to 653 from March/April 2019 to March/April 2020) (figure 2).

For geriatric trauma patients, we found an absolute reduction of 92 patients aged over 65 years in 2020 H1 compared to 2019 H1, while the relative numbers remained stable at 20.1% and 20.0% of the general trauma population, respectively ($p = 0.859$). Similar results were seen for March/April 2020 vs March/April 2019, with stable relative numbers of 20.3% and 20.1%, respectively ($p = 0.902$) (tables 2, figure 3 and tables S1 and S2 in the appendix).

As regards the mechanism of injury, there was a significant reduction in the number of falls of less than 3 metres ($p = 0.014$) and a smaller, non-significant decrease in the number of injuries due to mechanical force ($p = 0.242$) (table 2). In pedal cycle-related accidents, we found a significant increase of 58 cases ($p < 0.001$), representing 9.9% of the trauma population in 2020 H1 compared to 6.5% in 2019 H1. The absolute numbers of presentations associated with assault and self-harm remained similar over all periods observed, with relative numbers showing a non-significant increase at the peak of the restrictions (figure S1 in the appendix). In March/April, injuries related to self-harm evolved from 2.8% (29/1033) in 2019 H1 to 3.5% (23/653) in 2020 H1. Similarly, assault-related injuries evolved from 5.2% (54/1033) to 6.9% (45/653) of trauma-related ED presentations during the period of the strictest restrictions, but these changes were not significantly different ($p = 0.674$ and $p = 0.551$, respectively) (table 2, figure 3, tables S1 and S2).

There was a significant decrease in the proportion of sports trauma – from 14.0% (444/3163) in 2019 H1 to 11.6% (311/2676) in 2020 H1 (p = 0.006) and a trend towards fewer snow sports-related injuries (p = 0.092). This finding was even more pronounced in March/April, with a significant reduction (p <0.001) in sports-related injuries from 13.9% (144/1033) to 5.8% (38/653) and a significant decrease (p <0.001) in snow sports-related injuries, from 4.2% (43/1033) to 1.8% (12/653) (table 2, figure 3, tables S1 and S2).

Discussion

In this study, we investigated the epidemiology and injury patterns of trauma patients presenting to our level 1 trauma centre before and during the first wave of the COVID-19 pandemic.

In 2019 H1, 3163 consultations were recorded, as compared to 2676 consultations in 2020 H1. The most common mechanisms of injury were "falls less than 3 metres, slipping or tripping" and "exposure to mechanical force", with "injured pedal cycle rider" in third place. The most frequent injured regions were the upper and lower extremities. These findings are consistent with previous publications [23, 24].

A marked difference in trauma patterns was found between male and female patients. Female patients were more likely to sustain an injury to the extremities associated with "falls less than 3 metres, slipping or tripping". Low-energy trauma is a frequent cause of osteoporotic fractures, common in women over 50, potentially explaining our findings [25].

As regards the impact of the COVID-19 pandemic on trauma-related ED visits in our study population, we found a 15% reduction in trauma-related ED presentations from 2019 H1 to 2020 H1. This relative reduction peaked at 37% during the most rigorous stay-at-home orders in the months of March and April 2020. There have been a variety of different reports on how pandemic restrictions influenced the number of trauma-related ED presentations. These changes in trauma admissions ranged from a slight increase [26] to a decrease of up to 79.9% [6]. Our findings are in accordance with most publications, which reported a reduction of around 30% [2, 5, 8, 13, 27, 28].

The findings in the general trauma population on the reduction in trauma-related ED visits are similar to those described in the major trauma population at our centre [17].

As regards geriatric trauma patients, we found a reduction in absolute numbers but stable relative numbers for 2020 H1 compared to 2019 H1. Some studies have shown a drop in geriatric trauma, with a decrease in proximal hip fractures and distal radius fractures [23], while a Japanese study showed conflicting results, with an increase in hip fractures [15]. Adiamah et al. showed an increase in trauma in frail patients [5]. In our study, however, older patients were not identified as a particularly vulnerable group for traumatic injuries during the COVID-19 pandemic.

