



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Changes in Emergency Patient Presentation to a Maxillofacial Surgery Department During the COVID-19 Pandemic



Fritjof Lentge, MD,* Philipp Jehn, MD, DMD,† Alexander Nicolai Zeller, MD, DMD,*
Simon Spalthoff, MD, DMD,† Björn Rablf, DMD,† and Philippe Korn, MD, DMD†

Purpose: To examine possible changes in the emergency patient volume and reasons for presentation to an oral and maxillofacial surgery department during the coronavirus disease 2019 (COVID-19) pandemic and the resulting contact prohibitions. We hypothesized that the pandemic would lead to fewer patients presenting with emergent conditions.

Methods: A total of 939 patients, who presented to the Department for Oral and Maxillofacial Surgery of Hannover Medical School during the first 4 weeks of contact prohibitions in Germany, starting from March 23, 2020 until April 19, 2020, and in comparable periods were examined. The number of patients, reason for presentation, and required treatments were documented and compared to the years 2018 and 2019. Special attention was paid to the changes in trauma cases.

Results: We found that the number of patients in 2020 was significantly lower ($P_{(2019)} < .001$, $P_{(2018)} < .01$), but sex and age distributions were comparable to those in the previous years. Both the absolute and relative frequencies of dental diagnoses were significantly lower in 2020 ($P_{(2019)} < .001$, $P_{(2018)} < .001$), while the proportion of patients who presented with trauma was significantly higher ($P_{(2019)} < .001$, $P_{(2018)} < .001$). A significant decrease in patient number to the hospital, despite private practices being closed, was presumably due to patients' infection-related concerns. Trauma cases were more frequent in private settings, and traumatic events under the influence of alcohol were frequent. The circumstances and not the absolute number of trauma events had changed.

Conclusions: The results of this study suggest that the COVID-19 pandemic has important effects on the use of emergency services concerning oral and maxillofacial surgery in Germany.

© 2021 The American Association of Oral and Maxillofacial Surgeons.

J Oral Maxillofac Surg 79:2123.e1–2123.e6, 2021

The year 2020 has been impacted by the spread of a novel illness, the coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2). Initially perceived as an endemic event in China in November 2019, the virus has now spread rapidly beyond the borders of the Asian continent and become a pandemic, affecting both private and public life.¹⁻⁶ It is increasingly recognized that business closings, prohibition of

contact, entry bans at designated places, and a ban on major events may help slow down the spread of SARS-CoV-2.⁷ The German National Conference of Science even recommended a complete shutdown for several weeks.⁸ Furthermore, there is a rising concern among the population regarding COVID-19 illness.^{3,9} In anticipation of an overload on the healthcare system, particularly in the area of intensive care medicine, many medical disciplines are facing the

*Resident, Department of Oral and Maxillofacial Surgery, Hannover Medical School, Hannover, Germany.

†Consultant, Department of Oral and Maxillofacial Surgery, Hannover Medical School, Hannover, Germany.

Conflict of Interest Disclosures: None.

Address correspondence and reprint requests to Dr Lentge, Department of Oral and Maxillofacial Surgery, Hannover Medical

School, Carl-Neuberg-Strae 1, Hannover 30625, Germany; e-mail:

lentge.fritjof@mh-hannover.de

Received February 11, 2021

Accepted May 14, 2021.

© 2021 The American Association of Oral and Maxillofacial Surgeons.

0278-2391

<https://doi.org/10.1016/j.joms.2021.05.026>

interruption of regular operations, and the operations are being restricted to the non-elective and emergency treatments only.¹⁰ In addition, there is a pressing need to determine the extent to which emergency care can be maintained in COVID-19 patients if the healthcare system gets overloaded. Approximately, a decrease of up to 79% of elective procedures, such as arthrosis-related hip joint replacement, between March and April 2020 has been reported by the scientific institute of the general local health insurances.¹⁰ Moreover, a sharp decrease in the frequency of emergency hospital admissions for events such as myocardial infarction (31% decrease) and strokes (18% decrease) has also been observed during this period. Both regulatory and patient-specific factors are emphasized as possible reasons for this decrease.¹⁰

The daily routine during spring 2020 was mainly set by the hospitals themselves as the guidelines for dental or maxillofacial treatment were only published in summer and autumn 2020.¹¹

This study aims to retrospectively evaluate patient presentations to the emergency service of the Department of Oral and Maxillofacial Surgery at Hannover Medical School during the first 4 weeks of COVID-19-related contact restrictions in Germany. The underlying research hypothesis is that there has been a reduction in the frequency of emergency service presentations during these 4 weeks. Both the absolute number of patients and their relative composition, as well as the changes in causes and circumstances leading to presentation, were evaluated.

