COVID-19 impact on an oncologic emergency department visits: observational study

Aurélie Ram,1 Arnaud Pagès,2 Edouard Cubilier,3 Nesrine Daoudi,4 Frederic Vanderghynst,1 Florian Scotte,4 Sami Antoun,4 Mansouriah Merad4

ABSTRACT

Objective This study aimed at evaluating the impact of COVID-19 on emergency department (ED) visits in a tertiary cancer centre and providing information on the features of the unplanned events during the first wave of COVID-19 pandemic.

Methods This retrospective observational study based on data from ED reports was divided into three periods of 2 months each around the first lockdown announcement of 17 March 2020: pre-lockdown, lockdown and post-lockdown.

Results A total of 903 ED visits were included in the analyses. The mean (±SD) daily number of ED visits did not change during the lockdown period (14.6±5.2) when compared with the periods before (13.6±4.5) and after lockdown (13.7±4.4) (p=0.78). The proportion of ED visits for fever and respiratory disorders increased significantly (p=0.78). The proportion of ED visits for fever and respiratory disorders increased significantly to 29.5% and 28.5%, respectively (p<0.01) during lockdown. Pain, the third most frequent motive, remained stable with 18.2% (p=0.83) throughout the three periods. Symptom severity also showed no significant differences in the three periods (p=0.31).

Conclusion Our study shows that ED visits during the first wave of the COVID-19 pandemic remained stable for our patients regardless of the symptom’s severity. The fear of an in-hospital viral contamination appears weaker than the need for pain management or for the treatment of cancer-related complications. This study highlights the positive impact of cancer ED in the first-line treatment and supportive care of patients with cancer.

INTRODUCTION

The COVID-19 pandemic had a significant impact on the global healthcare system. The paradigm of conventional care was challenged, and the evidence-based practice acquired over the years was debated. Physicians were forced to change their approach and to reevaluate the priorities of the care they provided.1 Oncology patients require specific care due to their underlying disease and cancer treatments. It has been difficult to define whether these patients were more vulnerable to COVID-19 infections, or if cancer was associated with increased mortality or severe disease. Therefore, medical oncology staffs had to make difficult decisions between administering urgent cancer therapies or delaying treatments to prevent potential in-hospital viral exposures.2 In a multicentric study, Lee et al3 analysed a group of patients with an active or previous malignancy, and a severe pulmonary infection from COVID-19. They concluded that cancer type and oncologic therapy were not associated with increased COVID-19-related...
Original research

mortality. However, patients with multiple comorbidities and progressive oncologic disease or physical decline may be at higher risk of death. Another study in China concluded that the case fatality rate for oncologic patients was approximately double that of their general population (5.6% vs 2.3%).4 A Belgian study conducted during the first wave revealed a significant association between older age in patients with cancer and SARS-CoV-2 infections and the American Society of Clinical Oncology recommended mindful care for elderly patients with cancer due to their proneness to severe and deadly outcomes.6

Parallely, some studies focused on delayed treatments and diagnoses due to the COVID-19 pandemic and the fear of viral exposure. A multicentric study of 41 cancer centres between April and May 2020 showed reductions of 75% of cancer screenings, 46% of follow-up consultations, 36% and 37% of hospitalisations and chemotherapies and 49% of surgeries due to the COVID-19 pandemic.7 Delayed treatments due to the pandemic in 40% of patients with palliative thoracic cancer were observed,8 as well as treatment disruptions in patients with breast cancer.9 In recent studies, these treatment delays due to the COVID-19 pandemic appear to worsen the prognosis of patients with cancer, and modelling studies seem to project a significant negative impact on their morbidity and mortality.10

To this day, there are few data available on the impact of COVID-19 on unplanned events (UEs) and emergency department (ED) visits, which often occur under normal circumstances in the patient’s oncological history. Previous viral infections showed that ED visits depend on the characteristics of the infectious agent involved, its power of contagion and its mortality rates.11 12

This study aims to evaluate the first lockdown’s impact on patients with cancer during the COVID-19 pandemic concerning ED visits in a tertiary cancer care hospital. Our objective is to study the oncological patient’s behaviour when UEs or symptoms occur during their treatment course. Is the fear of an in-hospital viral contamination greater than the need for pain management or treatment of cancer-related complications?