American studies in particular have reported an increase in injuries related to interpersonal violence [26, 29], whereas European studies are less unanimous on this subject [5, 30]. In our study, trauma related to assault and self-harm remained stable throughout the study period, which suggests that this population remained susceptible to injuries even during the most stringent stay-at-home orders.

Table 1:
Demographic characteristics of the study population.

		Total population (n = 5839)	Subgroups				p value
			2019 H1	n = 3163	2020 H1	n = 2676	
Patient characteristics							
Sex	Female	2332 (39.9%)	1248 (39.5%)		1084 (40.5%)		
	Male	3507 (60.1%)	1915 (60.5%)		1592 (59.5%)		0.413
Age in years, median (IQR)		40 (27–60)	40 (26–59)		41 (27–60)		0.129
Age groups	18–24	1219 (20.9%)	685 (21.7%)		534 (20.0%)		0.111
	25–44	2021 (34.6%)	1078 (34.1%)		943 (35.2%)		0.354
	45–64	1431 (24.5%)	770 (24.3%)		661 (24.7%)		0.752
	65–84	868 (14.9%)	473 (15.0%)		395 (14.8%)		0.836
	>84	300 (5.1%)	157 (5.0%)		143 (5.3%)		0.512
Consultation characteristics							
Type of admission	Ambulance	1737 (29.7%)	889 (28.1%)		848 (31.7%)		0.003*
	General Practitioner	197 (3.4%)	106 (3.4%)		91 (3.4%)		0.917
	External hospital	352 (6.0%)	201 (6.4%)		151 (5.6%)		0.255
	Police	28 (0.5%)	13 (0.4%)		15 (0.6%)		0.410
	Repatriation	10 (0.2%)	6 (0.2%)		4 (0.1%)		0.711
	Walk-in	2254 (38.6%)	1193 (37.7%)		1061 (39.6%)		0.131
	Internal referral	88 (1.5%)	47 (1.5%)		41 (1.5%)		0.885
	Urgent care centre/doctor	72 (1.2%)	41 (1.3%)		31 (1.2%)		0.635
	Not specified	1101 (18.9%)	667 (21.1%)		434 (16.2%)		<0.001*
Triage	Life-threatening	392 (6.7%)	205 (6.5%)		187 (7.0%)		0.441
	Highly urgent	1445 (24.7%)	773 (24.4%)		672 (25.1%)		0.553
	Urgent	3716 (63.6%)	2018 (63.8%)		1698 (63.5%)		0.783
	Semi-urgent	285 (4.9%)	166 (5.2%)		119 (4.4%)		0.157
	Not specified	1 (0.0%)	1 (0.0%)		0 (0.0%)		0.358

IQR: interquartile range.

* p <0.05

For accidents related to pedal cycles, we found a significant increase of 28% in 2020 compared to 2019. This result is consistent with a previous study from Berlin, Germany [8], and may be linked to the restrictions on public transport. This effect was more important in this study than the general reduction in road traffic accidents described in other studies [27]. Our previous study in our ED was limited to the major trauma population and found no difference in pedal cycle accidents [17], so that the current results must have been driven by an increase in minor trauma.These results support the importance of preventive measures for users of pedal cycles, especially during the COVID-19 pandemic.

Lastly, we found a marked drop in sports-related accidents, especially in snow sports. Many authors have described a reduction in sports-related injuries, particularly in collective sports [30, 31]. Only a few have described the impact of the stay-at-home order on accidents related to snow sports [32]. This is a particular characteristic of our trauma centre, where a high proportion of accidents are related to snow sports (around 10% of all trauma patients in the high season), which is significantly higher than in other centres [5, 8]. Noticeably, there were relatively few restrictions on outdoor activities (e.g. skiing) in Switzerland [20, 33]. Nevertheless, the marked decrease in injuries related to sports and snow sports suggests that the restrictions were sufficient to greatly reduce the practice of snow sports, the associated risk of injury, and thereby to preserve ED resources for COVID-19 patients.

