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Did COVID-19 change the emergency department admissions ?

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Contents

Abstract

Background

The COVID-19 pandemic has changed the organization of health care in Belgium. Different strategies have been implemented in order to avoid hospital crowding. Moreover, patients were advised not to come to the emergency department (ED) for non-urgent reasons. Meanwhile, recent studies have shown a decrease in ED visits for urgent conditions.

Aim

The aim of this study was to describe the impact of the COVID-19 pandemic on ED admissions for urgent diagnoses.

Methods

From the 1st of January 2019 until the 31th of December 2020, all patients older than 18 years old who attended the ED at the University Hospital of Leuven (UZ Leuven) were included. Baseline characteristics of patients, admissions codes, way of ED admission and diagnoses included in the First Hour Quintet (cardiac arrest, severe respiratory difficulties, severe trauma, cardiac chest pain, stroke) were collected. To describe the impact of the COVID-19 pandemic, the periods of the pandemic waves were analyzed and compared with the same time period in 2019. In Belgium, the first wave took place from the 1st of March 2020 until the 22th of June 2020. The second wave started on the 31th of August 2020 and for the purpose of this study, we decided to censor the second wave to the 31th of December 2020.

Results

From January 2019 to December 2020, 99 569 patients older than 18 years attended the ED of UZ Leuven: 16 075 patients during the first wave of the pandemic and 16 893 patients during the comparison period in 2019. The treating discipline registered at entrance changed: 32,4% of the patients were recorded under “Emergency medicine” during the first wave versus 15,1% during the same period a year earlier ($p<0.001$), 24 % of the patients were recorded as “Internal medicine” versus 24,8% in the comparison period ($p = 0.086$) and 16,3% of the patients were recorded as “Trauma surgery” versus 19,3% in the comparison period ($p<0.001$).

14 739 patients attended the ED between the 31th of August and 31th of December 2020 compared with 18 704 patients during the same period in 2019. 23,8% of the patients was recorded under the discipline ” Internal medicine” versus 25,5% ($p<0.001$), 20,9% of the

patients was recorded as “Emergency medicine” versus 14,8% ($p<0.001$) and 18,1% for “Trauma surgery” versus 19,4% ($p = 0.02$)

During the first wave, the proportion of patients having one of the diagnoses of the First Hour Quintet was similar with the comparison period (First wave 4,4% versus 4,5 % of the patients in the comparison period, $p = 0.43$).

820 patients of the second wave had a diagnosis of the First Hour Quintet compared with 796 patients in the comparison period (Second wave FHQ 5,6% versus comparison period FHQ 4,3% $p < 0.001$).

There were statistically more patients diagnosed with chest pain and stroke during the second wave than in the comparison period (Cardiac chest pain 1,5% versus 1%, $p<0.001$; Stroke 1,9% versus 1,4%, $p< 0.001$)

Concerning the way of admission to the ED, we found that there were statistically more referred patients to the ED by a doctor during both waves of the pandemic compared with the comparison periods. (First wave 44,5% versus Comparison period 40,4% , $p < 0.001$) (Second wave 44,9% versus Comparison period 39,4% $p< 0.001$)

Conclusions

We found a decrease in number of patients attending the ED during the COVID-19 pandemic. Further studies are needed to determine for which conditions patients visited the ED less and to identify the causes for change in ED admissions.

Relevance

The COVID-19 pandemic has been worldwide a challenge for health care systems. We consider that it could be seen as an opportunity to redesign the emergency healthcare. Effort should be made to ensure that patients with urgent conditions are cared for at the ED, while patients with non-urgent conditions are managed at other healthcare settings. In order to achieve this goal, a collaboration of all stakeholders is necessary.

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Finally, I dedicate this Master's thesis to Marie L. whom I think about every single day.

Edeline Kaze

Background

In December 2019, the first cases of the SARS-CoV-2 virus were reported in China (1). The virus rapidly spread worldwide. On February 2020, the World Health Organization (WHO) named the disease caused by this new virus “Coronavirus disease 2019 (COVID-19)” (2) and on the 11th of March, 2020 the WHO declared COVID-19 a pandemic (3).

In Belgium, the first case was recorded on the 4th of February, 2020 (4-5). On the 18th of March, 2020 the National Security Council announced a national lockdown in order to limit the spread of COVID-19 and to prevent hospitals from being overwhelmed. Citizens were asked to stay at home, non-essential shops were closed and people were urged to respect hygiene measures and social distancing (6). To maintain hospital capacity for COVID-19 patients, specific strategies were implemented: non-urgent elective surgeries and treatments were postponed (7-8), triage systems performed by general practitioners were placed alongside EDs to identify patients who needed to be admitted (9-11) and face-to-face consultations were replaced by telephone consultations (7). Moreover, patients were encouraged to avoid the ED for non-urgent reasons (12).

Meanwhile, several studies from France, Austria, Spain, Italy, the United Kingdom, the United States of America and China have reported a decrease in patients attending the ED for urgent conditions such as acute coronary syndrome and stroke (13-25). At this time, there are no data available in Belgium.

Study objectives

1. Aim

The aim of this study was to describe the impact of the COVID-19 pandemic on emergency department (ED) admissions for urgent diagnoses (selected from the diagnoses of the First Hour Quintet). This study is, as far as is known, the first of its kind in Belgium.

2. Research questions

Our research questions were:

a) Did the reasons of admissions (according to the medical specialty) change during the COVID-19 pandemic?

b) Are there differences for the diagnoses of the First Hour Quintet during the COVID-19 pandemic?

c) Are there differences for the referral and non-referral admission to the ED during the COVID-19 pandemic?

We hypothesized that the COVID-19 pandemic has caused

- An increase in patients admitted for respiratory complaints
- a fall in patients attending with the diagnoses of the First Hour Quintet
- an increase in patients referred to the ED

Methods

1. Study settings and eligibility criteria for participants

From the 1th of January 2019 to the 31th of December 2020, all patients older than 18 years old who attended the ED at the University Hospital of Leuven (UZ Leuven) were included. UZ Leuven is located about 20 kilometers away from Brussels and is the largest university hospital in Belgium with nearly 10 000 employees and 2000 hospital beds. Every year nearly, 57 000 patients visit the ED (26-27).

2. Data

The following data were collected: baseline characteristics of patients (age, gender), admissions codes registered at the entrance based on the admission complaints and the way of admission to the ED (self-referral vs referred patient by a physician). To identify patients with urgent conditions, we decided to collect the diagnoses included in the First Hour Quintet.

First Hour Quintet

The First Hour quintet are a group of life-threatening emergencies defined by the EED project. These emergencies require rapid diagnosis and treatment and they include the following (28).

• Cardiac arrest

• Severe respiratory difficulties

• Severe trauma

• Chest pain, including acute coronary syndrome (Cardiac chest pain)

• Stroke

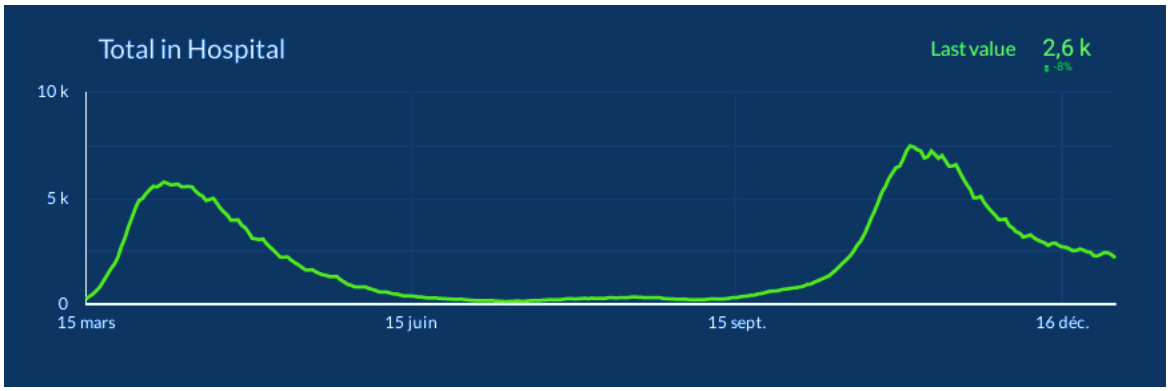
From the First Hour Quintet, symptom-based diagnoses were excluded. Moreover, conditions among “severe trauma” were replaced by high-energy trauma according to the Trauma Protocol at the hospital. A detailed description about the methodology is presented in appendix.

We identified diagnoses using the International Classification of Diseases Ninth and Tenth revision (ICD-9 and ICD-10). When the ICD codes were missing, the final diagnoses recorded at discharge was searched using keywords.

Waves of the COVID-19 pandemic

To describe the impact of the COVID-19 pandemic, the periods of the pandemic waves were analyzed and compared with the same time period in 2019 in order to avoid seasonal variations. In Belgium, the COVID-19 pandemic occurred in 2 waves in 2020 (29). The first wave took place from the 1st of March 2020 until the 22th of June 2020 and the second wave was from the 31th of August 2020 and for the purpose of this study, we decided to censor the second wave to the 31th of December 2020. Each wave was compared with the same period in the previous year.

Figure 1 : Belgium COVID-19 Epidemiological Situation (30)



Patients diagnosed with COVID-19

Patients attending the ED were tested for SARS-CoV-2 with reverse-transcription polymerase chain reaction. If they fulfilled the following conditions : If they were suspected to be a Covid case or suspected to need hospital admission. All patients diagnosed with both diagnosis, one of the First Hour Quintet and COVID-19 were excluded.

Outcomes

The primary outcome was the number of ED admission according to the medical specialty. The secondary outcomes were the number of conditions of the “First Hour Quintet”, epidemiologic characteristics of patients and the number of patients referred to the ED by a physician.

