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How did the use of Emergency Departments (ED) change during the first wave of the SARS-CoV-2 pandemic in the UK: an observational study

Chiara Calastri *(corresponding author)*
Institute for Transport Studies
University of Leeds, Leeds, United Kingdom, LS29JT
Email: c.calastri@leeds.ac.uk

Stephane Hess
Institute for Transport Studies
University of Leeds, Leeds, United Kingdom

Bradley Wilson
FRCEM, MRCS, Dip IMC RCD Ed, MD
Bradford Teaching Hospitals, Bradford, United Kingdom

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Abstract

Background

The coronavirus pandemic has been linked to a sharp drop in Emergency Department (ED) attendance, but the exact reasons for this are unclear. The aim of this study was to investigate differences between individuals attending the ED before and during the pandemic and the reasons for their choices.

Methods

Two population-based online surveys were conducted before (2019) and during (2020) the pandemic. Participants were recruited by a survey panel to be representative of the UK population aged 18-45. Both surveys asked about the circumstances and reasons for the last ED attendance, with specific pandemic-related questions in the second one. Comparisons of characteristics and symptoms of individuals attending during the pandemic were compared to those attending in prior years using chi-square tests. We determined the proportion of patients who had symptoms during the pandemic but did not attend, and the reasons for that choice.

Results

Young and high-income people, those with chronic illnesses, and those with flu-like symptoms were more likely to attend the ED during lockdown than before. 18% of respondents had experienced urgent symptoms during the pandemic; 60% of these individuals chose not to go to the ED. While about 30% of this group stated they believed their symptoms were not serious enough, 85% of these individuals mentioned fear of infection or worry about over-burdening the system as a reason for not attending. Individuals attending during the pandemic were more likely to consider their visit unnecessary compared to those attending previously.

Conclusions

The study suggests that the decision to use the ED has a discretionary component. This could potentially contribute to unnecessary visits, but also raises concerns that some patients who should present at the ED do not go. More effective communication about who should visit EDs during a pandemic, and the safety of doing so, is needed.

Key messages

What is already known on this subject?

- Data show that the Covid-19 pandemic brought about a sharp decrease in ED attendance, but there is limited understanding of how people made ED attendance decisions at this time.
- Substantial literature has identified key issues related to ED attendance, mainly in relation to crowding and avoidable attendances
- Suitable data could help unveil the decision processes behind the choice of whether to go to an ED during a pandemic and help address some of these challenges.

What does this study add?

- A population-based on-line survey found that a higher proportion of younger, high income and chronically ill individuals visited the ED during the pandemic than in the year prior.
- Some individuals with serious symptoms did not visit, either because isolating or fearful of catching the virus.
- Patients who attended during the pandemic were more likely to consider their visit unnecessary compared to those attending prior to the pandemic.

How might this study affect research, practice or policy?

- The study provides insight into how patients determine the need for an ED visit.
- Findings suggest the need for better communication and pre-screening strategies that can limit non-urgent visits, but encourage those with serious injuries/conditions to still attend.

Introduction

In 2020, the world experienced major disruption due to the SARS-CoV-2 (also referred to as Covid-19 or coronavirus) pandemic. On 14 May 2020, while the need for Intensive Care Units (ICU) in the UK was exceeding capacity, the National Health Service (NHS) reported that ED attendances in April 2020 had been 57% lower than those recorded in the same month the previous year [1]. A similar decrease in ED attendance has been reported in other countries, e.g. Ireland [2], Italy [3] and the US [4]. While the decreasing attendance could have been to lower rates of infection by other viruses and/or injuries due to lockdown, [5] such a drop might be related to people avoiding EDs for fear of Covid-19 [6]. This created concern that patients with potentially serious conditions might not attend EDs during the pandemic, potentially worsening their condition in the long run. At the same time, the decrease in visits suggested that some ED visits may be discretionary, and the changes could be used to understand more about the choices patients make to use EDs for what are often considered non-urgent reasons [7].