METHODS

Study design and participants

This retrospective, observational study was conducted in the Gustave Roussy cancer centre (France). All patients who consulted the ED during the first wave of COVID-19 (from 27 March to 12 July 2020) were included. Gustave Roussy’s ED takes care of patients treated at Gustave Roussy for cancer only. Patients consulting for nursing care and paediatric patients (<18 years) were excluded. Each consultation was considered as an independent event. A patient may have had several ED visits during the same period. The study period was divided into three periods of 8 weeks each, centred around the announcement of the first lockdown in the Paris area on 17 March 2020. We analysed 300 patients who visited the ED for each period of 2 months, by including the first 150 patients of the period, and the next 150 patients following a 3 weeks delay in each period to be as representative of each period as possible.

- Pre-lockdown period from 27 January to 16 March 2020 (n=299).
- Lockdown period from 17 March to 11 May 2020 (n=302).
- Post-lockdown period from 12 May to 12 July 2020 (n=302).

This study was reported according to the Strengthening the Reporting of Observational Studies in Epidemiology guidelines.13 Medical records were reviewed to collect demographic and clinical data using a standardised-specific form. The demographic data extracted comprised age, gender, cancer location, metastatic status of cancer and cancer status before current episode (complete response (CR), partial response (PR), stable disease (SD), progressive disease (PD)). The clinical data of ED visits comprised postoperative visit status, SARS-CoV-2 PCR test result on the nasopharyngeal swab, main symptoms, degree of symptom severity, causality (tumour-related, treatment-related, independent of tumour or treatment), patient’s medical evolution including hospitalisation length and mortality. Postoperative visits were defined as visits within 30 days of a surgical procedure. The main symptoms for an ED visit were chosen in a predefined list with a maximum of two items for every UEs: fever, digestive disorder, respiratory disorder, neurological disorder, cardio-circulatory disorder, altered general condition, pain, palliative care, abnormal biological workup and others. The degree of severity of the UE was established according to the FRENCH triage score, as recommended by the French Society of Emergency Medicine. This score ranks priorities from 5 to 1 (from least urgent to most urgent) according to prognosis and complexity/severity of the medical condition.14

Statistical analysis

Regarding the descriptive analysis, we presented the qualitative variables as numbers and percentages, and the quantitative variables with means and SD. In addition, we used the \( \chi^2 \) test to compare categorical variables and the Kruskal-Wallis test to compare continuous variables between the three periods. A difference was considered statistically significant for a \( p \) value less than 0.05 \( (p<0.05) \). Statistical analyses were performed using SAS V9.4 software (SAS Institute).

RESULTS

Number of ED visits

A total of 2309 ED visits were observed during the three periods, 760 before lockdown, 820 during the lockdown and 729 after lockdown. Three hundred ED
of each period were analysed. A total of 903 ED visits were included in the analyses. The mean (±SD) daily number of ED visits was not significantly different during the lockdown period (14±5.5) when compared with periods before (13±4.5) and after lockdown (13±4.4) (p=0.78) (figure 1).

Characteristics of the patients
The characteristics of the patients who consulted the ED are shown in table 1. Our population consisted of 368 men (40.8%) and 535 women (59.2%). The mean age of patients was 61.4 years (±14.6). The age distribution increased significantly for the post-lockdown period with a median of 63.6 (14.5) years (p=0.0048). The sex ratio was not significantly different between the three periods (p=0.7574). The most frequent cancers were breast cancers with 187 patients (20.7%), digestive cancers with 116 patients (13.8%) and lung cancers with 105 patients (11.6%). Five hundred and twenty-six patients had metastatic cancer (58.3%). There was no significant difference in the cancer location (p=0.27) and in the metastatic cancer status (p=0.09) between the three periods. Of the total population, 13.8% had CR, 6.4% had PR, 6.3% had SD, 52.5% had PD and 20.9% were at the beginning of management. The difference of cancer evolution was significant between the three periods (p=0.034) with a significant increase in CR patients during the lockdown period (18.2%) when compared with pre-lockdown (11.0%) and post-lockdown periods (12.3%) (table 1).

Characteristics of the ED visits
The characteristics of ED visits are shown in table 2. There was a significant difference in postoperative ED visits number between the three periods with respectively 31 (10.4%), 15 (5.0%) and 16 (5.3%) (p=0.014) in pre-lockdown, lockdown and post-lockdown periods. On all ED visits, the main symptom was fever for 20.6% and respiratory disorders for 18.7%. This proportion of ED visit reason increased significantly during the lockdown period to 29.5% for fever and 28.5% for respiratory disorders (p<0.01). Pain was the third most frequent motive with 18.2% of ED visits, and no significant difference was observed during the studied periods for this UE (table 2).