3. Statistics

Analyses were performed using IBM SPSS Statistics 27.0. Differences between groups were evaluated with the chi-square test for categorical variables and Student’s t-test for continuous variables. A p-value < 0.05 was considered significant.

4. Ethical considerations

Data were collected from the medical files and anonymized by one of the authors prior to their analysis by another author. This present study was approved by the Master’s thesis committee “Master of Science in Health Care Management and Policy” of the University of Leuven. Informed consent was not required given that this study is entirely retrospective.

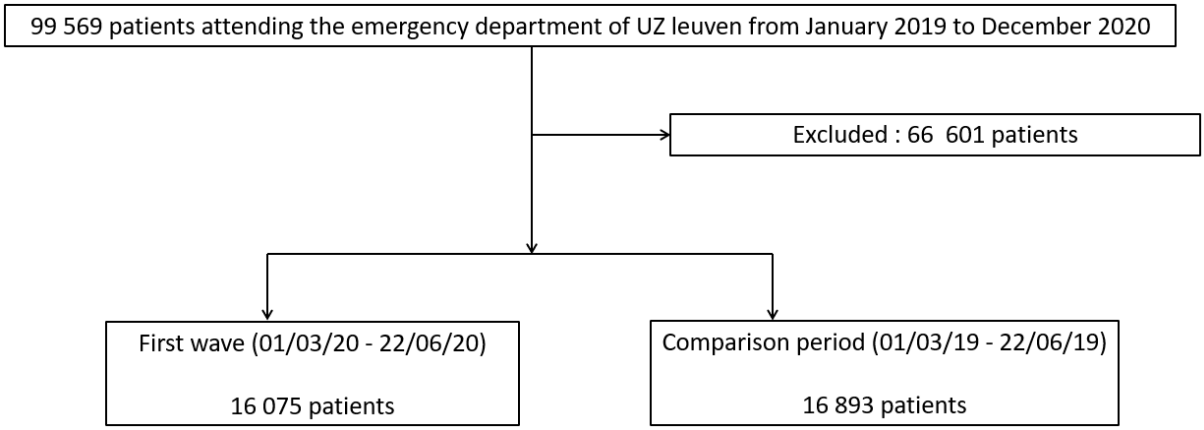
Results

1. Did the reasons of admission (according to the medical specialty) change during the COVID-19 pandemic?

First wave of the COVID-19 pandemic

From January 2019 to December 2020, 99 569 patients older than 18 years attended the ED of UZ Leuven: 16 075 patients during the first wave of the pandemic and 16 893 patients during the comparison period in 2019

Flow chart



The admission codes registered at entrance changed: 32,4% of the patients were recorded under the code “Emergency medicine” during the first wave versus 15,1% during the same period a year earlier (p<0.001), 24 % of the patients were recorded as “Internal medicine” versus 24,8% in the comparison period (p = 0.086) and 16,3% of the patients were recorded as “Trauma surgery” versus 19,3% in the comparison period (p<0.001).

Figure 2 : admission codes during the first wave

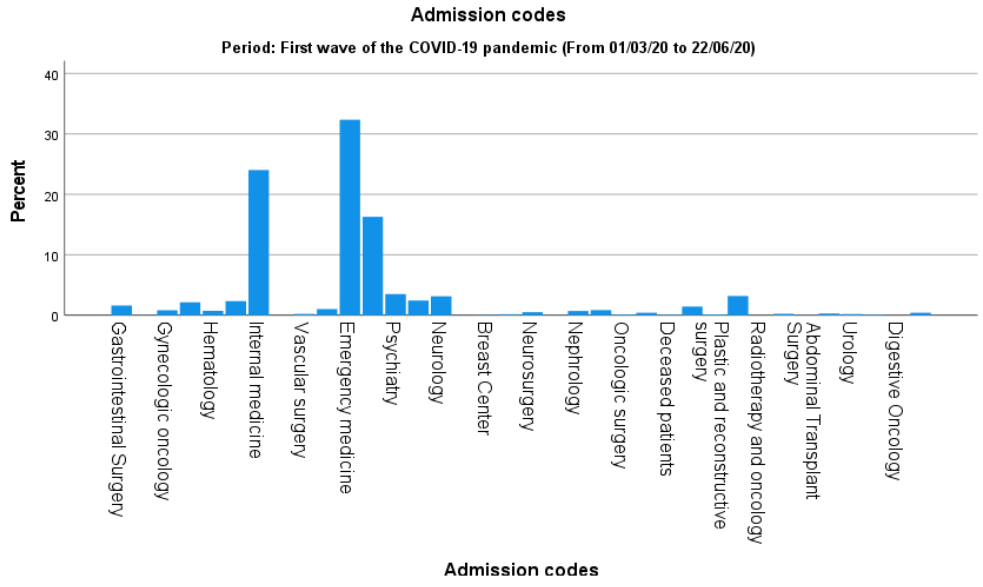
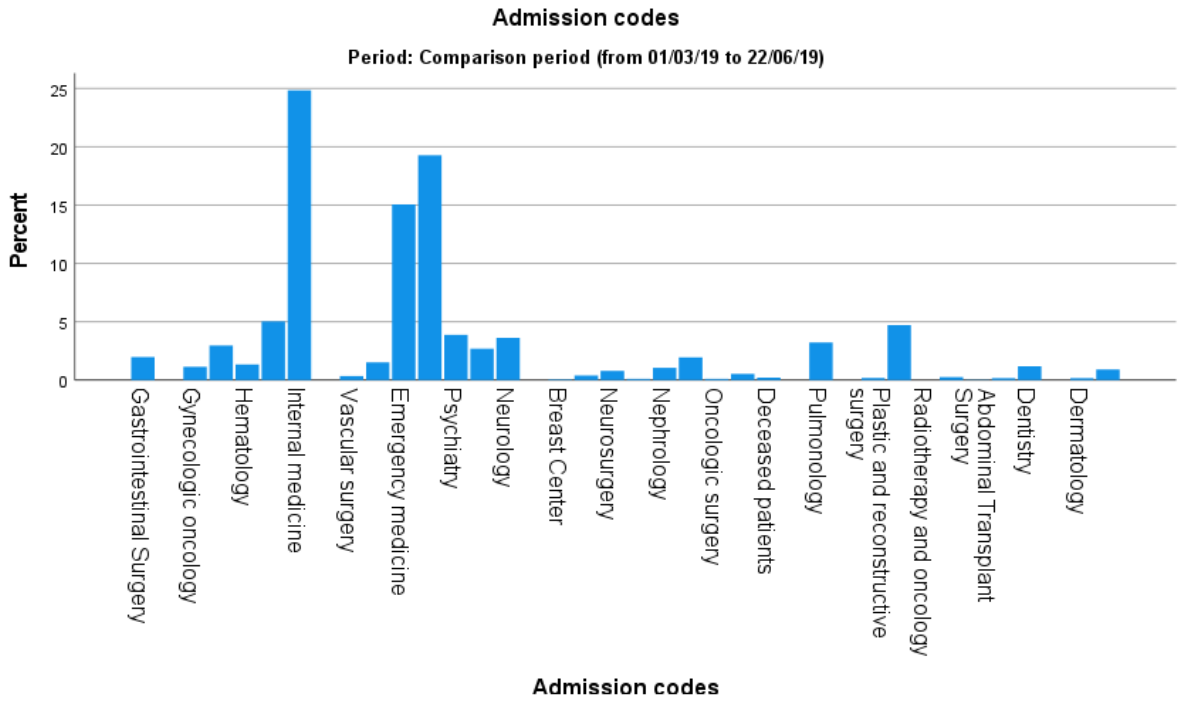


Figure 3 : admission codes during the comparison period

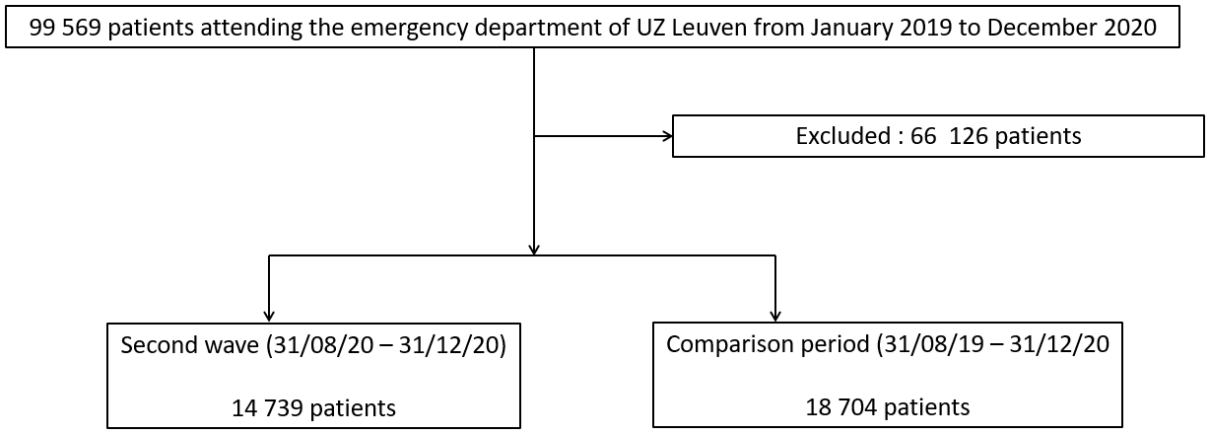


A detailed table of the all admissions codes can be found in appendix.

Second wave of the COVID-19 pandemic

14 739 patients attended the ED of our institution between August 31,2020 and December 31, 2020 compared with 18 704 patients from August 31,2019 to December 31,2019.

Flow chart



When we compared the main admissions code according to period of the second wave versus the comparison period, we found that 23,8% of the patients was recorded for" Internal medicine" versus 25,5% ($p<0.001$), 20,9% of the patients was recorded for "Emergency medicine" versus 14,8% ($p<0.001$) and 18,1% for "Trauma surgery" versus 19,4% ($p = 0.02$).