Methods

The observation period for the study was 28 days (4 weeks), starting from March 23, 2020 until April 19, 2020. The start date of the study coincided with the beginning of contact restrictions in the Federal Republic of Germany. It should be noted that the Easter holidays (Good Friday and Easter Monday) were within the observation period. We compared the patient volumes with those in 2018 and 2019. To

avoid systemic errors, the length of the observation periods in those years was also chosen to be 28 days and included the Easter holidays. The inclusion criteria were patient admissions outside of the standard service hours of the Department of Oral and Maxillofacial Surgery. The timings for emergency service treatment are listed in Table 1. This study also included patients who were primarily referred to another department; however, they required consultation in the Department of Oral and Maxillofacial Surgery. In addition to the date of the presentation, the patient's age, diagnosis, previous events related to the patient's diagnosis, treatment measures taken, need for surgical intervention (local and general anesthesia), and the medical need for inpatient admission were recorded. The exclusion criteria were presentation within the standard service hours and incomplete documentation of the case.

For statistical analyses, diagnoses were categorized into groups distinguishing traumata, abscesses, and complications after oral surgery and dental treatment diagnoses (prosthetics, tooth preservation, and orthodontics). The diagnosis of a single patient could be classified in multiple categories, e.g., an abscess after oral surgery was classified as both an abscess and a complication. Traumatological cases were further divided into subcategories of dental traumata, soft tissue traumata, and fractures.

Subsequently, statistical analysis of the patient volume, the distribution of selected diagnoses and causal events, the treatment measures taken, and the distribution of the patient volume were also adjusted for the 7 days of the week. Using the 2-sided t-test for independent samples, the number of patients and patients' age during the current survey period were compared with those of 2018 and 2019. A *P* value < .05 was considered statistically significant based on a 95% confidence interval. The effect size was evaluated using *Cohen's d*. Values from 0.2 to 0.5 were considered as a small effect, > 0.5 to 0.8 as a medium-size effect, and > 0.8 as a strong effect. The Chi-square test was used to compare the difference between the 3 observation periods (2018, 2019, and

Table 1. STANDARD AND EMERGENCY SERVICE TIMINGS AT THE DEPARTMENT FOR ORAL AND MAXILLOFACIAL SURGERY.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Standard service	08:00-17:00	08:00-17:00	08:00-17:00	08:00-16:00	08:00-15:00	-	-
Maxillofacial emergency service	17:00- 08:00	17:00- 08:00	17:00- 08:00	16:00- 08:00	15:00- 08:00	24 hr	24 hr
Dental emergency service	18:00-22:00	18:00-22:00	18:00-22:00	18:00-22:00	18:00-22:00	10:00-18:00	10:00-18:00

2020) for factors such as distribution of the diagnoses, causal events, the need for an inpatient stay or an operative intervention, and patients' sex. All calculations were carried out using the statistical program SPSS (IBM SPSS Statistics for Windows, Version 26.0. NY, USA). This study was approved by the appropriate institutional review board, and all participants provided written informed consent.

Results

A total of 939 patients were evaluated. **Table 2** shows an overview of the data on patient frequency, age, and sex distribution. The average patient volume per day was 6.79 (2020), 14.96 (2019), and 11.79 (2018). The patient volume in the 2 comparison years (2018 and 2019) was significantly higher than in the current observation period in 2020 ($P_{(2019)} < .001$, $P_{(2018)} < .01$). A medium effect size (Cohen's d) of -0.751 was observed in comparison with 2018; a large effect size of -4.055 was observed in comparison with 2019. This indicates a considerable reduction in the number of patients. Patients' age in 2020 did not differ significantly from the 2 comparison periods ($P_{(2019)} = .907$, $P_{(2018)} = .739$). The proportion of men was larger in 2020 than in previous years; however, the difference was not statistically significant ($P_{(2019)} = .054$, $P_{(2018)} = .13$).