Our study provides new information on trauma patterns during the first wave of the pandemic, which have not been previously described for a Swiss population. To the best of our knowledge, only a few studies have been published on this topic that included Swiss trauma centres, and all of these focused on major trauma [17, 34, 35].

However, the present study has several limitations. First and foremost, the short observation period and the single-centre design limit the external validity. Second, the observational study design allows confounding factors to alter our findings – such as a possible information bias due to the use of routine data. The analysis of trauma subpopulations may have increased the risk of type 1 error due to a multiplicity issue. Regarding our classification of

Table 2:
Injury characteristics and trauma mechanism.

		Total population (n = 5839)	Subgroups				p value
			2019 H1	n = 3163	2020 H1	n = 2676	
Injury characteristics							
Trauma mechanisms	Injury of occupant of vehicle	218 (3.7%)	120 (3.8%)		98 (3.7%)		0.791
	Injury of motorcycle rider	112 (1.9%)	50 (1.6%)		62 (2.3%)		0.041
	Injury of pedal cycle rider	472 (8.1%)	207 (6.5%)		265 (9.9%)		<0.001*
	Injury of pedestrian	41 (0.7%)	26 (0.8%)		15 (0.6%)		0.233
	Other transport accidents	71 (1.2%)	35 (1.1%)		36 (1.3%)		0.407
	Fall of at least 3 m	113 (1.9%)	66 (2.1%)		47 (1.8%)		0.361
	Fall of less than 3 m, slip or trip	2683 (45.9%)	1500 (47.4%)		1183 (44.2%)		0.014*
	Exposure to mechanical force	1390 (23.8%)	734 (23.2%)		656 (24.5%)		0.242
	Assault	333 (5.7%)	179 (5.7%)		154 (5.8%)		0.875
	Self-harm	151 (2.6%)	78 (2.5%)		73 (2.7%)		0.530
	Exposure to heat/fire/electricity/pressure	78 (1.3%)	43 (1.4%)		35 (1.3%)		0.864
	Avalanche, drowning or submersion	10 (0.2%)	7 (0.2%)		3 (0.1%)		0.315
	Other	120 (2.1%)	96 (3.0%)		24 (0.9%)		<0.001*
	Unknown	47 (0.8%)	22 (0.7%)		25 (0.9%)		<0.309
Sports-related injuries	Total	755 (12.9%)	444 (14.0%)		311 (11.6%)		0.006*
	Snow sports-related injuries	274 (4.7%)	162 (5.1%)		112 (4.2%)		0.092
Severe trauma		271 (4.6%)	161 (5.1%)		110 (4.1%)		0.076
Injured body regions							
Head		1299 (22.2%)	675 (21.3%)		624 (23.3%)		0.070
Face		1121 (19.2%)	597 (18.9%)		524 (19.6%)		0.494
Neck		277 (4.7%)	155 (4.9%)		122 (4.6%)		0.541
Thorax		536 (9.2%)	279 (8.8%)		257 (9.6%)		0.302
Abdomen		295 (5.1%)	167 (5.3%)		128 (4.8%)		0.388
Spine		327 (5.6%)	184 (5.8%)		143 (5.3%)		0.433
Upper extremities		2268 (38.8%)	1197 (37.8%)		1071 (40.0%)		0.089
Lower extremities		1667 (28.5%)	895 (28.3%)		772 (28.8%)		0.641
Other injury		2 (0.0%)	1 (0.0%)		1 (0.0%)		0.906
Procedural outcomes							
Discharge	Death	6 (0.1%)	2 (0.1%)		4 (0.1%)		0.305
	Discharge to home	4159 (71.2%)	2259 (71.4%)		1900 (71.0%)		0.725
	Hospital admission	1406 (24.1%)	753 (23.8%)		653 (24.4%)		0.596
	Transfer to external hospital	212 (3.6%)	113 (3.6%)		99 (3.7%)		0.796
	Not specified	56 (1.0%)	36 (1.1%)		20 (0.7%)		0.127
LoS ED in hours, median (IQR)		3.6 (2.3–5.3)	3.7 (2.4–5.4)		3.5 (2.3–5.1)		0.001*

IQR: interquartile range; LoS ED: length of stay in the emergency department.