Figure 4 : admission codes during the second wave

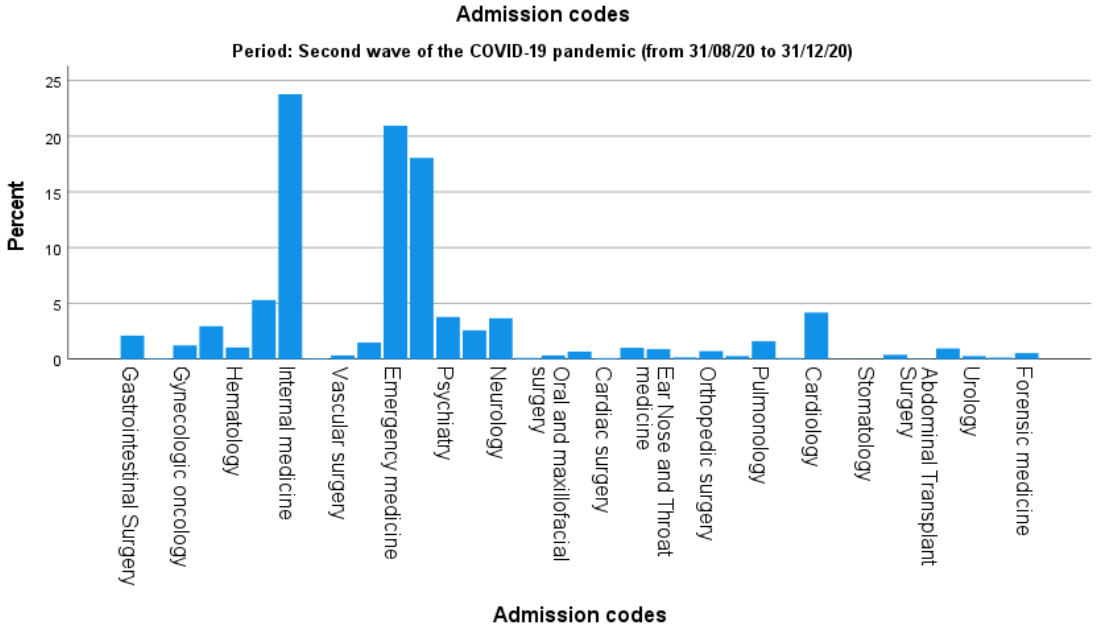
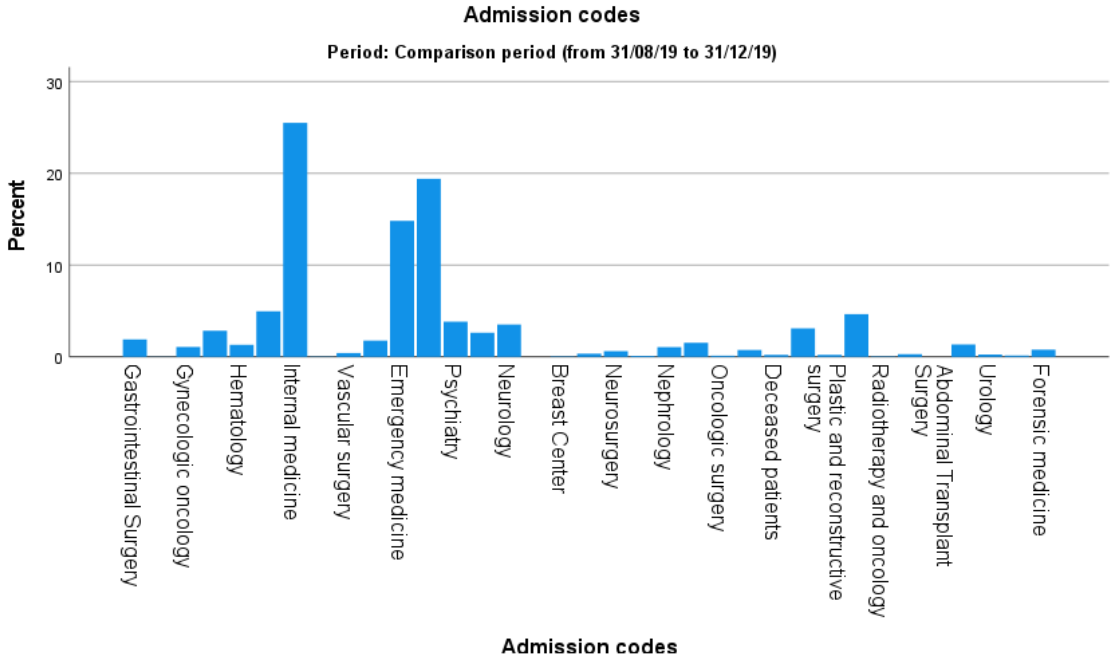


Figure 5 : admission codes during the comparison period



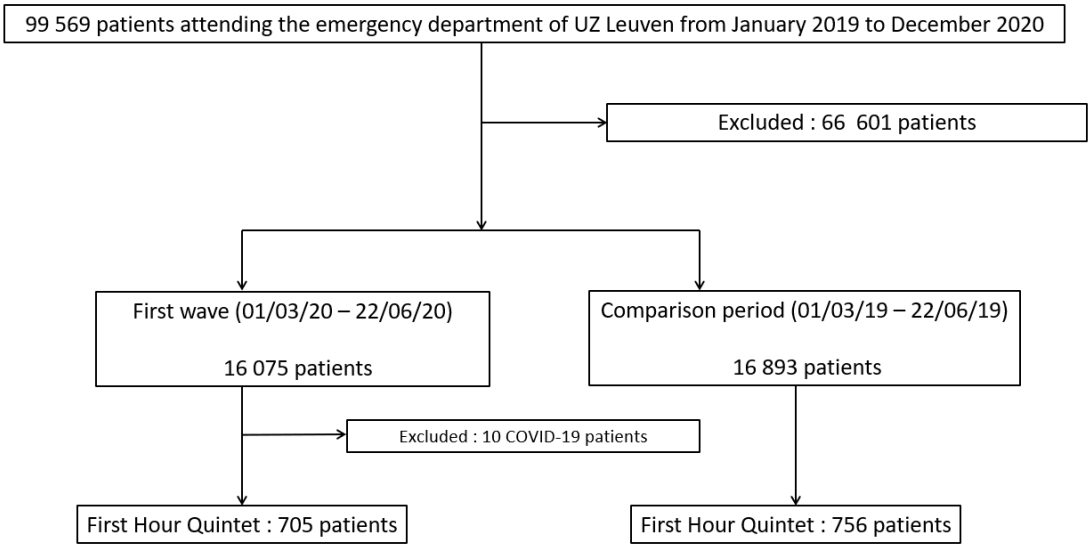
A detailed information of this graphs is seen in appendix.

2. Are there differences for the diagnoses of the First Hour Quintet during the COVID-19 pandemic?

First wave of the COVID-19 pandemic

Among the 16 075 patients who attended the ED during the first wave of the COVID-19 pandemic, 10 patients who had a diagnosis of the First Hour Quintet were excluded as they were tested positive for COVID-19. The 705 remaining patients were compared with the 756 patients who had a diagnosis of the First Hour quintet in the comparison period (First wave 4,4% of the patients versus 4,5 % of the patients in the comparison period, p = 0.43).

Flow chart First Hour Quintet during the first wave



The proportion of these patients was similar between both periods.

Figure 6 : Number of diagnoses included in the First Hour Quintet during the first wave and the comparison period