When considering the cumulative distribution of patients over the 7 days of the week, the highest values were found on weekends (Friday, Saturday, and Sunday), as illustrated in **Figure 1**. In 2020 and 2019, the least patient presentations occurred on Wednesdays; in 2018, on Tuesdays. The distribution of the patients over the 7 days of the week in 2020 did not differ significantly from the average comparison periods of the previous years.

Table 3 shows the frequency of selected reasons for emergency presentation. In comparison with 2018, there were more presentations due to traumatic events in 2020 but the number was almost the same as in 2019. However, the relative proportion of patients who presented due to trauma was

significantly higher in 2020 ($P_{(2019)} < .001$, $P_{(2018)} < .001$). Furthermore, complications after oral surgery that led to emergencies occurred less often in 2020 as compared to 2019 and 2018 in absolute terms; however, the relative proportion was nearly the same ($P_{(2019)} = .648$, $P_{(2018)} = .610$). Both the absolute number and relative proportion of patients who presented with dental issues were significantly lower in 2020 ($P_{(2019)} < .001$, $P_{(2018)} < .001$).

Table 4 shows the composition of different trauma-related injuries. The absolute number of fractures in 2020 was approximately the same as in 2019, but higher than in 2018. There was only a small change in the absolute number of soft tissue injuries. The number of patients who presented with dental trauma in 2020 fell within the range of observed frequencies in 2018 and 2019. Although the absolute number of traumatic diagnoses varied relatively slightly, the percentage of each traumatic diagnosis in the total patient volume increased significantly in 2020.

Table 5 shows the causes of accidents that resulted in trauma. The number of accidents while practicing sports/private hobbies remained unchanged in 2020 as compared to 2019, whereas in 2018 there were fewer presentations. In 2018, there were no presentations related to traffic accidents. A comparison between 2020 and 2019 revealed similar values for the absolute and the relative frequencies. Trauma due to interpersonal violence occurred more frequently in 2020 than in 2018, but less frequently in both years than in 2019. The relative frequencies did not differ significantly ($P_{(2019)} = .359$, $P_{(2018)} = .708$). Trauma presentations due to falls were most frequent in 2020, but the relative frequency did not differ as compared to previous years. The absolute number of traumatic events under the influence of alcohol was the largest in 2020 as was the relative proportion, although these differences were not statistically significant ($P_{(2019)} = .185$, $P_{(2018)} = .431$). The frequencies of subsequent operative interventions and of indication for inpatient treatment in 2020 did not significantly differ from those in previous years.

Table 2. OVERVIEW OF THE NUMBER OF PATIENTS, AGE, AND SEX DURING OBSERVATION PERIODS.

Year	Patients <i>n</i>	Patients/day		Age		Sex		
		<i>MV (SD)</i>	<i>P</i>	<i>MV (SD)</i>	<i>P</i>	Male (%)	Female (%)	<i>P</i>
2020	190	6.79 (4.80)		39.54 (23.76)		117 (61.58)	73 (38.42)	
2019	419	14.96 (9.53)	< 0.001	39.77 (21.91)	0.907	223 (53.22)	196 (46.78)	0.054
2018	330	11.79 (8.31)	< 0.01	38.87 (21.19)	0.739	166 (50.30)	164 (49.70)	0.13