Prior studies on non-urgent use of EDs are limited as they are conducted in EDs, after the patient has already decided to attend; no information is therefore available on patients who might have similar symptoms and choose not to go to the ED. Therefore population-based studies that include both those using and not using the ED are needed. In 2019, as part of the Safety Innovation Challenge initiative funded by NIHR Yorkshire and Humber Patient Safety Translational Research Centre (PSTRC), we launched a population-based survey of 18–45-year-olds to determine the factors associated with ED use. This group was targeted as they were identified as the patients more likely to attend with conditions that could be seen elsewhere. [8]. A second survey sampling another group of 18-45's was conducted in April-May 2020. This second survey was specifically designed to seize the opportunity to determine the impact of the pandemic on the decision to attend the ED and thus learn more about how individuals make choices about ED use. We sought to use these population-

based surveys to understand more about the discretionary nature of ED visits and the impact of the pandemic on choices of where and when to seek care.

Methods

This was an analysis of population-based internet-based survey data collected between 12/11/2019-29/12/2019 and 16/04/2020-03/05/2020 in Great Britain. Both surveys were approved by the University of Leeds Ethics Committee.

Research questions

This study aimed to answer the following research questions (RQ):
RQ1: Do patients who attend the ED before and during the pandemic differ?
RQ2: Does the proportion of perceived avoidable attendances before and during the pandemic differ?
RQ3: Why might people have chosen not to attend the ED during a pandemic even if in need of urgent medical attention?

Setting and participants

Participants were UK residents aged 18-45. The first survey took place in November and December 2019. The second survey, very similar to the first one but with minor changes to account for the pandemic circumstances, was conducted in April-May 2020, during the first lockdown. There was no overlap between the two samples. The main requirement for participation was age, but quotas were applied to ensure representative samples in terms of gender, ethnicity, and income. Participants stating that they had not attended an ED in the past 10 years (or ever) were excluded from the analysis to limit inaccurate reports of the details of their visits and excessively different personal and institutional contexts that might have otherwise affected the results.

Interventions

The initial survey was designed in collaboration with experts from the PSTRC and an ED consultant and informed by literature. The questions were discussed with the Yorkshire Quality and Safety Research patient panel [9] to assess relevance, clarity and suitability, and pre-tested with a small convenience sample directly recruited by the research team.

We collected socio-demographic characteristics (e.g. age, gender, income), ease of access to a General Practice (GP) and hospitals and pre-existing medical conditions. Respondents were asked for details about the last time they visited the ED. Patients were asked to report their symptoms by selecting the correct option from a list grouping the 11 main types of symptoms reported at the ED in the UK, but were also provided the opportunity to describe the problem they experienced if they believed it did not fall in one of the proposed categories. The list was prepared with the help of existing literature and discussion with the patient panel and the ED consultants. Emergency and urgent care symptoms as defined by the NHS [10] were considered potentially worthy of emergency care and later grouped into an “urgent” symptoms category for specific analyses. Respondents were also asked about

the circumstances of their visit and whether they felt they could have sought care elsewhere. The full list of variables is available as supplemental material.

The second survey, which was not originally planned but conducted to capture the change in attitudes during the pandemic, was mainly identical to the first but included additional questions to infer the reasons for going/not going to an ED during the lockdown. The survey structure is represented in Figure A (Supplemental material).

Data collection

The data was collected via a traditional, actively managed, double-opt-in market research panel accessed via the survey company Qualtrics. Potential participants were contacted via email and invited to take part in the survey. In case of full completion, participants were rewarded via a credit system, which could be used to acquire vouchers or discounts on consumer products. The company delivered two samples of a pre-established size and ensured their representativeness. It was not possible to determine how many people were originally contacted by the survey company.

Outcomes

In order to answer RQ1 ("Do patients who attended the ED before and during the pandemic differ?"), we compared the characteristics of the people who went to the ED before the pandemic (irrespective of whether they were recruited for the 2019 or 2020 survey) and those of the people who visited the ED during the pandemic, i.e. after 10 March 2020. This date was chosen as the "start" of the pandemic in the UK, when awareness of the virus became acute in the country with nearly 400 cases and 6 deaths. The pre-pandemic data gathered experience across ten years and this might imply a shifting perception of avoidable attendance over time, hence we examined the answer to this question by year to test this.

RQ2 aimed to understand the effect of the pandemic on avoidable attendance. We compared the number of individuals stating that they could have been seen elsewhere, such as at a GP practice or a pharmacy, before and during the pandemic.