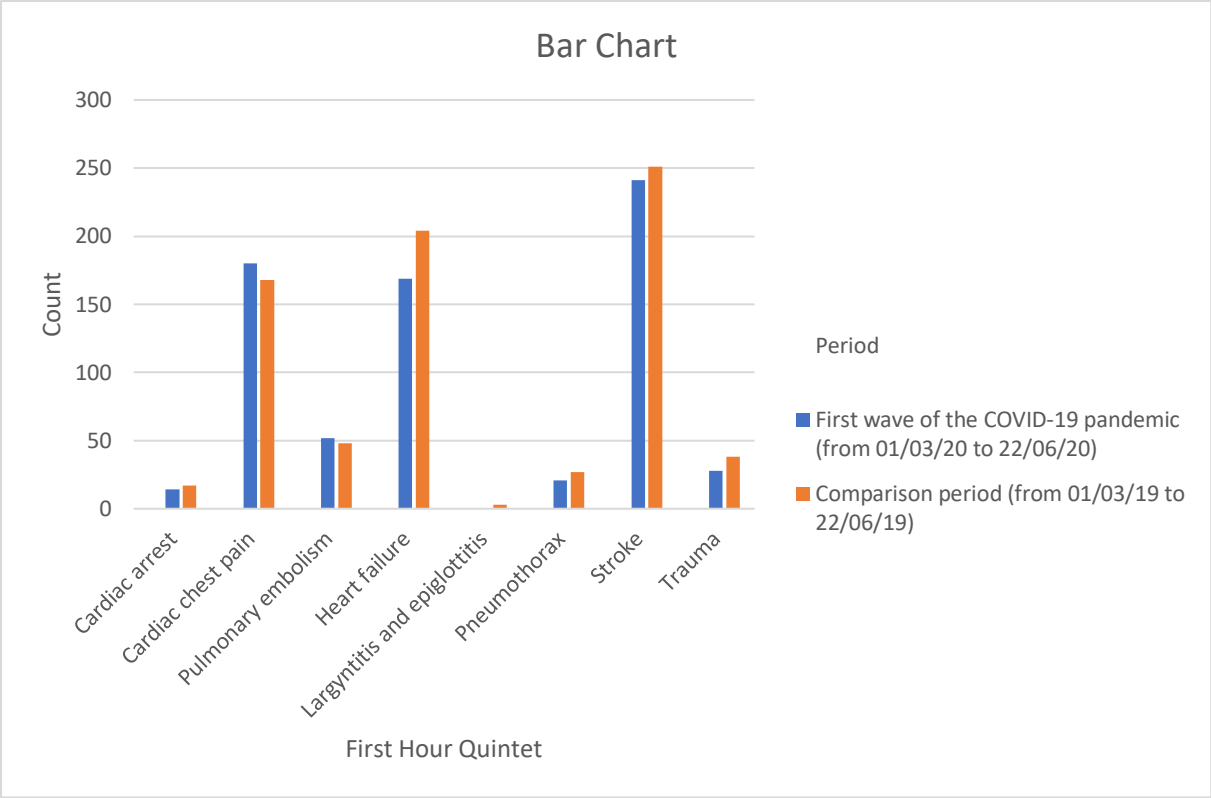


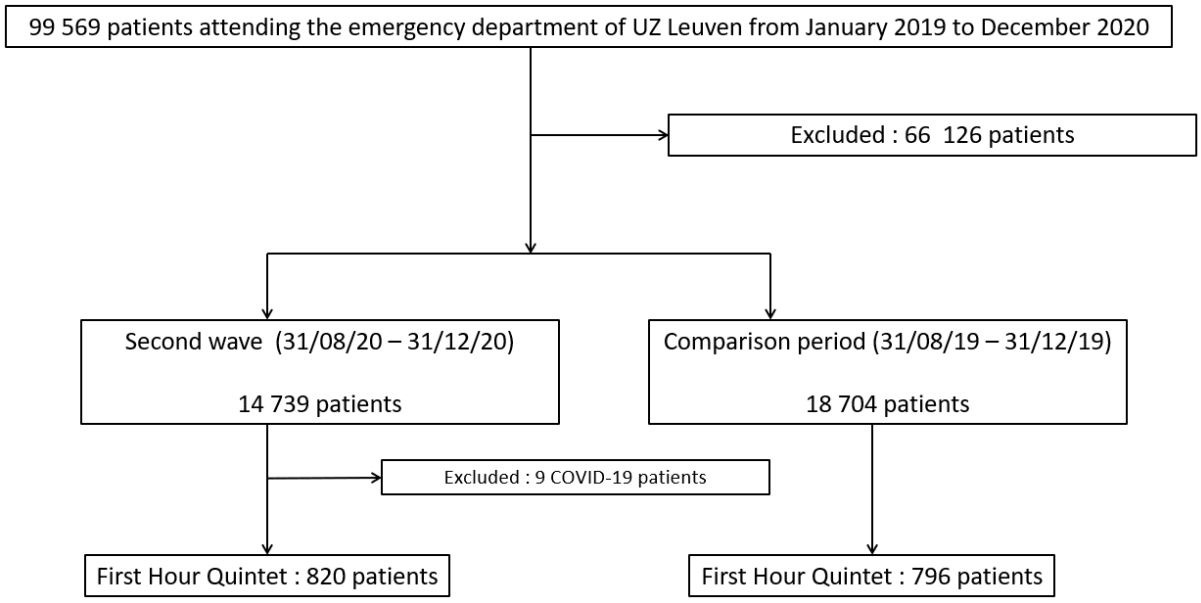
Table 1 : First Hour quintet during the first wave and the comparison period

	First wave N = 16 075 (01/03/20 - 22/06/20)	**Comparison period** N = 16 893 (01/03/19 - 22/06/19)	*P*
Cardiac arrest	14 (0,1%)	17 (0,1%)	*0.07*
Cardiac chest pain	180 (1,1%)	168 (1%)	*0.27*
Pulmonary embolism	52 (0,3%)	48 (0,3%)	*0.52*
Heart failure	169 (1,1%)	204 (1,2%)	*0.18*
Laryngitis and epiglottitis	0 (0%)	3 (0%)	*0.91*
Pneumothorax	21 (0,1%)	27 (0,1%)	*0.49*
Stroke	241 (1,5%)	251 (1,5%)	*0.92*
Trauma	28 (0,2%)	38 (0,2%)	*0.30*

Second wave of the COVID-19 pandemic

After exclusion of 9 COVID-19 patients, 820 patients with a diagnosis of the First Hour Quintet compared with 796 patients in the comparison period (Second wave FHQ 5,6% versus comparison period FHQ 4,3% p = < 0.001).

Flow chart



In the second wave of the pandemic, there were statistically more patients with a diagnosis of cardiac chest pain than in the comparison period (Second wave 1,5% versus Comparison period 1% p<0.001). Moreover, there were more patients with a diagnosis of stroke during the second wave. (Second wave 1,9% versus Comparison period 1,4%, p< 0.001).

Figure 7 : Number of diagnoses included in the First Hour Quintet during the second wave of the pandemic and the comparison period

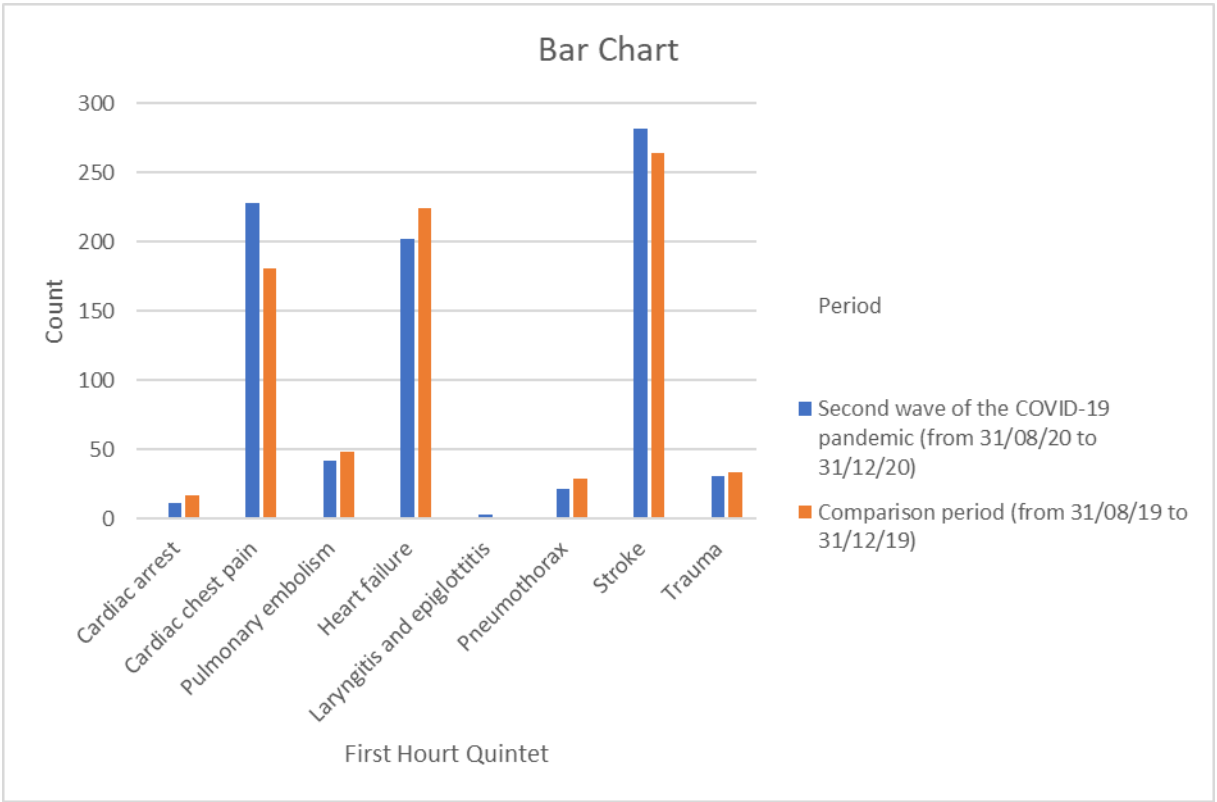


Table 2: First Hour Quintet during the second wave of the pandemic

	Second wave N = 14 739 (31/08/20 - 31/12/20)	**Comparison period** N = 18 704 (31/08/19 - 31/12/19)	*P*
Cardiac arrest	11 (0,1%)	17 (0,1%)	*0.61*
Cardiac chest pain	228 (1,5%)	181 (1%)	*< 0.001*
Pulmonary embolism	42 (0,3%)	48 (0,3%)	*0.62*
Heart failure	202 (1,4%)	224 (1,2%)	*0.16*
Laryngitis and epiglottitis	3 (0%)	0 (0%)	*0.51*
Pneumothorax	21 (0,1%)	29 (0,2%)	*0.77*
Stroke	282 (1,9%)	264 (1,4%)	*< 0.001*
Trauma	31 (0,2%)	33 (0,2%)	*0.48*

3. Are there differences for the referral and non-referral admission during the COVID-19 pandemic?

Concerning the way of ED admission, we observed that there were statistically more referred patients to the ED by a physician during both waves of the pandemic compared with the comparison periods. (First wave 44,5% versus Comparison period 40,4% , $p < 0.001$) (Second wave 44,9% versus Comparison period 39,4% $p< 0.001$)