* p <0.05

trauma mechanisms, the "exposure to mechanical force" group could have been further differentiated – especially to identify work-related injuries that could not be differentiated in our analysis. Similarly, characterisation of different fracture types would have helped to determine the impact of osteoporotic fractures in our population. Finally, injuries related to pedal cycles could be categorised as either sports-related or non-sports-related injuries, and this may have biased our results.

Despite these limitations, the present study is the first to include all trauma patients in a Swiss ED population and provides novel information on this topic.

Conclusion

In conclusion, this study showed a significant drop in trauma-related presentations of more than one third during the most rigorous stay-at-home order of theCOVID-19 pandemic. We found a marked reduction in snow sports-related accidents, a particular feature of our trauma centre. No change was observed in epidemiology of trauma in the elderly. Self-harm and assault-related trauma remained stable, and injuries related to pedal cycles increased. Our data, derived from all patients but most of whom experienced minor trauma, highlighted populations at risk of trauma during the pandemic in Switzerland in the context of previous international studies. These results may contribute to resource management and awareness of national particularities in a future pandemic.

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Potential competing interests

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflict of interest related to the content of this manuscript was disclosed.

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Figure 1: Mechanism of injury by body region and sex. Each bubble shows the frequency of injuries for a given body region and trauma mechanism, as indicated by the number (in %) and bubble size.

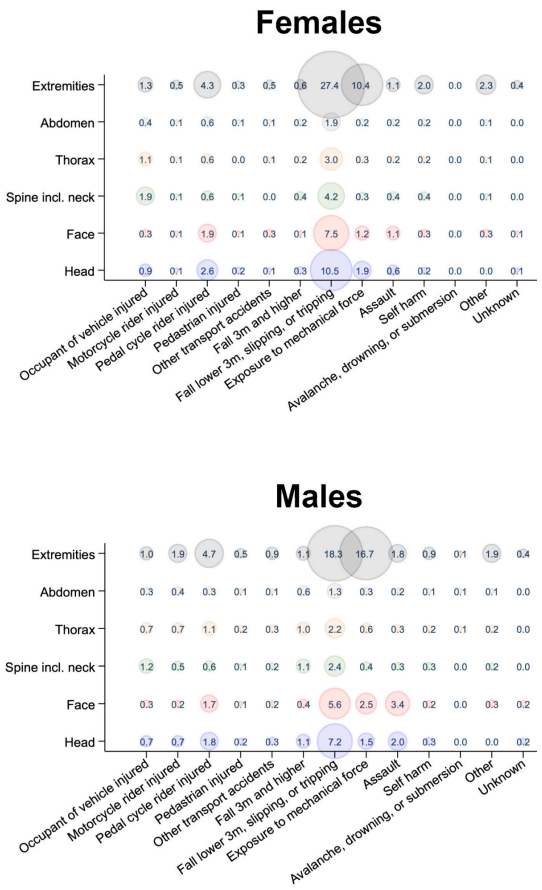


Figure 2: Incidence of COVID-19 in Switzerland (CH, green) and the canton of Bern (BE, red) in 2020 and change in trauma cases.

