

Brief Report

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Did COVID-19 Change Emergency Department Admissions?

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Abstract

Objective: This study aimed to describe the impact of the coronavirus disease (COVID-19) pandemic on emergency department (ED) admissions for urgent diagnoses.

Methods: From January 1, 2019, until December 31, 2020, patients older than 18 years who attended the ED at University Hospital of Leuven (UZ Leuven, Belgium) were included. Urgent diagnoses selected in the First Hour Quintet were collected. The periods of the pandemic waves in 2020 were analyzed and compared with the same time period in 2019.

Results: During the first wave of the pandemic, 16 075 patients attended the ED compared with 16 893 patients during the comparison period in 2019. The proportion of patients having one of the diagnoses of the First Hour Quintet was similar between the periods (4.4% vs 4.5%). During the second wave, 14 739 patients attended the ED compared with 18 704 patients during the same period in 2019; 5.6% of patients had a diagnosis of the First Hour Quintet compared with 4.3% of patients in the comparison period.

Conclusion: This study showed 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.

In December 2019, the first cases of a new pneumonia outbreak were reported in China. The cause was identified as a coronavirus, later officially named *severe acute respiratory syndrome coronavirus 2* (SARS-CoV-2). On February 2020, the World Health Organization (WHO) named the disease caused by this new virus, *coronavirus disease (COVID-19)*. The virus rapidly spread worldwide, and on March 11, 2020, the WHO declared COVID-19 a pandemic.¹

In Belgium, the National Security Council announced a national lockdown on March 18, 2020, in order to limit the spread of COVID-19 and to prevent hospitals from being overwhelmed.² Citizens were asked to stay at home, non-essential shops were closed, and people were urged to respect hygiene measures and social distancing. To maintain hospital capacity for COVID-19 patients, specific strategies were implemented: non-urgent elective surgeries and treatments were postponed, triage systems performed by general practitioners were placed alongside emergency departments to identify patients who needed to be admitted, and face-to-face consultations were replaced by telephone consultations. Moreover, patients were encouraged to avoid the emergency department (ED) for non-urgent reasons.³

Meanwhile, several studies have reported a decrease in patients attending the ED for urgent conditions such as acute coronary syndrome and stroke.^{4,5} At this time, there are no data available in Belgium.

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

Methods

Study Settings and Eligibility Criteria for Participants

From January 1, 2019, to December 31, 2020, all patients older than 18 years who attended the ED at the University Hospital of Leuven (UZ Leuven, Belgium) were included (monocentric).

Data

The following data were collected: baseline characteristics of patients (age, gender), way of admission (self-referral vs referred patient by a physician), and urgent conditions. To identify patients with urgent conditions, the diagnoses included in the First Hour Quintet were collected.

First Hour Quintet

The First Hour Quintet is a group of life-threatening emergencies defined by the European Emergency Data Project.⁶ These emergencies require rapid diagnosis and treatment, and they include the following:

- 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 UZ Leuven. A detailed description about the methodology is presented in the appendix.

Diagnoses were identified using the International Classification of Diseases, Ninth and Tenth Revisions (ICD-9 and ICD-10). When the ICD codes were missing, the final diagnoses recorded at discharge were 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 2020.⁷ The first wave took place from March 1, 2020, until June 22, 2020, and the second wave began on August 31, 2020. For the purpose of this study, we decided to censor the second wave to December 31, 2020.

Patients diagnosed with COVID-19

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

Statistics

Analyses were performed using SPSS Statistics 27.0⁸ (IBM Corp, Armonk, NY). 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.

Ethical Considerations

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

Results

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 COVID-19 pandemic and 16 893 patients during the comparison period in 2019.

Among the 16 075 patients who attended the ED during the first wave, 715 patients had a diagnosis of the First Hour Quintet. Among them, 10 patients were excluded as they were tested positive for COVID-19. The remaining patients were compared with the 756 patients who had a diagnosis of the First Hour Quintet during the comparison period. There were no statistical differences between the diagnoses of the First Hour Quintet between the 2 periods. However, there were statistically more referred patients to the ED by a physician during the first wave of the pandemic compared with the comparison period (first wave 44.5% vs comparison period 40.4%, $P < 0.001$) (Table 1).