The analyses for RQ1 and RQ2 used the same subsample of the data, i.e. all respondents from both surveys except those who stated that they have never been to the ED or last went over 10 years ago.

RQ3 explored the issue of why people might have decided not to visit the ED during a pandemic even if they needed urgent medical attention. Such investigation was only possible among the respondents of the survey conducted in 2020, as of course the pandemic had not begun in 2019. In particular, we asked respondents who had experienced urgent medical issues since 10 March but had not gone to the ED for the reason for this choice. We also asked those who had not experienced "urgent" (as defined above) medical issues since 10 March to imagine that they were experiencing the same symptoms as the last time they went to the ED, and then whether they would have gone again in April-May 2020, and if not, why.

Analysis

We did not perform an a priori sample size calculation due to the impossibility of determining the incidence of the key outcome on the target population (i.e. the decision to go to the ED during a pandemic). We instead aimed at a sample of approximately 1,000 respondents for each survey, which is in line with or above similar survey studies, e.g. [11].

The data from the two surveys was merged in Microsoft Excel, which was also used to produce descriptive statistics and bar charts. Statistical analyses were performed in R [12]. Chi-Square tests were applied to establish which characteristics distinguish people who decided to go to the ED before or during the pandemic (RQ1). In order to conduct these tests, some categories of the explanatory variables (e.g. education level) were aggregated in order to ensure at least 5 observations in each cell of the contingency tables, the requirement to ensure validity of the Chi-Square test [13]. Statistically significant results are generally considered as those with a p-value of less than 5%, but we applied a Bonferroni correction to limit the impact of confounding, so that our target p-value was 0.02. Chi-Square tests were also used to compare the pre- and during-pandemic perception of avoidable ED attendance (RQ2). The analyses for RQ3 are descriptive and were performed in Microsoft Excel.

Patient and Public Involvement:

The study design, research questions and questionnaire formulation were discussed with members of the Yorkshire Quality and Safety Research patient panel, a body made up of a group of patients across a range of demographics.

Results

The 2019 survey collected 966 responses, and the 2020 survey 1,411 for a total of 2377 responses. Table 1 shows socio-demographic characteristics of the participants in the two surveys, which are broadly representative of the target population. Characteristics of the participants in the two surveys were similar, although the 2020 survey captured slightly more younger and high-income people.

		First survey		*Second survey*	
Variable name	**Categories**	**N**	**%**	**N**	**%**
Gender	Male	487	49%	685	49%
	Female	509	51%	726	51%
Age	Age 18-24	179	18%	424	30%
	Age 25-34	406	41%	492	35%
	Age 35-45	411	41%	495	35%
Income	Low income (0 - £25,999)	368	37%	468	33%
	Med income (£26,000 - £47,999)	450	70%	549	56%
	High income (£48,000 and over)	177	61%	393	73%
Education	No formal education	17	2%	44	3%

	GCSE	94	9%	99	7%
	A levels	216	22%	339	24%
	Vocational qualification	134	13%	191	14%
	Undergraduate university degree	364	37%	454	32%
	Postgraduate university degree	171	17%	284	20%
Car ownership	Has car	834	84%	1181	84%
	No car	162	16%	230	16%
Cohabitation	Lives with others	831	83%	1218	86%
	Lives alone	165	17%	193	14%
Perceived distance to hospital	Very far	29	3%	48	3%
	Far	139	14%	203	14%
	Neither far nor close	325	33%	444	31%
	Close	402	40%	575	41%
	Very close	101	10%	141	10%
Chronic illness	Has chronic disease	280	28%	371	26%
	Does not have chronic disease	716	72%	1040	74%
Overall experience with hospitals	Positive	194	56%	759	57%
	Some positive, some negative	138	39%	496	37%
	Negative	19	5%	76	6%
Hospitalisation experience	Hospitalised in the past	351	42%	483	39%
	Never hospitalised in the past	490	58%	744	61%

Table 1 – Key sociodemographic characteristics of participants in the first (N=996) and second (N=1,411) survey.

A total of 1,744 participants had visited the ED during the 10 years before the pandemic (746 of those responding to the first survey; 998 of those responding to the second), while 76 people went to the ED during the pandemic (second survey only). Hence, 1,820 responses were used for the analyses for RQ1 and RQ2. The analyses for RQ3 used the responses from the participants in the second survey who had been to the ED in the past 10 years (1,074 participants).