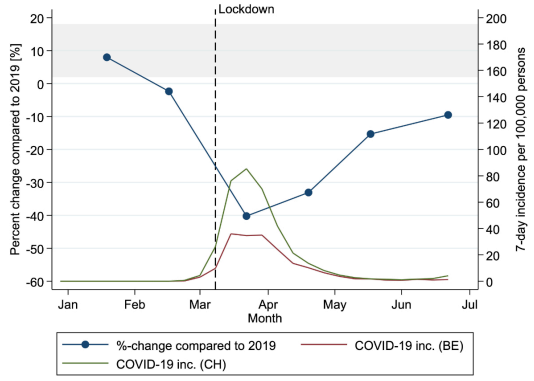
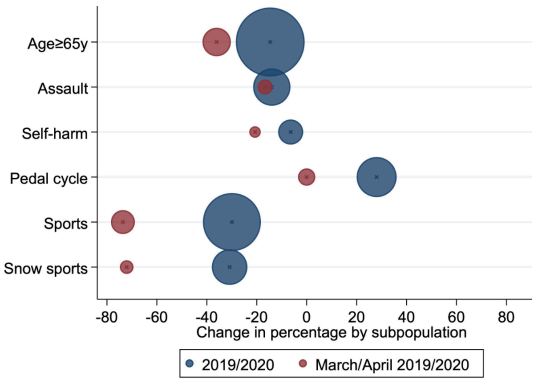


Figure 3: Percent changes in absolute ED presentations by trauma subpopulation. The diameter of a bubble corresponds to the total number of consultations in the subgroup in 2019.



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Appendix

Supplementary information on statistical analysis

For descriptive data, both absolute numbers and relative numbers in percentages were reported. Interquartile ranges were given for the age of the population.

Stata's (StataCorp, The College Station, Texas, USA) two-way command was used i) to create a bubble plot with frequency weights to illustrate injured body parts and injury mechanisms between males and females and ii) to show the incidence of COVID-19 in Bern canton and in Switzerland, as well as the change in trauma-related visits from 2019 H1 to 2020 H1.

Furthermore, a user-written heat plot command was used to illustrate the change in absolute consultations in different patient subgroups and according to different mechanisms (Ben Jann, 2019. "HEATPLOT: Stata module to create heat plots and hexagon plots", Statistical Software Components S458598, Boston College Department of Economics, revised 27 Aug 2021).

Supplementary tables and figure

Figure S1: Change in trauma cases in specific groups. (A) 2020 vs 2019, (B) March/April 2020 vs March/April 2019.

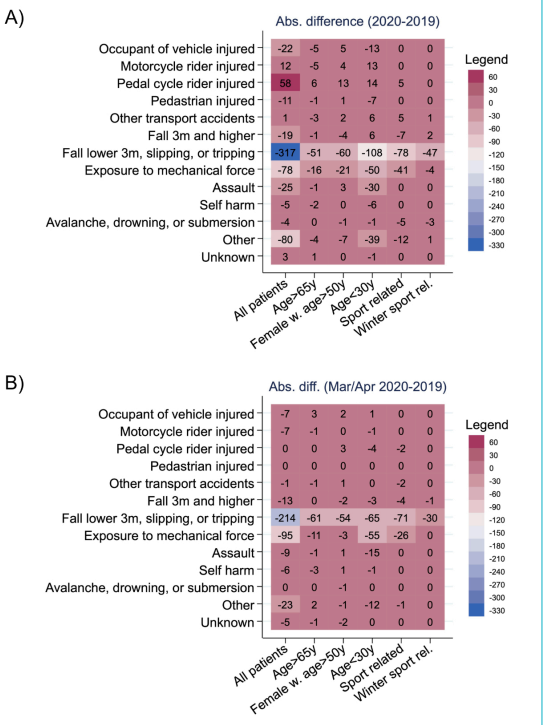

Table S1:
Demographic characteristics of the study population by two-month period – part 1.