The ED visits’ FRENCH triage scores showed 6.2% of scores 1 and 2 (management within 1 hour), 81.6% of score 3 (management within 24 hours) and 12.2% with scores 4 and 5. There was no significant difference in the degree of severity during the three periods (p=0.31) (table 2). Among the ED visits, 45.8% were for a cancer-related reason, 32.6% for a treatment-related reason and 21.3% for a non-cancer or non-treatment-related reason (21.3%). The proportion of ED visits for a non-cancer and non-treatment-related reason increased significantly during the lockdown period to 31.5% (p<0.001) (table 2).
**DISCUSSION**

Although our study shows that the first wave of the COVID-19 pandemic did not affect the visits’ trend in the Gustave Roussy oncology ED, we do observe delayed or adapted treatments in 30%–41% of the patients with cancer, in concordance with another study conducted in this centre. 15

Moreover, we found interesting variability in patient traits or ED visits characteristics throughout the three periods.

During the lockdown, there was an increased proportion of ED visits for reasons unrelated to cancer or its treatment, especially for COVID-19-related motives such as respiratory disorders, fever and flu-like symptoms.

Post-surgical ED visits decreased during and after the lockdown since many surgical interventions were postponed. Several countries recommended delaying non-urgent surgeries and chemotherapies in slowly progressive cancers to limit contaminations. 16 Given the possible deleterious implications of delayed...
therapies targeting cancer in patients, this decision may be questionable. A Canadian study highlighted the impact on morbidity and mortality of delaying cancer treatment. In 2020, a meta-analysis showed increased mortality rates in seven different cancers after a 4-week delay in cancer treatment. Another study focusing on surgical treatments for rectal cancer found that a 30-day delay had a negative impact on survival outcomes.

Scarce data are available in the literature about the consequences of delaying treatments for ED visits, especially for patients with cancer. What we know is that caring for symptoms swiftly for patients with cancer is crucial. For palliative patients, early management of symptoms not only improves the quality of life but also has an impact on survival.

A North Italian study in a general hospital showed an overall reduction in ED visits of 66.2% during the first wave of the pandemic compared with the same period of the previous year. This result was associated with a significant increase in overall mortality (43.2%) and cause-specific mortality for cancer (76.7%).

Another Italian study showed similar results with a 66.4% reduction of ED visits during the first lockdown compared with the previous year.

Parallelly, our study shows that ED visits for patients with cancer with low severity scores or pain management motives remained stable during lockdown, and even increased for patients in complete remission. Another tertiary cancer institute in Brazil also reported no significant reduction in ED visits during the first wave of COVID-19. When compared with a general primary care hospital, they reported a 66.4% reduction in all ED visits, and this difference was increased in low severity score patients.

Result variability between cancer centres and general hospitals raises an ethical discussion about critical care for patients with cancer in this pandemic. Due to limited resources, access to intensive care unit (ICU) in overwhelmed general hospitals was limited, which narrowed treatment options for patients with cancer requiring ICU therapies. This may have led these patients to favour consulting their oncology centre over a general hospital, which in turn maintained stable ED visits in cancer centres compared with general hospitals.

In this sense, a message has been sent to all the patients followed in our cancer centre through different communication channels, such as emails and text messages. Patients were encouraged to consult if they experienced COVID-19 related symptoms, pain or other symptoms, despite the pandemic. All patients were informed that the centre was able to treat them, even with a COVID-19 infection. An ethics committee was established to assist care practitioners in delicate clinical decisions. This particular focus on patient communication and caregiver support may also have backed the ED visits in our centre.

Furthermore, the fear of COVID-19 in patients combined with sudden and forced isolation was a difficult challenge during the pandemic. A study focused on the psychological impact of COVID-19 on patients with cancer and caregivers showed an increased level of depression, anxiety, stress and poorer sleep quality.

Table 2  Characteristics of the ED visits in a tertiary oncologic hospital in France during the three studied periods. P value for the comparison between pre-lockdown, lockdown and post-lockdown period using χ² test for categorical variables and Kruskal-Wallis test for continuous variables, n=number of ED visits