Abbreviations: MV, mean values; SD, standard deviation

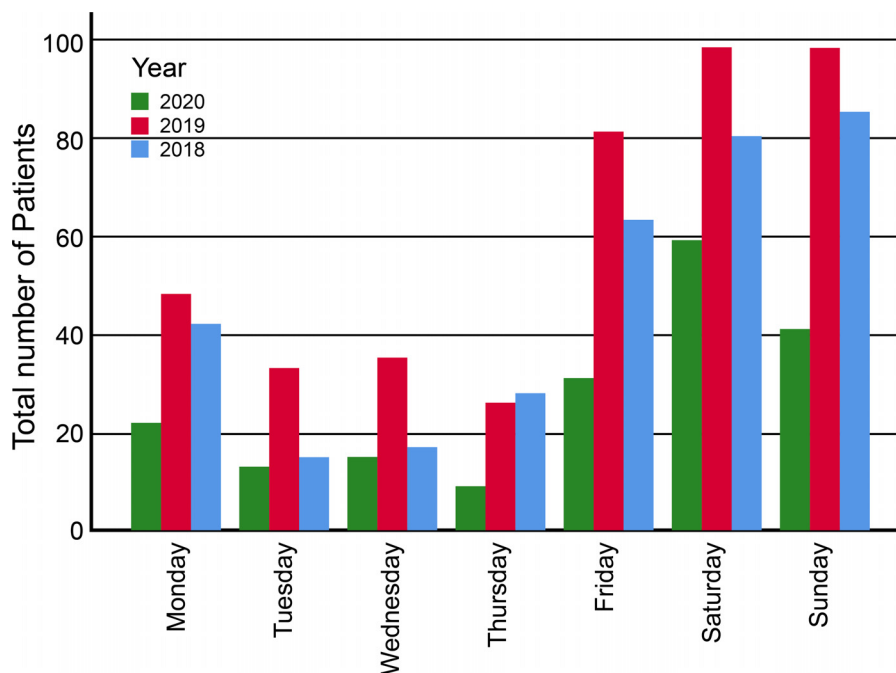


FIGURE 1. Distribution of the cumulative number of patients over the 7 days of the week during observation periods

Lentge et al. COVID-19 Presentation to a Maxillofacial Surgery Department. *J Oral Maxillofac Surg* 2021.

Discussion

The aim of this study was to investigate the hypothesis that the measures announced by the German federal government in March 2020 against the spread of the SARS-CoV-2 and the increased social awareness towards the pandemic had an effect on the frequency and composition of emergency presentations in the Department of Oral and Maxillofacial Surgery at Hannover Medical School. Quantitatively, there was a significant decline in the number of patient visits as compared to previous years. Various potential reasons therefore may be discussed.

Current studies found that patients were fearful of being exposed to SARS-CoV-2 while using health care facilities.^{3,9} In view of the observation that a high proportion of patients presenting during the emergency service in the German healthcare system are not emergency patients in the actual sense,¹²⁻¹⁵ possibly a more critical or even wrong assessment of the need

for an emergency presentation was carried out by the patients. In this regard, the fear of infection with SARS-CoV-2 while using health care services potentially changed the patients' assessment of their own situation.

Nevertheless, the age and sex distribution of patients did not differ significantly in 2020. This is particularly interesting because older people are considered a high-risk group for severe COVID-19 disease. In particular, the assumptions that this patient group avoided hospital visits during the pandemic and that average patients' age dropped have not been confirmed.

The number of patients requiring inpatient treatment or surgical intervention was higher in 2020 relative to previous years, but the difference was not statistically significant. Neither the hypothesis that only seriously ill patients presented at the health care facilities and the less suffering stayed away, nor the

Table 3. DISTRIBUTION OF DIAGNOSIS GROUPS DURING OBSERVATION PERIODS.

Year	Trauma		Complications		Abscess		Dental Treatment	
	n (%)	P	n (%)	P	n (%)	P	n (%)	P
2020	82 (43.16%)		10 (5.26%)		28 (14.73%)		48 (25.26%)	
2019	83 (19.81%)	< 0.001	26 (6.21%)	0.648	54 (12.89%)	0.536	182 (43.43%)	< 0.001
2018	59 (17.88%)	< 0.001	21 (6.36%)	0.610	59 (17.88%)	0.355	182 (55.15%)	< 0.001

Lentge et al. COVID-19 Presentation to a Maxillofacial Surgery Department. *J Oral Maxillofac Surg* 2021.

Table 4. COMPOSITION OF TRAUMA-RELATED INJURIES DURING OBSERVATION PERIODS.