		Total (n = 5839)	Two-month periods		
			2019 M1–M2 (n = 1023)	2019 M3–M4 (n = 1033)	2019 M5–M6 (n = 1107)
Patient characteristics					
Sex	Female	2332 (39.9%)	439 (42.9%)	377 (36.5%)	432 (39.0%)
	Male	3507 (60.1%)	584 (57.1%)	656 (63.5%)	675 (61.0%)
Age in years, median (IQR)		40 (27– 60)	41 (27–61)	40 (26–59)	39 (25–58)
Age group	18–24	1219 (20.9%)	212 (20.7%)	226 (21.9%)	247 (22.3%)
	25–44	2021 (34.6%)	331 (32.4%)	361 (34.9%)	386 (34.9%)
	45–64	1431 (24.5%)	265 (25.9%)	238 (23.0%)	267 (24.1%)
	65–84	868 (14.9%)	161 (15.7%)	154 (14.9%)	158 (14.3%)
	>84	300 (5.1%)	54 (5.3%)	54 (5.2%)	49 (4.4%)
Consultation characteristics					
Type of admission	Ambulance	1737 (29.7%)	275 (26.9%)	274 (26.5%)	340 (30.7%)
	General Practitioner	197 (3.4%)	34 (3.3%)	41 (4.0%)	31 (2.8%)
	External hospital	352 (6.0%)	62 (6.1%)	66 (6.4%)	73 (6.6%)
	Police	28 (0.5%)	3 (0.3%)	5 (0.5%)	5 (0.5%)
	Repatriation	10 (0.2%)	2 (0.2%)	3 (0.3%)	1 (0.1%)
	Walk-in	2254 (38.6%)	409 (40.0%)	377 (36.5%)	407 (36.8%)
	Internal referral	88 (1.5%)	18 (1.8%)	15 (1.5%)	14 (1.3%)
	Urgent care centre/doctor	72 (1.2%)	10 (1.0%)	15 (1.5%)	16 (1.4%)
	Not specified	1101 (18.9%)	210 (20.5%)	237 (22.9%)	220 (19.9%)
Triage	Life-threatening	392 (6.7%)	56 (5.5%)	61 (5.9%)	88 (7.9%)
	Highly urgent	1445 (24.7%)	233 (22.8%)	252 (24.4%)	288 (26.0%)
	Urgent	3716 (63.6%)	672 (65.7%)	678 (65.6%)	668 (60.3%)
	Semi-urgent	285 (4.9%)	62 (6.1%)	42 (4.1%)	62 (5.6%)
	Not specified	1 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)
Injury characteristics					
Trauma mechanism	Injury of occupant of vehicle	218 (3.7%)	36 (3.5%)	33 (3.2%)	51 (4.6%)
	Injury of motorcycle rider	112 (1.9%)	4 (0.4%)	23 (2.2%)	23 (2.1%)
	Injury of pedal cycle rider	472 (8.1%)	34 (3.3%)	72 (7.0%)	101 (9.1%)
	Injury of pedestrian	41 (0.7%)	14 (1.4%)	3 (0.3%)	9 (0.8%)