RQ1: Do patients who attended the ED before and during the pandemic differ?

Table 2 below shows the results of comparisons (using Chi-Square tests) of the characteristics of the patients who attended the ED before and during the pandemic. The proportions of men and women attending the ED did not significantly change before and during the pandemic. Similarly, no difference was found for the level of education, car availability and cohabitation. A weakly significant difference was found in age and income. In particular, ED visits among young people (18-24) increased during the pandemic whereas the ED visits among those 25 and older declined p=0.04). A greater proportion of high-income people attended the ED during the lockdown as opposed to before (p=0.02). A greater proportion of people suffering from chronic illnesses attended the ED during the pandemic as opposed to before ($p<0.001$). Additionally, a greater proportion of people living both very close and very far from the hospital attended the ED compared to the pre-pandemic period ($p< 0.001$). A greater proportion of people who had prior positive experiences with hospitals and those who were hospitalised in the past attended the ED

during the pandemic with respect to before. People with flu-like symptoms, headache and breathing difficulty were more likely to attend the ED during the pandemic; while a lower proportion of people who had pain following an injury and wounds/burns attended.

Variable	Categories	N before Covid-19	N during Covid-19	% before Covid-19	% during Covid-19	Pearson's Chi-Square test (p-value)
Gender	Male	858	43	49.2	56.6	0.21
	Female	886	33	50.8	43.4	
Age	Age 18-24	462	30	26.5	39.5	0.04
	Age 25-34	683	24	39.2	31.6	
	Age 35-45	599	22	34.3	28.9	
Income	Low income	589	19	33.8	25.3	0.02
	Medium income	740	28	42.5	37.3	
	High income	414	28	23.8	37.3	
Education	GCSE or lower	180	9	10.3	11.8	0.83
	A levels	419	21	24	27.6	
	Vocational qualification	236	10	13.5	13.2	
	University degree	909	36	49.9	47.4	
Car ownership	Has car	1476	67	84.6	88.2	0.40
	No car	268	9	15.4	11.8	
Cohabitation	Lives with others	1486	64	85.2	84.2	0.81
	Lives alone	258	12	14.8	15.8	
Perceived distance to hospital	Very far	56	10	3.2	13.2	p<0.001
	Far	263	9	15.1	11.8	
	Neither far nor close	564	19	32.3	25	
	Close	692	25	39.7	32.9	
	Very close	169	13	9.3	17.1	
Chronic illness	Chronic illness	519	41	29.8	53.9	p<0.001
	No chronic illness	1225	35	70.2	46.1	
Overall experience with hospitals	Positive	700	50	55.6	66.7	0.01
	Mixed	485	17	38.6	22.7	
	Negative	73	8	5.8	5.6	
Hospitalisation experience	Hospitalised in the past	668	34	46	64.2	0.009
	Never hospitalised	783	19	54	35.8	
Symptom: flu-like	Reported at the ED	159	22	9.1	28.9	p<0.001
	Not reported at the ED	1585	54	90.9	71.1	
Symptom: pain with injury	Reported at the ED	429	7	24.6	9.2	0.002
	Not reported at the ED	1315	69	75.4	90.8	
	Reported at the ED	163	15	9.3	19.7	0.002

Symptom: headache	Not reported at the ED	1581	61	90.7	80.3	
Symptom: Breathing difficulty, allergies	Reported at the ED	207	32	11.9	42.1	p<0.001
	Not reported at the ED	1537	44	88.1	57.9	
Symptom: Wounds, burns, bleeding	Reported at the ED	251	5	14.4	6.6	0.02
	Not reported at the ED	1493	71	85.6	93.4	

Table 2- Chi-Square tests results (N=1820)

RQ2: Does the proportion of perceived avoidable attendances before and during the pandemic differ?