Year		n	Fractures		Soft Tissue Injuries		Dental Trauma	
			n (%)	P	n (%)	P	n (%)	P
2020	Trauma	82	28 (34.15%)		32 (39.02%)		24 (29.23%)	
	Total	190	28 (14.73%)		32 (16.84%)		24 (12.63%)	
2019	Trauma	83	26 (31.33%)	0.699	37 (44.57%)	0.470	20 (24.10%)	0.453
	Total	419	26 (6.20%)	0.001	37 (8.83%)	0.005	20 (4.77%)	0.001
2018	Trauma	59	7 (11.86%)	< 0.001	28 (47.46%)	0.318	25 (42.37%)	0.107
	Total	330	7 (2.12%)	< 0.001	28 (8.48%)	0.004	25 (7.57%)	0.063

Lentge et al. COVID-19 Presentation to a Maxillofacial Surgery Department. *J Oral Maxillofac Surg* 2021.

counter-hypothesis that a higher number of non-emergency patients presented during emergency service hours (for example, due to practice closures) have been confirmed. This is quite remarkable, given that the provision of elective health care service was restricted during the observation period in 2020, but the emergency treatment service was not.¹⁰

A closer look at the distribution of the diagnoses leading to patients' presentation provides possible explanations for the reduced number. As shown in the current study, the relative frequency of presentations based on dental diagnoses decreased by 13 and 25%, compared to 2018 and 2019, respectively. The absolute number of cases changed accordingly. This may be interpreted in terms of either excessive use of emergency services before, or that the reluctance to use emergency treatment among patients markedly increased during the pandemic. Given that many private practices reported a significantly reduced number of patients, it is quite remarkable to not witness an increased number of patients in other medical facilities, such as the studied center.¹⁶ A report from northern Italy at the time of the COVID-19 pandemic supports these considerations; in that observation, both patients and dentists were concerned about possible infection during dental treatment.¹⁶

The results of the current study might further be regarded in terms of the ongoing social discussion on the overuse of emergency services by elective cases.¹²⁻¹⁵ In this regard, the present findings are in

line with the assumption that the central emergency rooms are increasingly being utilized by patients with medical issues not best managed in this clinical setting.¹²⁻¹⁵

The presentations observed due to trauma are particularly surprising; despite the lower absolute numbers in 2020, the absolute number of trauma presentations was only slightly lower than in 2019 and remarkably higher than in 2018. Compared to previous years, the share of trauma cases in the total patient volume was significantly higher. The underlying traumatic events did not show any significant changes overall. In accordance with the increased share of traumatic events, the share of observed trauma increased significantly. The main causes of fractures were interpersonal violence, the influence of alcohol, or practice during sports, especially within team and contact sports. This observation is interesting as a lower frequency of physical confrontations would be expected owing to the prohibition of sports (involving large groups and contact sports), temporary closure of dance halls, and the ban on major events. Furthermore, it is also noteworthy that the absolute frequency of trauma under the influence of alcohol was higher in 2020 as compared to previous years. The previous observations suggest a shift in trauma causes to private or domestic life, while a decrease in alcohol consumption in public might be accompanied by an increase in consumption in private settings, which equally leads to injuries and

Table 5. CAUSES OF ACCIDENT AND TRAUMA DURING OBSERVATION PERIOD.

Year	Total n (%)	Sports/Hobby		Traffic Accident		Interpersonal Violence		Overthrow		Alcohol	
		n (%)	P	n (%)	P	n (%)	P	n (%)	P	n (%)	P
2020	82	21 (25.61)		4 (4.89)		10 (12.20)		46 (56.10)		7 (8.54)	
2019	83	20 (24.10)	0.822	3 (3.61)	0.687	14 (16.87)	0.359	40 (48.19)	0.309	3 (3.61)	0.185
2018	59	5 (8.47)	0.100	0 (0%)		6 (10.17)	0.708	42 (71.19)	0.068	3 (5.08)	0.431

Lentge et al. COVID-19 Presentation to a Maxillofacial Surgery Department. *J Oral Maxillofac Surg* 2021.

emergency presentations. Here, the extent to which a catch-up effect occurs after the pandemic subsides has to be observed.

