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ORIGINAL RESEARCH

Do Non-COVID-19 Patients' Behaviour Towards Emergency Changed During the COVID-19 Outbreak? A Severity-Based Approach

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Objective: During the COVID-19 pandemic, the number of patients presenting to the emergency department (ED) declined. The main goal of this study was to compare and describe the non-COVID-19 patient's disease severity presentation during the pandemic with its pre-pandemic severity.

Methods: We conducted a retrospective observational study. We selected two samples of visits: one during the first COVID-19 wave of 2020 (pandemic period, PP) and the other during the same months of 2019 (control period, CP). The primary endpoints were the comparison of severity and distribution of the Emergency Severity Index (ESI). Secondary endpoints were comparisons of specific patient characteristics (age, sex, length of the symptoms before the visits, spontaneous visits or not, return home or not).

Results: The mean ESI of the visits during the PP (3.19) was statistically significantly lower ($P = 0.001$) than it was in the CP (3.43). These changes were more pronounced during the months of March (3.03 versus 3.33, $P = 0.037$) and April (2.96 versus 3.48, $P < 0.001$). The change in ESI was mainly due to an increase in the proportion of visits by patients with an ESI score of 3 (42% versus 28%, $P < 0.001$). There were no differences in the characteristics of patients except a decline in patients whose symptoms had a duration of more than 30 days (2% during PP versus 4% during CP, $P = 0.03$).

Conclusion: The COVID-19 pandemic caused a change in the pattern of non-COVID-19 visits, with proportionally more severe presentations based on the ESI. To our knowledge, this is the first description of changes in behaviour in ED visits by specifically non-COVID-19 patients.

Keywords: COVID-19, emergency visits, epidemiology, Emergency Severity Index

Introduction

In mid-March 2020 lockdown was announced in the majority of European countries due to COVID-19 pandemic.[1] Emergency medicine consultation was profoundly affected,[2,3] causing a decrease in the number of total visits. During this period, the sharp decline was accompanied by a reduction of patients presenting with pathologies needing urgent care like ACS (acute coronary syndrome), stroke and hyperglycemic crisis.[4–6] Despite the decrease in emergency department (ED) admissions, the global death rate was increasing, which was attributed to COVID-19.[7] We postulate that behind these numbers lies a reality where patients presenting life-threatening disease unrelated to covid, did not seek medical attention as they should.

The first aim of our study was to characterize the behavioural change in the population toward ED visits. To perform this assessment, we compared the disease severity of patients presenting in our ED, during and before the pandemic. To better discriminate patients, we chose to exclude patients with covid-like symptoms, since we wanted to compare the severity of disease presentation unrelated to covid. Our main hypothesis was that patients visiting the emergency department during the pandemic were scarce but were presenting more severe diseases.

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The second aim was to characterize the population presenting to the ED. We expected a possible change in the proportion of patients referred by a general practitioner or in the duration of symptoms before the visit to our ED.

These results could be of capital used in the organization of emergency response to catastrophic events.

Materials and Methods

Study Design and Setting

This retrospective single-center study analyzed non-COVID-19 visits to the emergency department of an academic teaching site of a university hospital on the outskirts of a city of 200,000 inhabitants. This chart review was conducted in adherence to methodological standards.[8,9] We compared our observations during the period of the first wave of the COVID-19 outbreak in Belgium, which we named the Pandemic Period (PP). This first wave is defined by Sciensano (a public institution recognized as a research institution by the Belgian Science Policy) as the time between the first diagnosed case and the lowest number of confirmed cases diagnosed. The first wave is thus defined as the period between March 1 and June 22, 2020.[10] We decided to extend the Pandemic Period to June 30, 2020, to have four full months of patient data.

Because of the seasonal character of ED consultations,[11] we chose to match our sample to patients who came to the ED during the same months in 2019, which we named the Control Period (CP).

Selection of Participants

Our study complies with the Declaration of Helsinki, and after gaining approval from the Ethics Committee (CHU UCL Namur Godinne Site Medical Ethic Committee), we obtained data by searching our medical records. The ethics committee will have authorized the waiver of the consent of patients or their representatives for the consultation of their medical records, for fear of unnecessarily awakening bad memories of a visit, for example a death. We identified all consultations from patients who presented to our ED during the selected periods. We extracted the data from a random sample of patient visits. The number of visits selected for the sample was calculated as 394 per period after exclusion (for a margin of error of 5%, a power of 80%, a standard deviation of 1, and a difference of 0.2) and rounded to 400 (Figure 1).