Among patients who attended the ED during the periods of interest, the perception of whether the visit was avoidable depended on whether it took place before or after 10 March. Compared to the pre-pandemic period, after 10 March a greater proportion of people who attended the ED thought they could have gone to the Pharmacy or stayed at home. (Chi-Square p<0.01, degrees of freedom=3)

Could you have been treated elsewhere?	*N before 10 March*	*N after 10 March*	*% before 10 March*	*% after 10 March*
No, I don't think so	1059	33	62%	43%
Yes, at the GP/district nurse/other clinic	546	24	31%	32%
Yes, at the pharmacy	73	12	4%	16%
Yes, at home (no action)	54	7	3%	9%

Table 3 – Proportion of people reporting whether their ED visit was necessary or whether they could have been treated elsewhere (N=76)

RQ3: Why might people have chosen not to attend the ED during a pandemic even if in need of urgent medical attention?

Eighteen percent of the respondents who completed the second survey experienced urgent health symptoms since the start of the pandemic. Among these, 60% decided not to visit the ED during the lockdown. Forty-four percent did so because they were self-isolating as they (or a household member) had Covid-19 symptoms (cf. Figure 1). A quarter of respondents said that they did not want to risk catching Covid-19 while attending the ED, and 28% were concerned about catching other viruses. Overall, 85% of respondents declared that their reasons not to go to the ED were related to the epidemic, although the second most common reason not to go was related to the urgency of the symptoms.

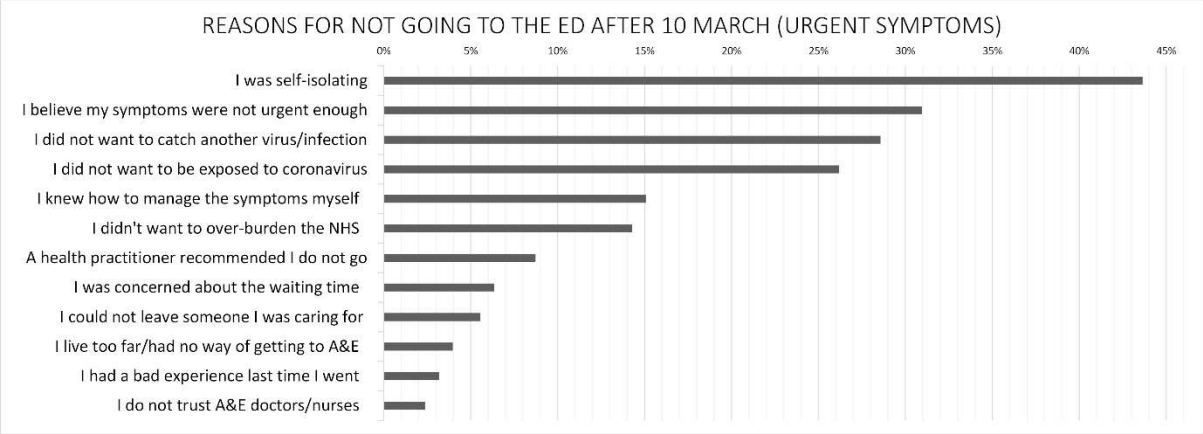

Figure 1. Reported reasons for not having gone to the ED during the pandemic despite experiencing urgent symptoms (N=126). Respondents could provide more than one reason.

Respondents in the 2020 survey who had neither experienced urgent symptoms after 10 March nor visited the ED during that time were asked to imagine that they were experiencing the same symptoms on the day of the survey that they had when they last visited the ED and whether they would still go to the ED to seek care. Half of them (51%) replied affirmatively. Among those who stated they would not go to the ED again, 70% had originally reported urgent symptoms, including pain after an injury (25%), chest pain (17%) had or wounds or bleeding (11%).