In conclusion, the present study demonstrates the important effects of the SARS-CoV-2 pandemic on the use of emergency services concerning oral and maxillofacial surgery in Germany. Overall, markedly reduced patient presentations and pronounced reduction in patient self-admissions based on dental diagnoses are most noteworthy. Until now it remains to be seen whether this is possibly a short-term phenomenon with a catch-up effect. Despite the ban on dance halls and sporting events, where injuries often occur, the number of trauma-related presentations did not diminish during the beginning of contact restriction. Although the accidents seem to take place in a more private than public setting during the pandemic, the proportion of patients under the influence of alcohol remains high. It remains to be seen whether these are only short-term or long-term effects; as the pandemic is still ongoing, the number of infections varies and restrictions are constantly being adjusted.

Acknowledgments

None.

References

- Sohrabi C, Alsafi Z, O'Neill N, et al. World health organization declares global emergency: a review of the 2019 novel coronavirus (COVID-19). *Int J Surg* 76:71, 2020
- Stafford N: Covid-19: why Germany's case fatality rate seems so low. *BMJ* 369:m1395, 2020
- Teufel M, Schweda A, Dorrie N, et al. Not all world leaders use Twitter in response to the COVID-19 pandemic: impact of the way of Angela Merkel on psychological distress, behaviour and risk perception. *J Public Health (Oxf)*, 2020
- Velavan TP, Meyer CG: The COVID-19 epidemic. *Trop Med Int Health* 25:278, 2020
- Wilder-Smith A, Freedman DO: Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak. *J Travel Med* 27, 2020
- Yan Y, Shin WI, Pang YX, et al. The first 75 days of novel coronavirus (SARS-CoV-2) outbreak: recent advances, prevention, and treatment. *Int J Environ Res Public Health* 17, 2020
- Lau H, Khosrawipour V, Kocbach P, et al. The positive impact of lockdown in Wuhan on containing the COVID-19 outbreak in China. *J Travel Med* 27, 2020
- Haug G: Ad-hoc-Stellungnahmen zur Coronavirus-Pandemie. Available at: https://www.leopoldina.org/uploads/tx_leopublication/2020-03-21_Leopoldina_Coronavirus-Pandemie_in_Deutschland_01.pdf [Accessibility verified October 22, 2020].
- Petzold MB, Bendau A, Plag J, et al. Risk, resilience, psychological distress, and anxiety at the beginning of the COVID-19 pandemic in Germany. *Brain Behav* e01745, 202046#
- Günster C DD, Hentschker C, Klauber J, Malzahn J, Schillinger G, Mostert C: WIdO-Report: Entwicklung der Krankenhausfallzahlen während des Coronavirus-Lockdowns. Nach ICD-Diagnosekapiteln und ausgewählten Behandlungsanlässen. Berlin, Wissenschaftliches Institut der AOK (WIdO), 2020
- Aerosol-übertragbaren DUmzPbBm, Erregern“ L, 2020, AWMF-Registriernummer: 046-083, Available at: <https://www.awmf.org/leitlinien/detail/ll/083-046.htmlZa>.
- Faulkner D, Law J: The 'unnecessary' use of emergency departments by older people: findings from hospital data, hospital staff and older people. *Aust Health Rev* 39:544, 2015
- Fulde GW, Duffy M: Emergency department frequent flyers: unnecessary load or a lifeline? *Med J Aust* 184:595, 2006
- Hallfors E, Saku SA, Makinen TJ, Madanat R: A consultation phone service for patients with total joint arthroplasty may reduce unnecessary emergency department visits. *J Arthroplasty* 33:650, 2018
- Van Dillen C, Kim SH: Unnecessary emergency medical services transport associated with alcohol intoxication. *J Int Med Res* 46:33, 2018
- Consolo U, Bellini P, Bencivenni D, Iani C, Checchi V: Epidemiological aspects and psychological reactions to COVID-19 of dental practitioners in the Northern Italy Districts of Modena and Reggio Emilia. *Int J Environ Res Public Health* 17, 2020