	Other transport accidents	71 (1.2%)	6 (0.6%)	14 (1.4%)	15 (1.4%)
	Fall 3 m and higher	113 (1.9%)	17 (1.7%)	21 (2.0%)	28 (2.5%)
	Fall less than 3m, slip or trip	2683 (45.9%)	563 (55.0%)	475 (46.0%)	462 (41.7%)
	Exposure to mechanical force	1390 (23.8%)	213 (20.8%)	256 (24.8%)	265 (23.9%)
	Assault	333 (5.7%)	62 (6.1%)	54 (5.2%)	63 (5.7%)
	Self-harm	151 (2.6%)	24 (2.3%)	29 (2.8%)	25 (2.3%)
	Exposure to heat/fire/electricity/pressure	78 (1.3%)	9 (0.9%)	14 (1.4%)	20 (1.8%)
	Avalanche, drowning, or submersion	10 (0.2%)	4 (0.4%)	1 (0.1%)	2 (0.2%)
	Other	120 (2.1%)	29 (2.7%)	27 (2.6%)	40 (3.6%)
	Unknown	47 (0.8%)	8 (0.8%)	11 (1.1%)	3 (0.3%)
Sports-related injuries	Total	755 (12.9%)	184 (18.0%)	144 (13.9%)	116 (10.5%)
	Snow sports-related injuries	274 (4.7%)	116 (11.3%)	43 (4.2%)	3 (0.3%)
Severe trauma		271 (4.6%)	48 (4.7%)	68 (6.6%)	45 (4.1%)
Inured body region					
	Head	1299 (22.2%)	240 (23.5%)	217 (21.0%)	218 (19.7%)
	Face	1121 (19.2%)	193 (18.9%)	204 (19.7%)	200 (18.1%)
	Neck	277 (4.7%)	48 (4.7%)	58 (5.6%)	49 (4.4%)
	Thorax	536 (9.2%)	82 (8.0%)	85 (8.2%)	112 (10.1%)
	Abdomen	295 (5.1%)	51 (5.0%)	59 (5.7%)	57 (5.1%)
	Spine	327 (5.6%)	56 (5.5%)	58 (5.6%)	70 (6.3%)
	Upper extremities	2268 (38.8%)	355 (34.7%)	381 (36.9%)	461 (41.6%)
	Lower extremities	1667 (28.5%)	277 (27.1%)	283 (27.4%)	335 (30.3%)
	Other injury	2 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)
Procedural outcomes					
Discharge	Death	6 (0.1%)	1 (0.1%)	0 (0.0%)	1 (0.1%)
	Discharge to home	4159 (71.2%)	741 (72.4%)	738 (71.4%)	780 (70.5%)
	Hospital admission	1406 (24.1%)	230 (22.5%)	252 (24.4%)	271 (24.5%)
	Transfer to external hospital	212 (3.6%)	40 (3.9%)	31 (3.0%)	42 (3.8%)
	Not specified	56 (1.0%)	11 (1.1%)	12 (1.2%)	13 (1.2%)
LoS ED in hours, median (IQR)		3.6 (2.3– 5.3)	3.8 (2.5–5.5)	3.5 (2.4–5.3)	3.7 (2.4–5.6)