We excluded patients who were admitted for confirmed or suspected COVID-19 infection. This process was simplified by the fact that every patient who visits our ED is flagged at the end of the consultation as having COVID-19 (with a positive PCR assay) or probable COVID-19 (meeting Sciensano criteria for case definition of COVID-19).[12] We also excluded visits for which the Emergency Severity Index (ESI) classification was not achievable because of missing data.

Data Collection

Two abstractors (CH and FC) abstracted the data. They were trained to perform their job and used a standardized abstraction form. Before they began to extract data, they completed a trial process separately and together. The authors ran periodic meetings with chart abstractors during the data collection to monitor and ensure the quality of the reporting. The abstractors were not blinded to the relation studied. Another investigator (NS) performed a blinded abstraction of 15% of the data to determine the reliability of the abstractors. The Kappa value of the interrater agreement was at minimum 0.74 (for the patient returning home or not) and at best was 1 (for patient age).

Outcomes

The primary outcome was to assess if the non-COVID-19 patients visiting the emergency department had a different severity at presentation at the ED. We determined the severity by classifying patients into the five ESI groups. The severity outcome was calculated in two ways, according to (1) the difference between the mean ESI distributions of the two periods, and (2) the differences between the ESI group sizes in these periods. The ESI was calculated for each visit by the abstractors. The ESI is a tool for use in ED triage. The ESI triage algorithm yields rapid, reproducible, and clinically relevant stratification of patients into five groups, from level 1 (most urgent) to level 5 (least urgent).[13] It provides a method for categorizing ED patients by both acuity and resource needed. The ESI was chosen by the investigators because of its validity as a severity scale in its contemporary use worldwide, regardless of patient age and which healthcare professionals use it,[14–16] and because of its ease of retrospective application to all of our cases' records.