Flow chart referred patients first wave

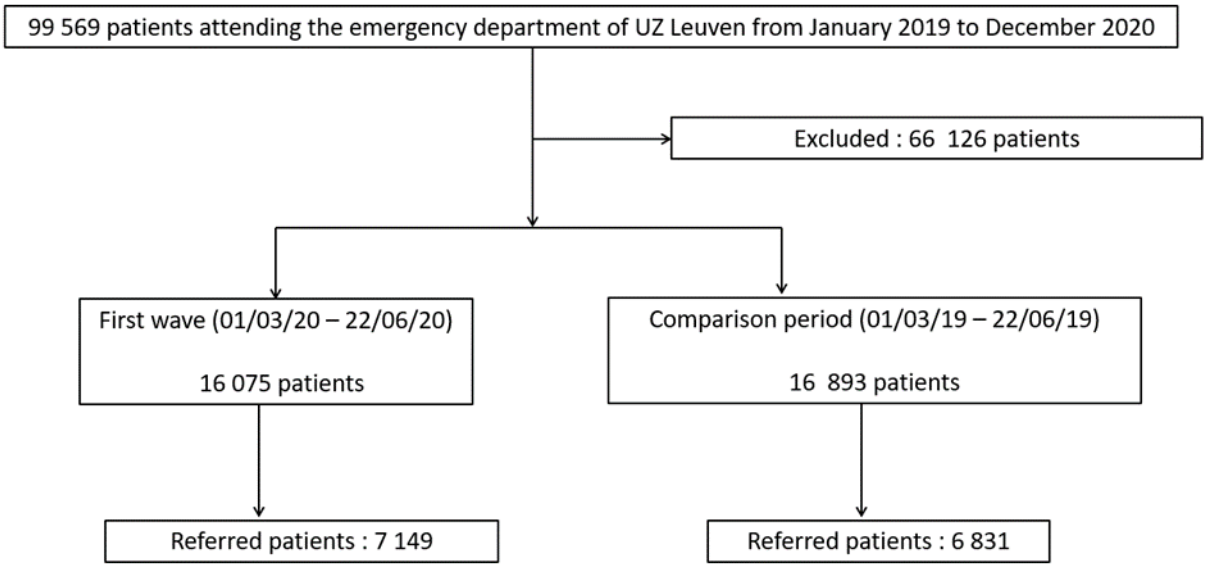


Figure 8: number of non-referred patients and referred patients during the first wave and the comparison period

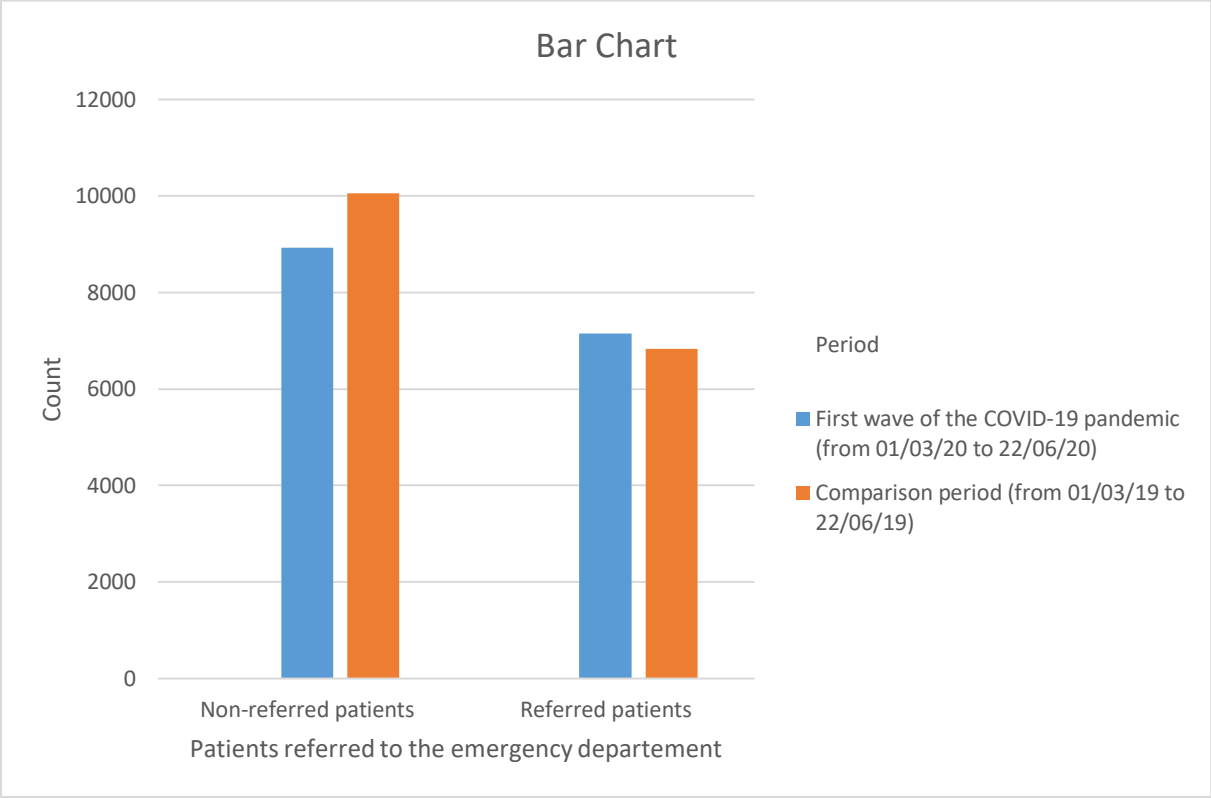


Table 3: referred patients during the first wave and the comparison period

	First wave N = 16 075 (01/03/20 - 22/06/20)	**Comparison period** N = 16 893 (01/03/19 - 22/06/19)	*P*
Referred patients	7 149 (44,5%)	6 831 (40,4%)	*< 0.001*

Flow chart referred patients second wave

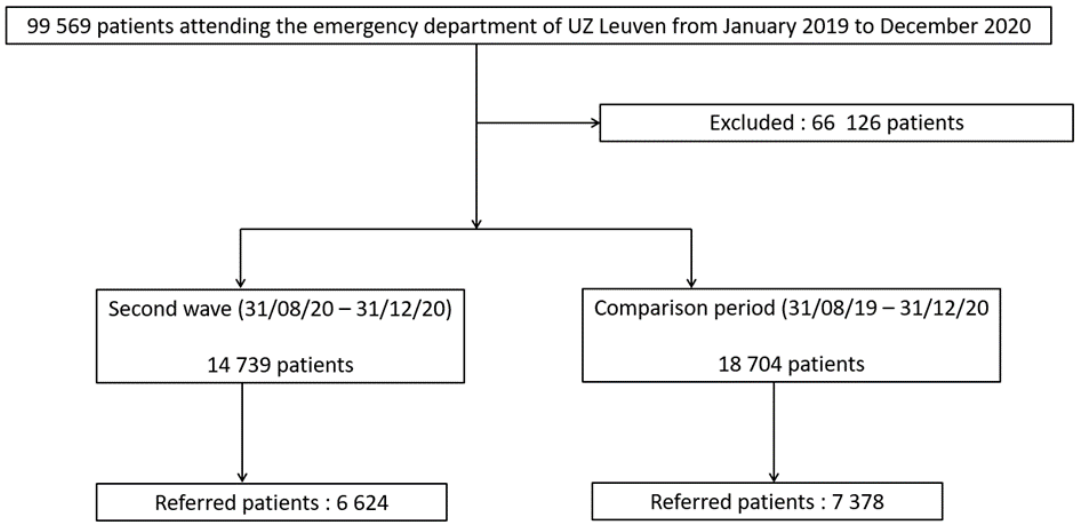


Figure 9 referred patients during the second wave and the comparison period

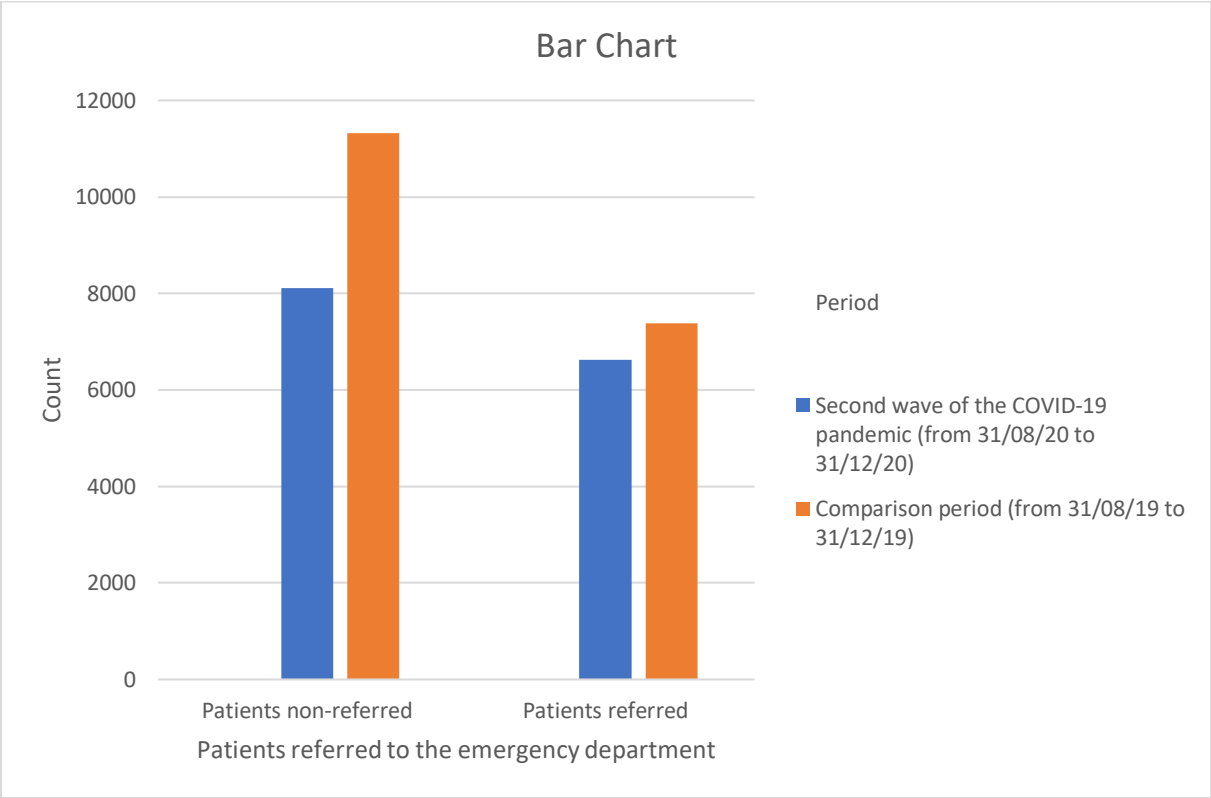


Table 4: referred patients second wave

	Second wave N = 14 739 (31/08/20 - 31/12/20)	**Comparison period** N = 18 704 (31/08/19 - 31/08/19)	*P*
Referred patients	6 624 (44,9%)	7 378 (39,4%)	*< 0.001*