Second Wave of the COVID-19 Pandemic

Patients totaling 14 739 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.

After exclusion of 9 COVID-19 patients with a diagnosis of the First Hour Quintet, 820 patients were compared with 796 patients in the comparison period.

In the second wave of the pandemic, there were statistically more patients with cardiac chest pain than in the comparison period (second wave 1.5% vs comparison period 1%, $P < 0.001$). Moreover, there were more patients with stroke during the second wave than in the same period a year earlier (second wave 1.9% vs comparison period 1.4%, $P < 0.001$). There were also statistically more referred patients to the ED during the second wave of the pandemic compared with the comparison period (second wave 44.9% vs comparison period 39.4%, $P < 0.001$) (Table 2).

Discussion

Some interesting findings were observed. When the COVID-19 pandemic waves in 2020 were compared with the same periods the year before, a decrease in ED admissions was found during both waves. In addition, 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. Finally, there were differences in the referral and non-referral admissions to the ED. More patients attended the ED through referral.

Interestingly, the decrease in ED admissions was not observed for patients with a diagnosis of the First Hour Quintet. In contrary, more patients were admitted for cardiac chest pain and stroke during the second wave. However, this is in contradiction with the findings of studies in other countries, which demonstrated a decline of ED admissions for acute coronary syndrome and stroke.^{4,5}

The increase of admission for cardiac chest pain and stroke during the second wave is not fully understood. Even though COVID-19 has been associated with coronary artery disease,⁹ it did not influence the observations of this study as patients with COVID-19 were excluded.

Finally, more patients were referred to the ED by a physician during both pandemic waves. These findings were probably linked to the policies implemented by the Belgian authorities: The collaboration between general practitioners and hospitals was reinforced to maintain hospital capacity for COVID-19 patients. Patients were asked to call their general practitioners in case of respiratory complaints or fever and not to go spontaneously to the ED. Only following telephone triage were patients directed to

Table 1. First Hour Quintet and referred patients during the first wave of the COVID-19 pandemic 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 |
| Referred patients | 7 149 (44,5%) | 6 831 (40,4%) | < 0.001 |

Table 2. First Hour Quintet and referred patients during the second wave of the COVID-19 pandemic and the comparison period

| | 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 |
| Referred patients | 6 624 (44,9%) | 7 378 (39,4%) | < 0.001 |

the ED.³ The decrease in self-referral during the second wave may be explained by the fear of patients arriving at the hospital.

Limitations

This is one of the first studies in Belgium to evaluate the impact of COVID-19 on ED admissions. A strength of the present study is its sample size. Moreover, we studied several urgent conditions based on the First Hour Quintet. However, there are several limitations. The study was monocentric in a tertiary hospital in Belgium; therefore, the observations may not be generalizable. Moreover, misclassifications of ICD-code or diagnosis recorded at discharge were possible.

Conclusions

This study showed 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, to identify the causes for the change in ED admissions and whether other factors contributed.

The COVID-19 pandemic has been a challenge for health care systems worldwide, but it can be seen as an opportunity to redesign the emergency health care. Before the COVID-19 pandemic, there was concern about ED crowding. ED crowding was frequently attributed to the attendance of patients with non-urgent conditions who could be treated by a primary care service.¹⁰ 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 are managed at other health care settings. To achieve this goal, a collaboration of all stakeholders is necessary.

Supplementary material. To view supplementary material for this article, please visit <https://doi.org/10.1017/dmp.2022.149>

Author contributions. EK and MS conceived and designed the analysis. JV collected the data. EK performed the analysis. All authors discussed the results. EK wrote the manuscript. JV and MS commented on the manuscript.

Conflict(s) of interest. The authors have no conflicts of interest to declare.

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