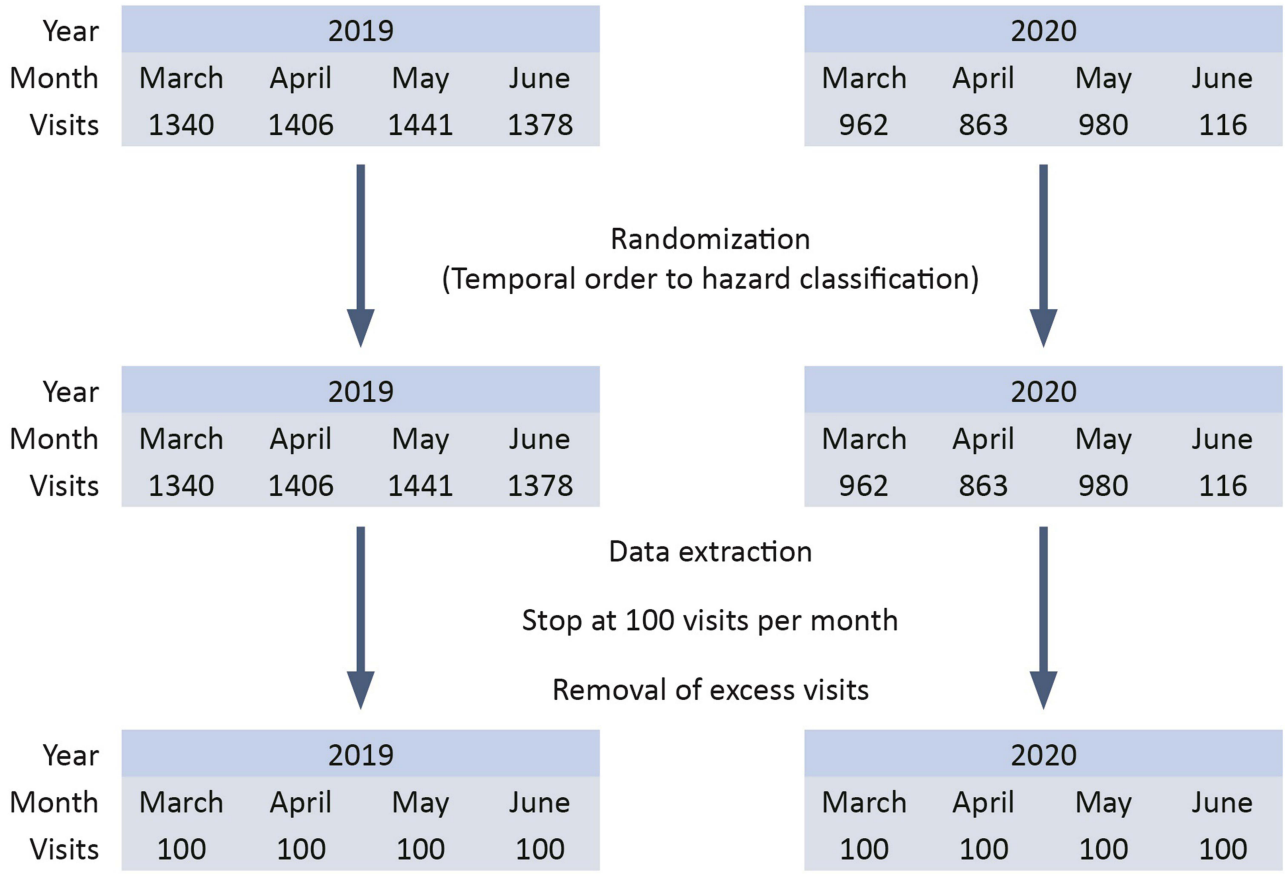

Figure 1 Selection of participants flowchart. Patients were excluded if the visit concerned COVID-19 (recognized or meeting the criteria for suspicion) or if data required for the ESI classification (ie, the respiratory rate) were missing.

Secondary outcomes were to assess if potentially interesting patient characteristics differed between the PP and the CP visits. These included age, sex, duration of symptoms, whether the visit was spontaneous or not (spontaneous as opposed to being recommended by another doctor or other healthcare professional) and whether the patient was treated as in or outpatient.

Statistical Analysis

We compared the mean ESI between the PP and the CP, and the differences in mean ESI between the PP and CP visits for each of the 4 months in each period. We also compared the other characteristics between the PP and the CP. For these comparisons, we performed chi-squared tests and *t*-tests. The missing data were encoded as "Not Available" and omitted, and the remaining data were then analyzed. All analyses were performed using R 4.0.1 (R Foundation for Statistical Computing, Vienna).

Results

Mean ESI Distribution Between the Periods

The mean ESI of the visits during the PP (3.19) was lower than the mean ESI during the CP (3.43). The delta of −0.24 (95% confidence interval [CI] 0.38 to −0.09) between the two mean ESI values was statistically significant (P=0.001). The mean ESI values of the patients in each month of the 4 months of the PP and the CP were distributed as follows (Figure 2): The mean ESI in March was lower in the PP than in the CP (3.03 PP, 3.33 CP, delta=−0.3, 95% CI −0.58 to −0.02, P=0.037). The mean ESI in April was lower in the PP than in the CP (2.96 PP, 3.48 CP, delta=−0.52, 95% CI −0.8 to −0.24, P<0.001). The mean ESI in May was not statistically significantly lower in the PP than in the CP (3.35 PP, 3.48