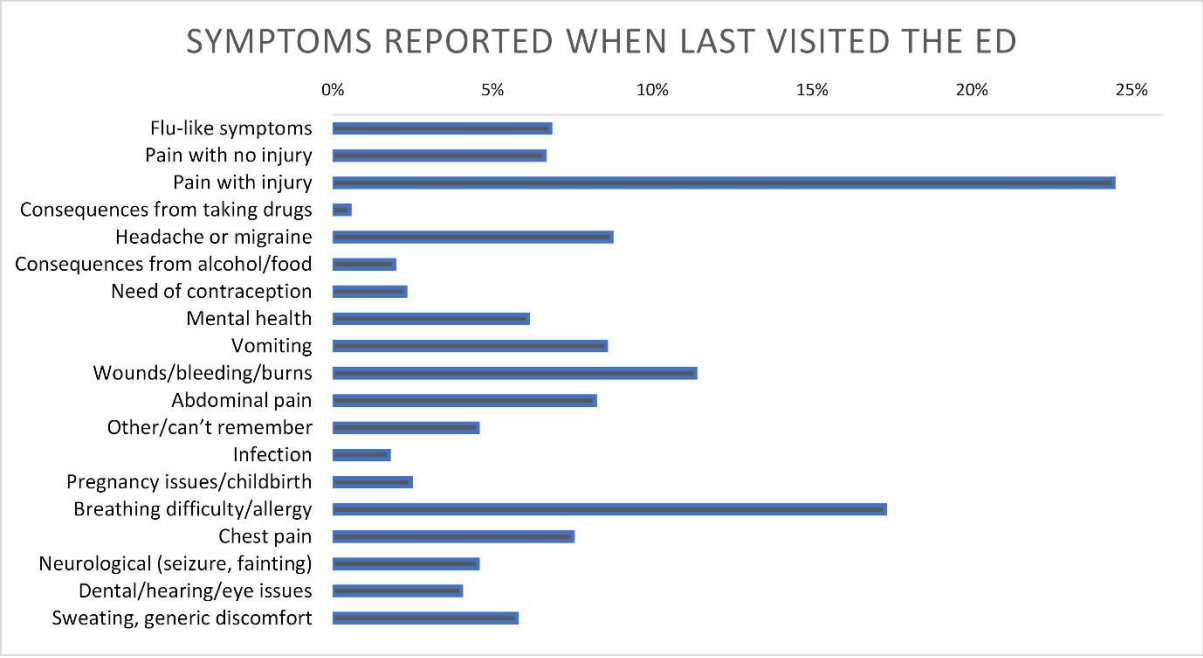

Figure 2. Symptoms causing the most recent ED visit people who would not have gone to the ED during lockdown (N=590)

Those who stated they would not go were also asked why they would not repeat their choice. 24% reported the fear of catching Covid-19 while at the hospital (Figure 3).

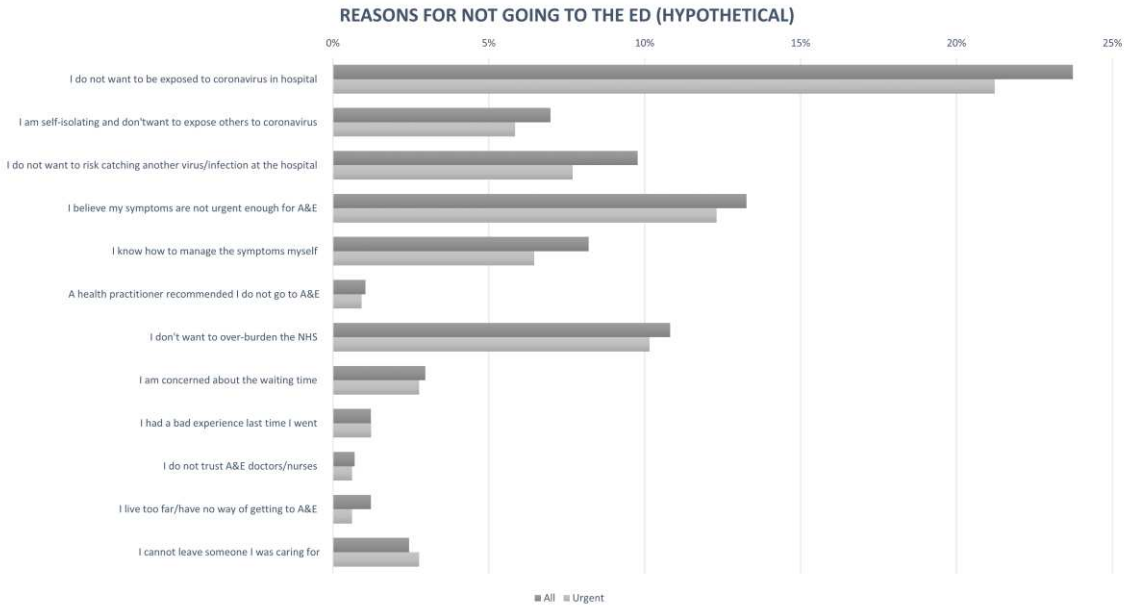

Figure 3. Reasons for not wanting to visit the ED during the lockdown (hypothetical question, N=590). In the figure, next to the value for all respondents, we highlight the response by those who presented symptoms considered as "urgent", such as pain with injury, chest pain, vomiting, and bleeding (N=358).