Discussion

Some interesting findings were observed. When we compare the COVID-19 pandemic waves with the same periods the year before, we found that

<u>The reasons of admissions changed</u>

- more patients were recorded as “Emergency medicine” during both waves
- less patients were recorded as “Trauma surgery” during both waves
- less patients were recorded as “Internal medicine” during the second wave

<u>The number of ED admissions decreased</u>

- less patients attended the ED during both waves

There were differences in the diagnoses of the First Hour Quintet

- more patients were admitted with cardiac chest pain and stroke during the second wave

There were differences in the referral and non-referral admission to the ED

- more patients attended the ED through referral

The fact that more patients were registered as “Emergency medicine” can be easily be explained as all patients with symptoms suggestive for COVID-19 (i.e respiratory complaints, loss of taste or smell, fever) were encoded as “Emergency medicine”.

The decrease in ED admission seemed to be related to the decrease in patients recorded as “Trauma surgery” and for the second wave as patients recorded as “Internal medicine”. Interesting to note, is that the proportion of patients with high-energy trauma according to the protocol was similar during the pandemic waves and the comparison periods, which suggests that the decrease was linked to patients who were admitted for no severe trauma.

About patients registered as “Internal medicine” we cannot formulate any hypotheses because the analysis of the diagnoses included in this category was beyond the scope of this study.

Interestingly, the fall in ED admissions did not seem to be related to the diagnoses of the FHQ. In contrary, more patients were admitted for cardiac chest pain and stroke during the second wave. However, this contradicts the findings of other studies in other countries which demonstrated a decline of ED admissions for stroke and acute coronary syndrome.

We think that it was probably due to the fact that these studies assessed the impact of their national lockdown on ED admissions. Therefore, the study period was mainly limited to the months February, March and April (13-20, 22-25).

Mafham et al.(21) studied the weekly admissions for acute coronary syndromes in England from January 2020 to the end of May 2020. They showed a decline in admissions for acute coronary syndrome from mid-February of 42% but during April admissions rate increased, and at the end of May the reduction was 16% below the baseline.

Jeffery et al.(31) studied all causes of ED visits in 24 EDs in the United states from January to April 2020. They found a decrease in overall ED visits. Their hypothesis was that the decline of ED admissions was the fear of the patients to get in contract with COVID-19 by going to the hospital.

The increase of admission for cardiac chest pain and stroke during the second wave was not fully understood. Even thought, COVID-19 has been associated with coronary artery disease (32), we do not think that it has played a role since patients with COVID-19 were excluded.

Finally, another interesting finding was that more patients were referred to the ED by a physician during both pandemic waves. This finding was probably linked to the policies implemented by the Belgian authorities during the first wave of the pandemic: the collaboration between general practitioners and hospitals were reinforced to maintain hospital capacity for covid-19 patients. Patients were asked to call their general practitioners in case of respiratory complaints of fever and not to go spontaneously to the ED. Only following telephone triage, patients were directed to the ED (9, 33).

The decrease in self-referral during the second wave may be explain by the fear of patients to come to the hospital.

Strengths and limitations

As far as is known, this is the first study in Belgium to evaluate the impact of COVID-19 on ED admissions. One of the strengths of the present study is its large sample size. Moreover, we studied several urgent conditions based on the First Hour Quintet.

However, there are several limitations. The study took place in a single tertiary hospital in Belgium, therefore, the observations may not be generalizable to other contexts. Moreover, misclassifications of ICD-code or diagnose recorded at discharge was possible.

Conclusions

We found a decrease in the number of patients attending the ED during the COVID-19 pandemic. Further studies are needed to determine for which conditions patients visited the ED less and to identify the causes for the change in ED admissions and whether other factors contributed to this change.

The COVID-19 pandemic has been worldwide a challenge for health care systems but we believe that it can be seen as an opportunity to redesign the emergency healthcare.

Before the COVID-19 pandemic, there was concern about the increase of ED admissions/patients and ED crowding frequently attributed to the attendance of patients with non-urgent conditions who could be treated by a primary care service (34-36).

Now, studies from other countries, have raised the concern about the decline of ED admissions for urgent diagnoses. Effort should be made to ensure that patients with urgent conditions are cared for at an ED while patients with non-urgent conditions, however, are

managed at other healthcare settings. In order to achieve this goal, a collaboration of all stakeholders is necessary.

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Appendix

Supplementary table 1 : First Hour Quintet : Cardiac arrest

Cardiac Arrest	ICD10	ICD9
Cardiac arrest	I46	427.5
Cardiac arrest with successful resuscitation	I46.0	
Sudden cardiac death, so described	I46.1	798.1, 427.5
Cardiac arrest, unspecified	I46.9	427.5
Unattended death	R98.X	798.9
Sudden Infant death syndrome	R95.X	798.0
Instantaneous death	R96.0	798.1
Death occurring in less than 24 hours from onset	R96.1	798.2
VF	I49.0	

Thomas Krafft T., Riesgo L.G., Fischer M., Robertson-Steel I., Lippert F. European Emergency Data Project Appendix Table 14: Cardiac Arrest incidences (ICD 9 & 10) included in the First Hour Quintet . [Internet]. München: EED project group; 2002 [cited 2 May 2021]. Available from : https://ec.europa.eu/health/ph_projects/2002/monitoring/fp_monitoring_2002_a1_frep_07_en.pdf

Supplementary table 2 : First Hour Quintet : Cardiac chest pain

Cardiac Chest Pain	ICD10	ICD9
Angina pectoris	I20	413 (needs to be expanded)
Unstable angina	I20.0	
Angina pectoris with documented spasm	I20.1	
Other forms of angina pectoris	I20.8	414
Angina pectoris, unspecified	I20.9	
Acute myocardial infarction	I21	410
Certain current complication follow acute myocardial infarct	I23	
Acute ischaemic heart disease, unspecified	I24.9	411

Thomas Krafft T., Riesgo L.G., Fischer M., Robertson-Steel I., Lippert F. European Emergency Data Project Appendix Table 13: Cardiac chest pain incidences (ICD 9 & 10) included in the First Hour Quintet. [Internet]. München: EED project group; 2002 [cited 2 May 2021]. Available from : https://ec.europa.eu/health/ph_projects/2002/monitoring/fp_monitoring_2002_a1_frep_07_en.pdf

Supplementary table 3 : First Hour Quintet : Stroke

Stroke or suspected cerebrovascular events	ICD10	ICD9
Subarachnoid haemorrhage	I60	430
Intracerebral haemorrhage	I61	431 432
Nontraumatic extradural haemorrhage	I62.1	432.0
Intracranial haemorrhage (nontraumatic), unspecified	I62.9	432.9
Cerebral infarction	I63	434 (needs to be expanded)
Stroke, not specified as haemorrhage or infarction	I64.X	436
Transient cerebral ischaemic attacks and related syndromes	G45	435

Thomas Krafft T., Riesgo L.G., Fischer M., Robertson-Steel I., Lippert F. European Emergency Data Project Appendix Table 12: Stroke incidences (ICD 9 & 10) included in the First Hour Quintet [Internet]. München: EED project group; 2002 [cited 2 May 2021]. Available from : https://ec.europa.eu/health/ph_projects/2002/monitoring/fp_monitoring_2002_a1_frep_07_en.pdf

Supplementary table 4 : First Hour Quintet : Respiratory failure

Respiratory Failure	ICD10	ICD9
Pulmonary embolism	I26	415.1
Heart failure	I50	428 (needs to be expanded)
Congestive heart failure	I50.0	428
Left ventricular failure	I50.1	428.1
Acute obstructive laryngitis [croup] and epiglottitis	J05	464
Bacterial pneumonia, not elsewhere classified	J15	485 486
Acute bronchiolitis	J21	466
Viral pneumonia, unspecified	J12.9	480.9
Bronchitis, not specified as acute or chronic	J40X	490
Unspecified chronic bronchitis	J42X	496
Asthma	J45	493 (needs to be expanded)
Adult respiratory distress syndrome	J80.X	
Pulmonary oedema	J81.X	514
Pneumothorax	J93	512 (needs to be expanded)
Respiratory failure, not elsewhere classified	J96	518
Acute respiratory failure	J96.0	518
Chronic respiratory failure	J96.1	518.83
Respiratory failure, unspecified	J96.9	518.84
Dyspnoea	R06.0	786.09
Respiratory failure, respiratory arrest	R09.2	799.1

Thomas Krafft T., Riesgo L.G., Fischer M., Robertson-Steel I., Lippert F. European Emergency Data Project Appendix Table 11: Respiratory failure incidences (ICD 9 & 10) included in the First Hour Quintet [Internet]. München: EED project group; 2002 [cited 2 May 2021]. Available from : https://ec.europa.eu/health/ph_projects/2002/monitoring/fp_monitoring_2002_a1_frep_07_en.pdf

Supplementary table 5 : First Hour Quintet : Respiratory failure : Excluded diagnoses