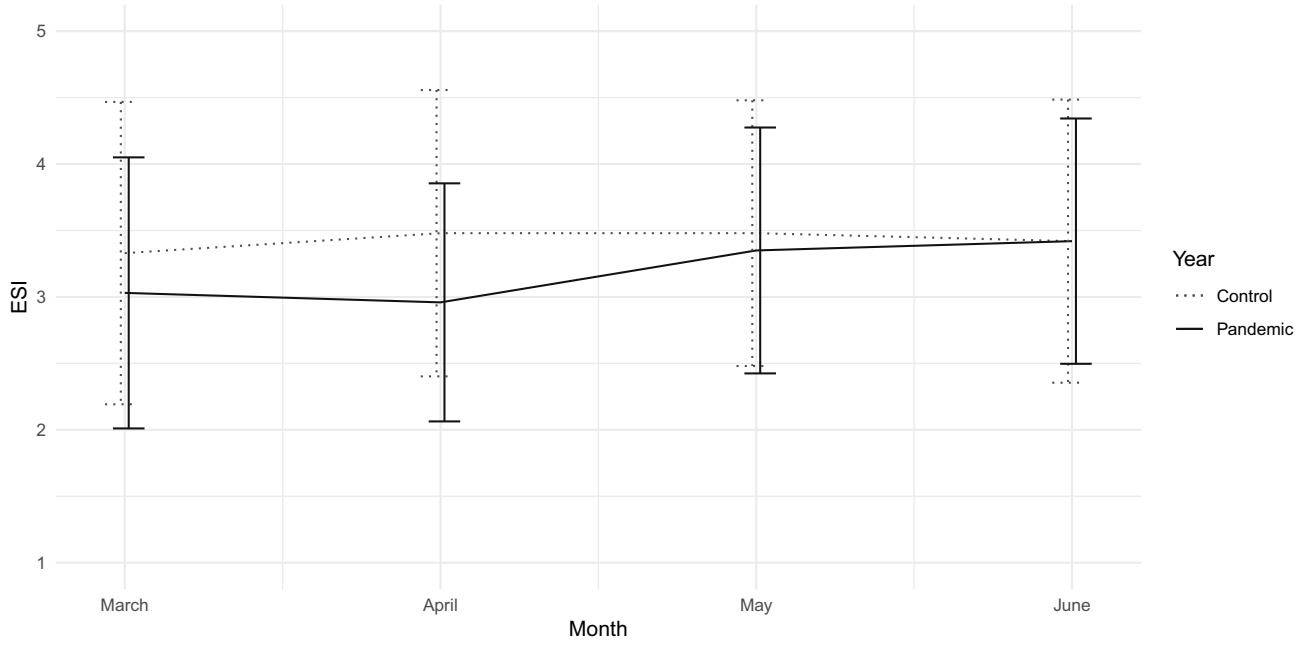

Figure 2 Mean ESI distribution between the periods (with standard deviation).
Abbreviations: ESI, Emergency Severity Index. Pandemic period, first wave of the COVID-19 pandemic, 2020; Control period, the same months in 2019, before the pandemic.

CP, delta=−0.13, 95% CI −0.41 to 0.15], *P*=0.36). The mean ESI in June did not significantly differ between the PP and the CP (3.42 PP, 3.42 CP, delta=0, 95% CI −0.28 to 0.28, *P*=1).

Comparison of ESI Group Sizes Between the Periods

The number of visits in each ESI group of the PP and the CP were distributed as follows (Figure 3): The ESI 1 group sizes in the PP and CP were not statistically different (2% during the PP, 2% CP, *P*=1). The ESI 2 group sizes in the PP

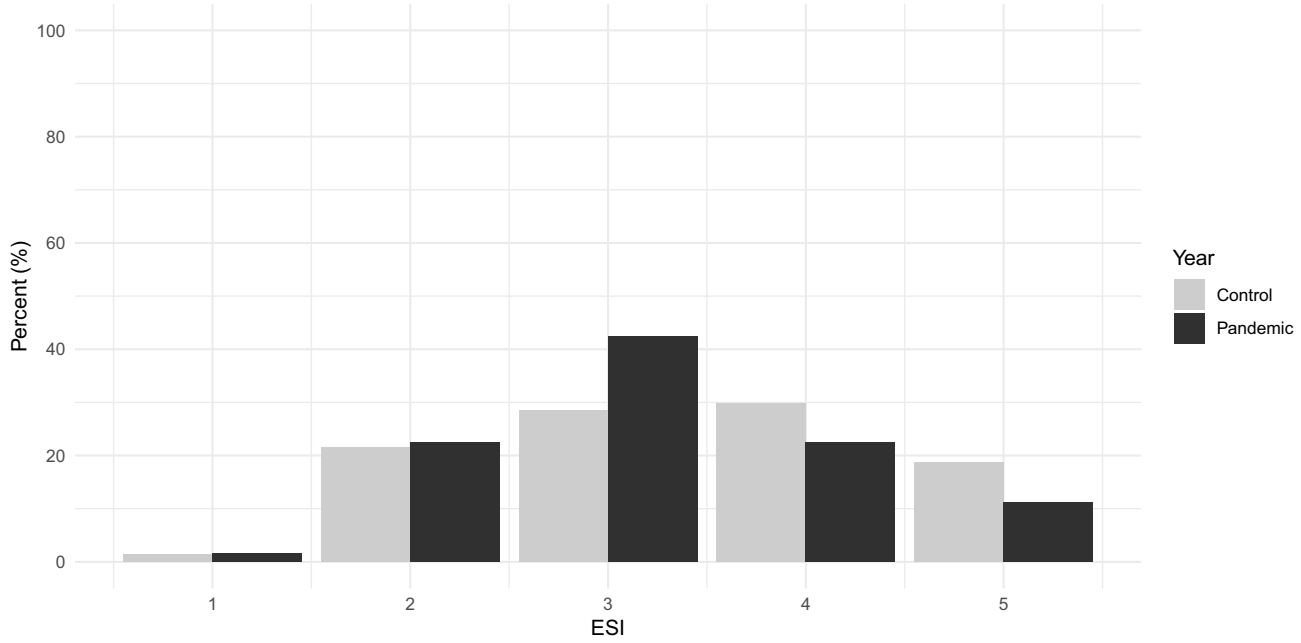

Figure 3 ESI group size comparison and evolution between the Pandemic and the Control periods.
Abbreviations: ESI, Emergency Severity Index; Pandemic, the first wave of the COVID-19 pandemic; Control, the same months one year before.