Discussion

This study found that there were significant differences between the way people used EDs before and during the pandemic. The main differences relate to socio-demographics, geographical factors and symptoms reported. The perception of whether care could have been sought elsewhere was also found to differ.

Our results showed that a higher proportion of young and high-income people, and those with chronic illnesses attended the ED during the pandemic compared to before. Younger people might have been less worried about infection, while the finding on higher-income patients is more difficult to interpret and might be due to confounding. Those with chronic illnesses might have limited availability of alternative face-to-face options, a factor which could have also made the ED appealing to those with previous good experiences with hospitals, who were also more likely to attend during the pandemic. This might suggest that more suitable alternatives for the chronically ill should have been provided.

In line with results by McKee et al. [14], a study in Northern Ireland, distance to hospital mattered. A higher proportion of people living very close or very far (hence likely in remote areas) were likely to visit the ED during the pandemic. While those living close may have found hospital the nearest place to obtain care, those living in remote areas may have had more difficulty. A higher proportion of people visited EDs with flu-like symptoms,which has also been reported by others [15]) and likely due to concerns for Covid-19, while and a smaller proportion of individuals with *Pain with injury* and *Wounds*, attended, in line with findings by Leow et al. [16]. This might be a consequence of the fact that the lockdown reduced injuries related to sports or alcohol abuse, but could also signal that some people

were not attending when they needed to (e.g. in the case of exercise/accidents at home). We found that patients who experienced urgent symptoms but did not go to the ED largely made this choicee for fear of the virus or to protect others, effectively putting themselves at risk of worsening their condition. This, together with the high proportion of of patients with symptoms suggestive of Covid who did visit, suggests the need for a more effective communication policy.

About 30% of patients who experienced severe symptoms did not go to the ED because they believed that their situation was not urgent enough, but concurrently, a higher proportion of the patients who went to EDs during the pandemic believed that their visit was avoidable. We believe this comparison to be robust, as we have examined the pre-pandemic data for shifting perception of avoidable attendance over time and found that the variation was mainly random (see Figure B, supplemental material).
Fifty percent of people stated that if experiencing the same symptoms as during their last ED visit, they would not have attended for several reasons mainly related to Covid-19. This highlights the need to understand whether these beliefs might have resulted in people not using the ED when they should have. When asking about avoidable attendance, it was our intention to capture patients' perceptions rather than clinical assessment. At the same time, we acknowledge that participants might have been explicitly told by ED staff that they should not have attended. In the case of people reporting potential Covid-19 symptoms, this would explain the high proportion of people who said they could have used a pharmacy. These findings begin to shed light on the issue of discretionary attendance during the pandemic but also highlight the need to better understand the difference between what is medically considered to be a necessary visit and patients' perceptions.

The absence of the information of how many potential participants were approached by the survey company as well as the small number of available observations for people who attended ED during the pandemic are limitations. While the available sample was sufficient to produce statistically significant results, the latter may not be possible [17]. Future studies might be able to capture a larger number of patients who had ED experiences during the pandemic. Another limitation of the study is the fact that the data did not support a multivariate analysis to address the proposed questions, hence some of the findings might be a result of confounding.

In conclusion, this study provides new insights into the use of EDs during the pandemic and how this differs from previous years in terms of symptoms reported, attendance and perception of the necessity of visits. The may help to further understand when and why people decided to seek urgent care.

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Ethics approval statement

The present study received ethical approval by the University of Leeds Ethics Committee; Reference number: LTTRANS-101

Clinical Trial Registration- Not applicable

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Contributorship Statement:

C. Calastri: study design, data collection, data analysis, manuscript writing; S. Hess: study design, data analysis, manuscript writing; B. Wilson: study design, data collection, manuscript review. The Yorkshire Quality and Safety Research patient panel supported the research by providing helpful feedback and patient insights.

Conflict of interest:
None declared