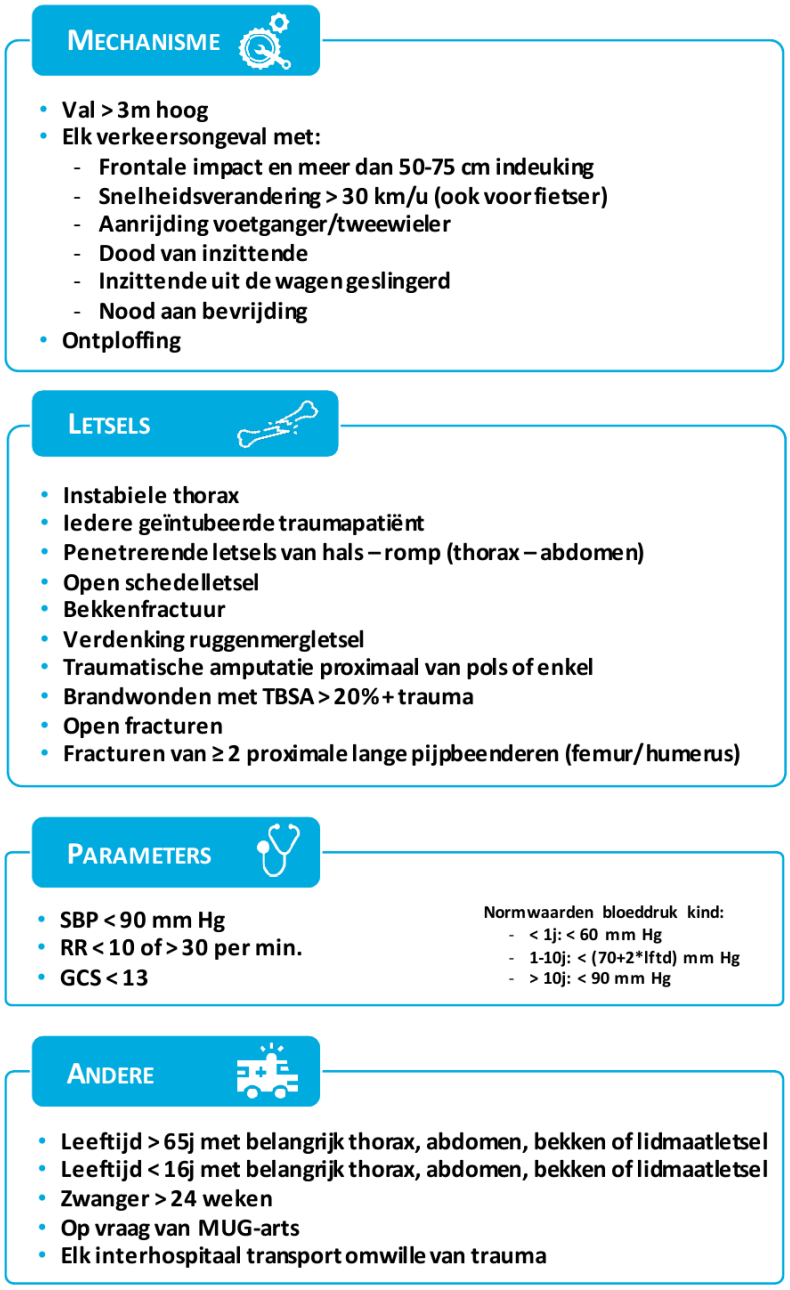
Excluded diagnoses

Bacterial pneumonia
Acute bronchiolitis
Viral pneumonia
Bronchitis
Unspecified chronic bronchitis
Asthma
Adult respiratory distress syndrome
Respiratory failure, not elsewhere classified
Acute respiratory failure
Chronic respiratory failure
Respiratory failure, unspecified
Dyspnoea
Respiratory failure

Supplementary table 6 : First Hour Quintet : Respiratory failure : Selected diagnoses

Selected diagnoses
Pulmonary embolism
Heart failure and pulmonary oedema
Acute obstructive laryngitis and epiglottitis
Pneumothorax

Supplementary figure 1 : Definition of High-energy trauma



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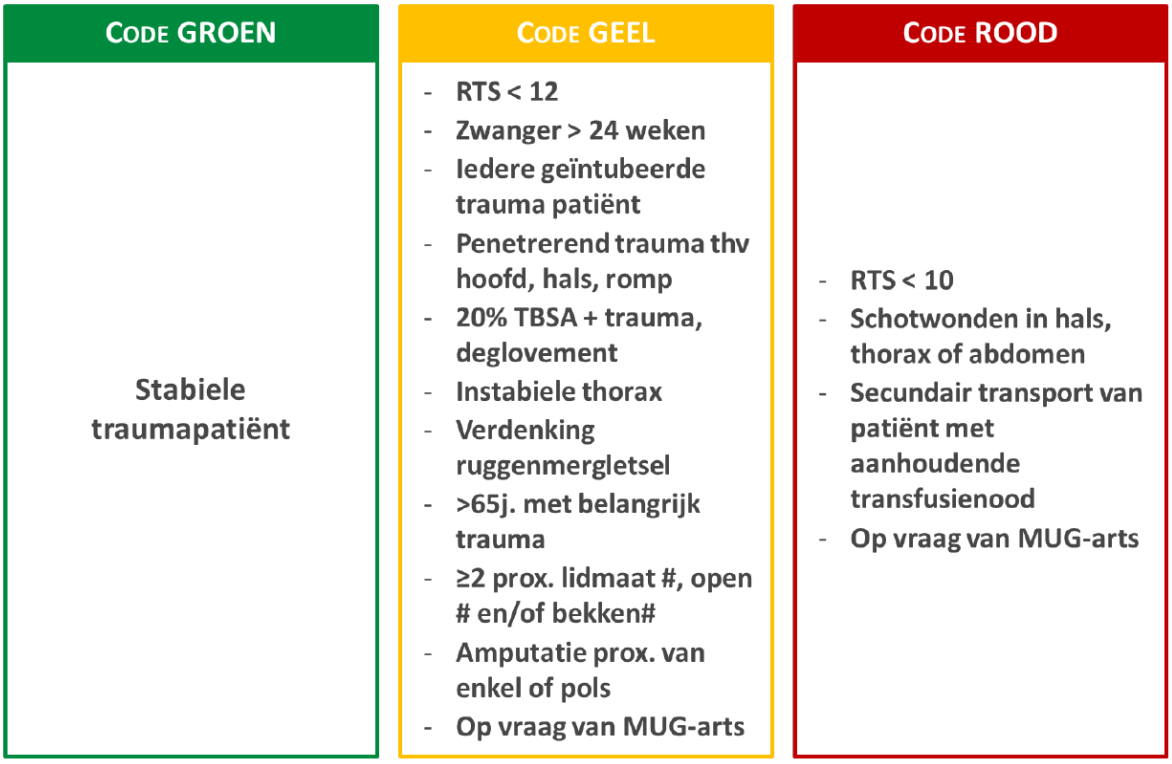
Supplementary figure 2 : Trauma codes



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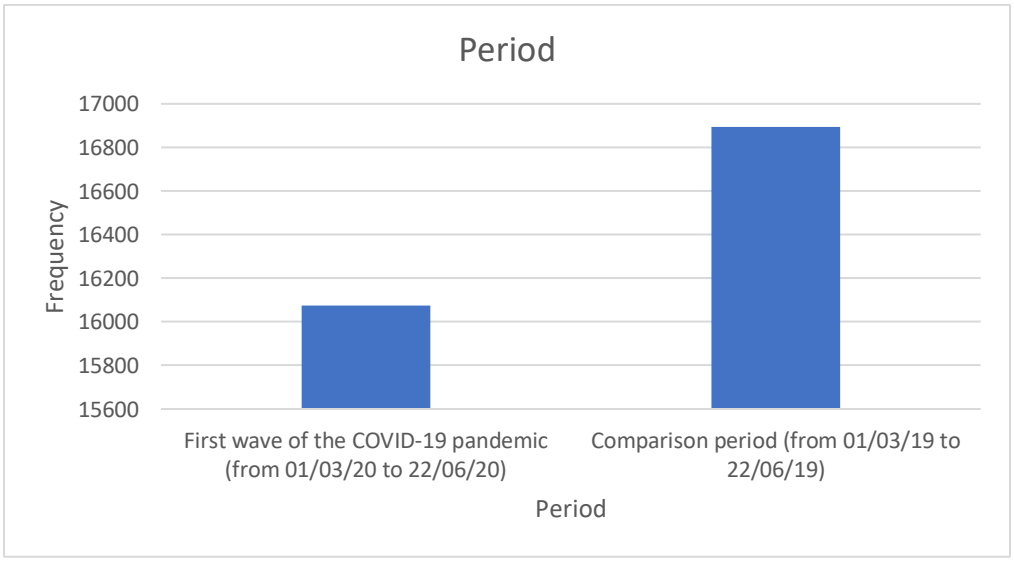
Supplementary figure 3 : Number of patients admitted to the ED during the first wave and the comparison period