<table>
<thead>
<tr>
<th>Characteristics of ED visits</th>
<th>Pre-lockdown, n=299</th>
<th>Lockdown, n=302</th>
<th>Post-lockdown, n=302</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptom of ED visit, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td>52 (17.4)</td>
<td>89 (29.5)</td>
<td>45 (14.9)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Respiratory disorder</td>
<td>41 (13.7)</td>
<td>86 (28.5)</td>
<td>42 (13.9)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Pain</td>
<td>51 (17.1)</td>
<td>56 (18.5)</td>
<td>57 (18.9)</td>
<td>0.83</td>
</tr>
<tr>
<td>Digestive disorder</td>
<td>50 (16.7)</td>
<td>34 (11.3)</td>
<td>47 (15.6)</td>
<td>0.13</td>
</tr>
<tr>
<td>Altered general condition</td>
<td>28 (9.4)</td>
<td>17 (5.6)</td>
<td>29 (9.6)</td>
<td>0.13</td>
</tr>
<tr>
<td>Neurological disorder</td>
<td>16 (5.4)</td>
<td>18 (6.0)</td>
<td>25 (8.3)</td>
<td>0.31</td>
</tr>
<tr>
<td>Cardio-circulatory disorder</td>
<td>17 (5.7)</td>
<td>8 (2.6)</td>
<td>8 (2.6)</td>
<td>0.07</td>
</tr>
<tr>
<td>Palliative care</td>
<td>2 (0.7)</td>
<td>2 (0.7)</td>
<td>6 (2.0)</td>
<td>0.20</td>
</tr>
<tr>
<td>FRENCH triage score, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score 1 and 2</td>
<td>16 (5.4)</td>
<td>21 (7.0)</td>
<td>19 (6.3)</td>
<td>0.31</td>
</tr>
<tr>
<td>Score 3</td>
<td>247 (82.6)</td>
<td>236 (78.1)</td>
<td>254 (84.1)</td>
<td></td>
</tr>
<tr>
<td>Score 4 and 5</td>
<td>36 (12.0)</td>
<td>45 (14.9)</td>
<td>29 (9.6)</td>
<td></td>
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<tr>
<td>Type of reason, n (%)</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Cancer-related</td>
<td>138 (46.2)</td>
<td>127 (42.1)</td>
<td>149 (49.3)</td>
<td>&lt;0.01*</td>
</tr>
<tr>
<td>Treatment-related</td>
<td>113 (37.8)</td>
<td>77 (25.5)</td>
<td>104 (34.4)</td>
<td></td>
</tr>
<tr>
<td>Non-cancer or treatment-related</td>
<td>48 (16.1)</td>
<td>95 (31.5)</td>
<td>49 (16.2)</td>
<td></td>
</tr>
</tbody>
</table>

*Statistically significant. ED, emergency department.
with loneliness as a significant predictor factor. When an UE occurred during lockdown, patients with cancer may thus have dreaded complications related to cancer and have been tempted to visit the ED.

The outcome of our COVID-19 population is similar to the Saudi Arabia experience, where they studied patients with cancer admitted for oncologic emergencies during the pandemic. In patients with cancer who tested positive for COVID-19, they found mortality rates of 16% compared with 13% in our study with mortality not only due to COVID-19 but also to disease progression. We also found that 50% of our COVID-19 positive patients with cancer who died were admitted for cancer-related reasons. These results are comparable with the 30-day all-cause mortality of 13% reported in the Cancer consortium CCC-19, which is the largest cohort study for patients with cancer diagnosed with COVID-19.

Another study of our Cancer Centre, analysing the first 178 COVID-19 patients showed a hospitalisation rate of 70.2% and a mortality of 17.4%.

Our study is limited in some points. First, we do not have information on potential ED visits of our patients with cancer in ED of other general hospitals, although data on ED visits in general hospitals seem to have dropped during the first wave of this pandemic. Lack of previous studies on the topic can make it difficult to extrapolate from existing data.

**CONCLUSION**

Our study shows that ED visits during the COVID-19 pandemic remained stable in our oncologic sample, regardless of the symptom severity. Fear of complications related to cancer or the need to palliate symptoms appears to be greater than the fear of exposure to the virus. This tendency could be beneficial to patients treated for cancer in oncological hospitals since delayed treatment hinders their prognosis and quality of life. This study highlights the positive impact of a tertiary cancer ED in the first-line treatment and supportive care of patients with cancer. Further studies are needed to determine the long-term consequences of the COVID-19 pandemic on oncologic patients, and to elaborate future pandemic management strategies involving ED in cancer centres.

**Twitter** Arnaud Pagès @ArndPgs

**Contributors** Arnaud Pagès conceptualised and designed the study, collected the data, drafted the initial manuscript and reviewed and revised the manuscript. Ap carried out the statistical analyses and reviewed and revised the manuscript. EC participated in the study conceptualisation, reviewed and revised the manuscript. ND, FV reviewed and revised the manuscript. SA, MM conceptualised and designed the study and reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work. MM accepts responsibility for the finished work and the conduct of the study, had access to the data, and controlled the decision to publish. MM is responsible for the overall content as the guarantor.

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**Data availability statement** Data are available upon request.

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**ORCID iDs**

Aurélie Ram http://orcid.org/0000-0002-9011-2916

Arnaud Pagès http://orcid.org/0000-0002-2337-8693

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