IQR: interquartile range; LoS ED: length of stay in the emergency department. * p <0.05

Table S2:
Demographic characteristics of the study population by two-month period – part 2.

		Two-month periods			
		2020 M1–M2 (n = 1052)	**2020 M3–M4 (n = 653)**	**2020 M5–M6 (n = 971)**	**p value**
Patient characteristics					
Sex	Female	448 (42.6%)	256 (39.2%)	380 (39.1%)	
	Male	604 (57.4%)	397 (60.8%)	591 (60.9%)	0.026
Age in years, median (IQR)		42 (27–61)	42 (28–61)	39 (26–59)	0.099
Age group	18–24	209 (19.9%)	113 (17.3%)	212 (21.8%)	0.143
	25–44	360 (34.2%)	237 (36.3%)	346 (35.6%)	0.590
	45–64	259 (24.6%)	170 (26.0%)	232 (23.9%)	0.639
	65–84	161 (15.3%)	106 (16.2%)	128 (13.2%)	0.518
	>84	63 (6.0%)	27 (4.1%)	53 (5.5%)	0.504
Consultation characteristics					
Type of admission	Ambulance	313 (29.8%)	222 (34.0%)	313 (32.2%)	0.003*
	General Practitioner	36 (3.4%)	27 (4.1%)	28 (2.9%)	0.531
	External hospital	62 (5.9%)	38 (5.8%)	51 (5.3%)	0.852
	Police	4 (0.4%)	5 (0.8%)	6 (0.6%)	0.778
	Repatriation	3 (0.3%)	1 (0.2%)	0 (0.0%)	0.579
	Walk-in	403 (38.3%)	252 (38.6%)	406 (41.8%)	0.127
	Internal referral	17 (1.6%)	11 (1.7%)	13 (1.3%)	0.934
	Urgent care centre/doctor	13 (1.2%)	8 (1.2%)	10 (1.0%)	0.890
	Not specified	201 (19.1%)	89 (13.6%)	144 (14.8%)	<0.001*
Triage	Life-threatening	67 (6.4%)	50 (7.7%)	70 (7.2%)	0.168
	Highly urgent	240 (22.8%)	162 (24.8%)	270 (27.8%)	0.071
	Urgent	702 (66.7%)	405 (62.0%)	591 (60.9%)	0.004*
	Semi-urgent	43 (4.1%)	36 (5.5%)	40 (4.1%)	0.110
	Not specified	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.510
Injury characteristics					
Trauma mechanism	Injury of occupant of vehicle	35 (3.3%)	26 (4.0%)	37 (3.8%)	0.560
	Injury of motorcycle rider	11 (1.0%)	16 (2.5%)	35 (3.6%)	<0.001*
	Injury of pedal cycle rider	63 (6.0%)	72 (11.0%)	130 (13.4%)	<0.001*
	Injury of pedestrian	9 (0.9%)	3 (0.5%)	3 (0.3%)	0.031
	Other transport accidents	5 (0.5%)	13 (2.0%)	18 (1.9%)	0.010*
	Fall of at least 3 m	20 (1.9%)	8 (1.2%)	19 (2.0%)	0.513
	Fall of less than 3 m, slip or trip	555 (52.8%)	261 (40.0%)	367 (37.8%)	<0.001*
	Exposure to mechanical force	240 (22.8%)	161 (24.7%)	255 (26.3%)	0.086
	Assault	60 (5.7%)	45 (6.9%)	49 (5.0%)	0.674
	Self-harm	23 (2.2%)	23 (3.5%)	27 (2.8%)	0.551
	Exposure to heat/fire/electricity/pressure	16 (1.5%)	8 (1.2%)	11 (1.1%)	0.533
	Avalanche, drowning or submersion	0 (0.0%)	1 (0.2%)	2 (0.2%)	0.402
	Other	4 (0.4%)	10 (1.4%)	10 (1.0%)	<0.001*
	Unknown	11 (1.0%)	6 (0.9%)	8 (0.8%)	0.336
Sports-related injuries	Total	204 (19.4%)	38 (5.8%)	69 (7.1%)	<0.001*
	Snow sports-related injuries	99 (9.4%)	12 (1.8%)	1 (0.1%)	<0.001*
Severe trauma	—	38 (3.6%)	38 (5.8%)	34 (3.5%)	0.004*
	Head	262 (24.9%)	142 (21.7%)	220 (22.7%)	0.063
	Face	221 (21.0%)	144 (22.1%)	159 (16.4%)	0.037*
	Neck	51 (4.8%)	22 (3.4%)	49 (5.0%)	0.423
	Thorax	101 (9.6%)	57 (8.7%)	99 (10.2%)	0.354
	Abdomen	58 (5.5%)	28 (4.3%)	42 (4.3%)	0.654
	Spine	52 (4.9%)	21 (3.2%)	70 (7.2%)	0.017*
	Upper extremities	362 (34.4%)	265 (40.6%)	444 (45.7%)	<0.001*
	Lower extremities	329 (31.3%)	175 (26.8%)	268 (27.6%)	0.127
	Other injury	0 (0.0%)	0 (0.0%)	1 (0.1%)	0.602
Procedural outcomes					
Discharge	Death	1 (0.1%)	2 (0.3%)	1 (0.1%)	0.590
	Discharge to home	759 (72.1%)	456 (69.8%)	685 (70.5%)	0.800
	Hospital admission	244 (23.2%)	168 (25.7%)	241 (24.8%)	0.655
	Transfer to external hospital	41 (3.9%)	22 (3.4%)	36 (3.7%)	0.871
	Not specified	7 (0.7%)	5 (0.8%)	8 (0.8%)	0.772
LoS ED in hours, median (IQR)		3.7 (2.4–5.3)	3.3 (2.0–4.7)	3.5 (2.3–5.1)	<0.001*

IQR: interquartile range; LoS ED: length of stay in the emergency department.

* p <0.05