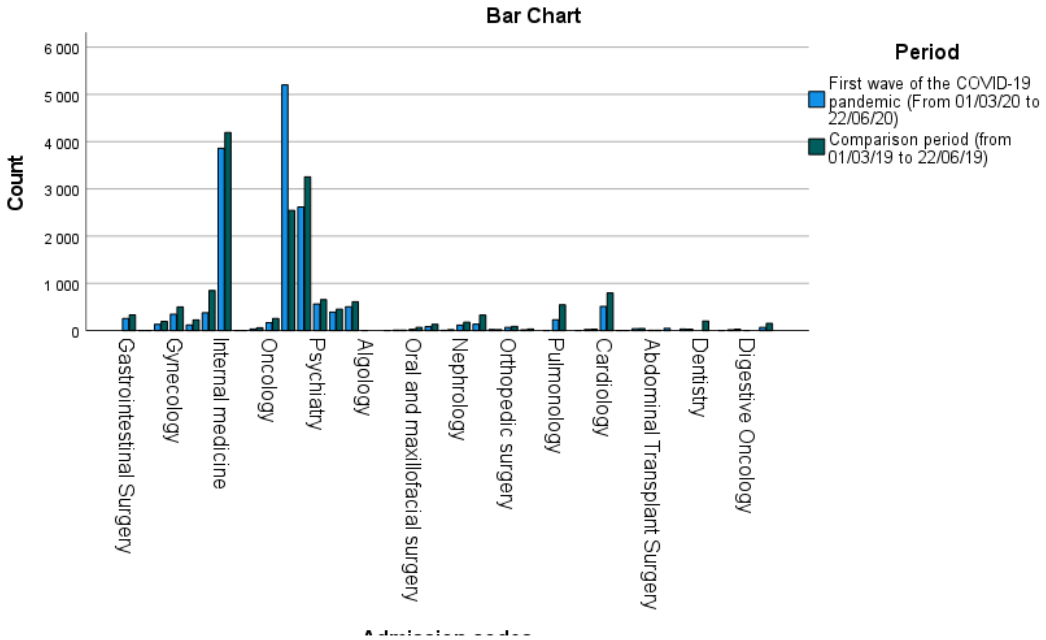


Supplementary table 7 : Admission codes during the first wave and the comparison period

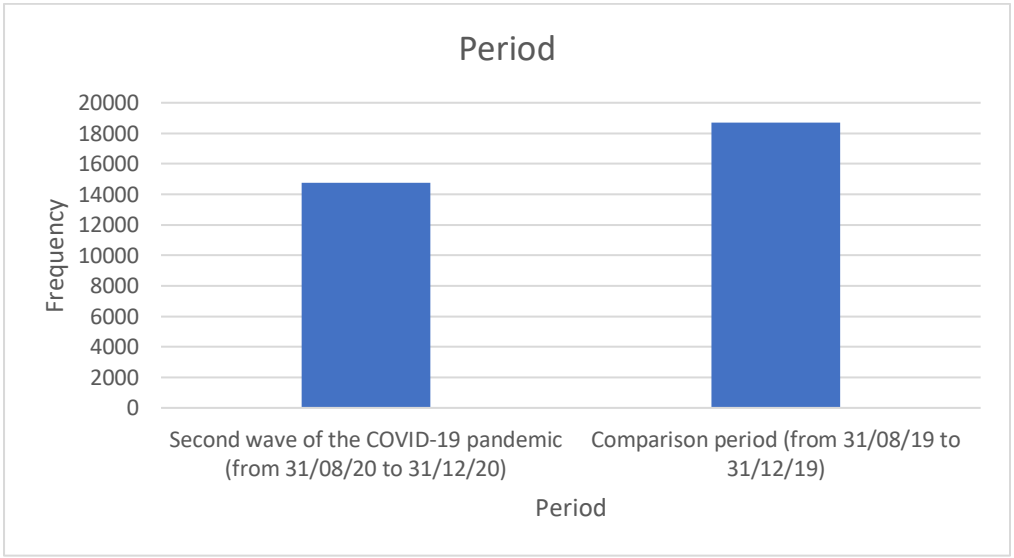
Admission codes * Period Crosstabulation

		Period					
		First wave of the COVID-19 pandemic (From 01/03/20 to 22/06/20)		Comparison period (from 01/03/19 to 22/06/19)		Total	
		N	%	N	%	N	%
Admission codes	Gastrointestinal Surgery	258	1,6%	334	2,0%	592	1,8%
	Physical medicine	4	0,0%	2	0,0%	6	0,0%
	Gynecologic oncology	135	0,8%	195	1,2%	330	1,0%
	Gynecology	347	2,2%	502	3,0%	849	2,6%
	Hematology	119	0,7%	227	1,3%	346	1,0%
	Gastroenterology and hepatology	378	2,4%	851	5,0%	1229	3,7%
	Internal medicine	3862	24,0%	4196	24,8%	8058	24,4%
	General pediatric medicine	3	0,0%	2	0,0%	5	0,0%
	Vascular surgery	36	0,2%	61	0,4%	97	0,3%
	Oncology	167	1,0%	259	1,5%	426	1,3%
	Emergency medicine	5202	32,4%	2546	15,1%	7748	23,5%
	Trauma surgery	2618	16,3%	3256	19,3%	5874	17,8%
	Psychiatry	566	3,5%	656	3,9%	1222	3,7%
	Ophthalmology	393	2,4%	455	2,7%	848	2,6%
	Neurology	506	3,1%	612	3,6%	1118	3,4%
	Algology	1	0,0%	0	0,0%	1	0,0%
	Obstetrics	0	0,0%	1	0,0%	1	0,0%
	Breast Center	11	0,1%	12	0,1%	23	0,1%
	Oral and maxillofacial surgery	29	0,2%	68	0,4%	97	0,3%
	Neurosurgery	85	0,5%	135	0,8%	220	0,7%
	Cardiac surgery	6	0,0%	20	0,1%	26	0,1%
	Nephrology	116	0,7%	179	1,1%	295	0,9%
	Ear Nose and Throat medicine	139	0,9%	330	2,0%	469	1,4%
	Oncologic surgery	23	0,1%	19	0,1%	42	0,1%
	Orthopedic surgery	69	0,4%	90	0,5%	159	0,5%
	Deceased patients	16	0,1%	36	0,2%	52	0,2%
	Parodontology	0	0,0%	1	0,0%	1	0,0%
	Pulmonology	232	1,4%	546	3,2%	778	2,4%
	Radiology	0	0,0%	1	0,0%	1	0,0%
	Plastic and reconstructive surgery	25	0,2%	31	0,2%	56	0,2%
	Cardiology	513	3,2%	798	4,7%	1311	4,0%
	Radiotherapy and oncology	2	0,0%	2	0,0%	4	0,0%
	Thoracic surgery	41	0,3%	46	0,3%	87	0,3%
	Abdominal Transplant Surgery	6	0,0%	6	0,0%	12	0,0%
	Emergency dentistry	49	0,3%	0	0,0%	49	0,1%
	Urology	33	0,2%	30	0,2%	63	0,2%
	Dentistry	0	0,0%	202	1,2%	202	0,6%
	Stroke	0	0,0%	1	0,0%	1	0,0%
	Dermatology	16	0,1%	30	0,2%	46	0,1%
	Digestive Oncology	1	0,0%	0	0,0%	1	0,0%
	Forensic medicine	68	0,4%	155	0,9%	223	0,7%
Total		16075	100,0%	16893	100,0%	32968	100,0%

Supplementary figure 4 : Admissions codes during the first wave and the comparison period



Supplementary figure 5 : Number of patients admitted to the ED during the second wave



Supplementary table 8 : Admission codes during the second wave and the comparison period

Admission codes * Period Crosstabulation

		Period				Total	
		Second wave of the COVID-19 pandemic (from 31/08/20 to 31/12/20)		Comparison period (from 31/08/19 to 31/12/19)			
		N	%	N	%	N	%
Admission codes	Gastrointestinal Surgery	312	2,1%	357	1,9%	669	2,0%
	Physical medicine	9	0,1%	5	0,0%	14	0,0%
	Gynecologic oncology	183	1,2%	203	1,1%	386	1,2%
	Gynecology	435	3,0%	533	2,8%	968	2,9%
	Hematology	154	1,0%	248	1,3%	402	1,2%
	Gastroenterology and hepatology	783	5,3%	930	5,0%	1713	5,1%
	Internal medicine	3503	23,8%	4770	25,5%	8273	24,7%
	General pediatric medicine	11	0,1%	8	0,0%	19	0,1%
	Vascular surgery	50	0,3%	80	0,4%	130	0,4%
	Oncology	219	1,5%	333	1,8%	552	1,7%
	Emergency medicine	3087	20,9%	2772	14,8%	5859	17,5%
	Trauma surgery	2661	18,1%	3631	19,4%	6292	18,8%
	Psychiatry	558	3,8%	718	3,8%	1276	3,8%
	Ophthalmology	382	2,6%	493	2,6%	875	2,6%
	Neurology	541	3,7%	661	3,5%	1202	3,6%
	Algology	0	0,0%	1	0,0%	1	0,0%
	Breast Center	17	0,1%	12	0,1%	29	0,1%
	Oral and maxillofacial surgery	50	0,3%	65	0,3%	115	0,3%
	Neurosurgery	100	0,7%	118	0,6%	218	0,7%
	Cardiac surgery	14	0,1%	22	0,1%	36	0,1%
	Nephrology	150	1,0%	200	1,1%	350	1,0%
	Ear Nose and Throat medicine	133	0,9%	287	1,5%	420	1,3%
	Oncologic surgery	23	0,2%	24	0,1%	47	0,1%
	Orthopedic surgery	107	0,7%	143	0,8%	250	0,7%
	Deceased patients	40	0,3%	41	0,2%	81	0,2%
	Pulmonology	237	1,6%	583	3,1%	820	2,5%
	Plastic and reconstructive surgery	16	0,1%	43	0,2%	59	0,2%
	Cardiology	616	4,2%	872	4,7%	1488	4,4%
	Radiotherapy and oncology	3	0,0%	11	0,1%	14	0,0%
	Stomatology	1	0,0%	0	0,0%	1	0,0%
	Thoracic surgery	59	0,4%	57	0,3%	116	0,3%
	Abdominal Transplant Surgery	5	0,0%	3	0,0%	8	0,0%
	Emergency dentistry	140	0,9%	255	1,4%	395	1,2%
	Urology	41	0,3%	48	0,3%	89	0,3%
	Dermatology	20	0,1%	29	0,2%	49	0,1%
	Forensic medicine	79	0,5%	148	0,8%	227	0,7%
Total		14739	100,0%	18704	100,0%	33443	100,0%

Supplementary figure 6 : Admission codes during the second wave and the comparison period