and CP were not statistically different (22% during the PP, 22% CP, P=0.805). The ESI 3 group was larger in the PP than in the CP (42% during the PP, 28% CP, P<0.001). The ESI 4 group was smaller in the PP than in the CP (22% during the PP, 30% CP, P=0.024). The ESI 5 group was smaller in the PP than in the CP (11% during the PP, 19% CP, P=0.003).

Comparison of Patient Characteristics Between the Periods

The distributions of the analyzed characteristics of the visits in the PP and the CP groups were as follow: The mean age was 50.95 during the PP and 51.58 during the CP (P=0.68). Female patients were 44% of the total during the PP and 44% during the CP (P=0.31). There were statistically (p=0.03) fewer visits by patients with symptoms of longer duration (more than 30 days before the day of the emergency visits) during the PP (2%) than during the CP (4%). There was no statistical difference (P=0.07) in the proportion of spontaneous visits during the PP (67%) compared with the CP (73%). There was no statistical difference (P=0.34) in the proportion of return to domicile of the emergency visits during the PP (74%) compared with the CP (71%).

Discussion

During the first wave of COVID-19 in our hospital in Belgium, the disease severity was higher for non-COVID-19 patients. This effect was most visible during the first half of this wave. We observed that there were proportionally fewer non-COVID-19 patients with ESI scores of 4 and 5, in favour of an increase in non-COVID-19 patients with an ESI score of 3 on a scale from 1 (most urgent) to 5 (least urgent). Also, there were proportionally fewer visits of patients presenting symptoms of long duration during this first wave.

To our knowledge, this is the first study to focus on ED visits by non-COVID-19 patients during the COVID era. Some papers have included data on ESI patterns of ED visits during this period in the tables or appendix, but they have mixed COVID-19 and non-COVID-19 patients.Those have not reported the trends in patient characteristics that we observed in this study.[17–19]

The number of visits to the ED decreased worldwide during pandemic beginning, and our ED did not deviate from the rule.[20] This confirms our hypothesis that, in our ED, the number of visits decreased during the COVID-19 first wave and the non-COVID-19 patient visits were more urgent, based on the ESI triage tool.

It is our understanding that these changes are a reflection of multiple factors taking places at the same time. The pandemic and the struggles of hospital care were represented in mainstream media.[21] This could have selected patients with more severe diseases. The ease of access to telemedicine with general practitioners which was funded by the government could also explain the shorter duration of symptoms. Patients with chronic illnesses had an easier way of getting in touch with a medical professional. Alternatively, it could mean that patients with less severe presentation did not seek medical attention, leading to worsening condition and underreporting of common pathologies as acute coronary syndrome or stroke.[22,23]

The strength of this study is that it provides an objective observational fact supporting emergency practitioner's real-life impressions.

This study had some limitations. First, the observational nature of this study could have introduced some bias. The unicentric character and the potential influence of the regional characteristics of our patients should be kept in mind; also, our hospital did not have obstetric or pediatric units. As explained above, the abstractors were not blinded to the hypothesis. Consequently, our results might not be generalizable to other populations.

Conclusions

In summary, we showed that the COVID-19 pandemic changed the characteristics of the emergency consultations in our ED for non-COVID-19 patients, especially in its earliest phase. It is not clear what long- term impact these changes will have. A qualitative study investigating the motivations of the ESI 4 and 5 patients not to visit the ED could also be interesting.

We understand that these date reflects the extreme events that we faced. Extreme events should be used as teaching points to allow better healthcare to be built on the bricks of global experience. World-wide response to a global event should be integrated allowing to treat emergent patients, not begrudging day-to-day diseases.

We think that a global response to such events should be organized on the country or state level. This should allow to pool of healthcare workers in dire situations such in the case of contamination and allow for a better coordination. This

crisis showed us that a split up healthcare system, while sustainable in routine work is not sustainable in the case of a country and world-wide event.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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