

RAPID RESEARCH IN COVID-19 PROGRAMME

Improving the prehospital identification and management of people presenting to the ambulance service with COVID 19 symptoms.

AIMS

Little is known about how COVID-19 patients present to ambulance services, what happens to them or how paramedics engage with this patient group. Using routinely recorded patient data from between 1st March and 31st August 2020, and qualitative data from interviews we conducted with paramedics, we i) investigated the demographic and clinical characteristics of individuals who called the Scottish Ambulance Service (hereafter called the “ambulance service”) with COVID-19 symptoms and those that were not considered to be potentially COVID-19 related but later tested positive; ii) analysed what happened to patients attended by paramedics; iii) Described the admission and mortality outcomes of COVID-19 positive patients; and iv) investigated paramedics’ experiences of working during the COVID-19 pandemic, their clinical decision making, and their use of decision support tools.

KEY FINDINGS

- 257,207 patient calls* were made to the ambulance service from n=171,169 unique patients over the age of 16 years.
- Of these patient calls, n=7305 were flagged as possible COVID-19, of which n=438 (6%) tested positive within 10 days either side of the call; n=4737 (65%) were not tested within 10 days.
- 4,570 patient calls were attended where there was a positive virology test within 10 days; n=4,132 (90.4%) were not flagged by the ambulance service as COVID-19.
- Of the calls flagged COVID-19, the majority (59.7%; n=4358) were transported for further care.
- The 30 day mortality rate for patients flagged COVID-19 and who received a positive virology test within 10 days (n=420) was 29.7%; compared to 8.8% (2130) for those with a negative virology test (n=2130).
- Paramedics described clinical decision making about who to transport to hospital as challenging. Where enhanced decision support from other clinicians was available, it was perceived to be highly valuable and supportive.
- The ambulance services’ use of various means of communicating the rapidly developing national COVID-19 guidance created uncertainty for paramedics we spoke to.

*n.b. ‘Patient calls’ represent the unique combination of patients to calls. While most calls only involved one patient some patients called more than once and some calls had multiple patients.

WHAT DID THE STUDY INVOLVE?

The ambulance service electronically records patient data (clinical and demographic) on every call it receives. NHS Health Boards in Scotland also routinely collect patient data. These data are linked by Public Health Scotland in a specialist database called the Unscheduled Care Data Mart. These data provide an overview of a patient's journeys from ambulance call to hospital attendance and record outcome. We used these data to answer research questions i-iii. Research question iv was answered by interviewing paramedics from the three geographical divisions of the ambulance service (North, East and West) and analysing that data.

WHAT WERE THE RESULTS AND WHAT DO THEY MEAN?

i) Patient demographics and clinical characteristics (Table 1)

Evidence of COVID-19 testing was looked for 10 days either side of the ambulance call. The ambulance service responded to n=257,207 patient calls during the six-month study period. Of these, 2.8% (n=7,305) were categorised as possible COVID-19 patients by the ambulance control centre. From the flagged +ve patient calls 6% had a COVID-19 positive result, 29% had a negative COVID-19 result and the other 65% had no evidence of being tested. For clinical characteristics we report averages on initial recorded prehospital physiology. Those patients with a positive virology for COVID-19 had a higher temperature and respiratory rate, and lower oxygen saturation than in the other subgroups. These data are first non-missing recorded parameters.

Table 1: Demographic characteristics and first non-missing recorded clinical characteristics by Covid-19 flag and testing subgroup.

Subgroup	Demographic characteristics				First non-missing Clinical characteristics (means or medians)			
	N patient/calls	Mdn age (years) (IQR)	% of females	% with 2+ co-morbidities	Temp (max) (0°)	SpO2 (median) (IQR)	Resp rate (max)	Pulse rate (max)
Missing data rates (% rounded)	N/A	N/A	N/A	N/A	19	15	14	14
Not flagged/ No test evidence	179,391	61 (35)	51	57	36.7	97 (3)	18.4	87.1
Not flagged/ Tested -ve	66,379	75 (22)	52	68	37	96 (4)	20.2	90.4
Flagged +ve/no test evidence	4,737	62 (31)	52	55	37	97.8 (3)	19.8	90.8
Flagged +ve/ Tested +ve	438	70.5 (23)	43	58	37.9	92 (10)	26	95.3
Not flagged/ Tested +ve	4,132	74 (23)	46	65	37.8	94 (8)	23.8	93.1
Flagged +ve/ Tested -ve	2,130	72 (24)	49	66	37.4	96 (6)	22.6	97.3

(ii) What happened to patients attended by paramedics

Figure 1 describes the unscheduled care pathways after the initial ambulance call-out where COVID-19 was suspected or later confirmed (n=7052). The majority of patients (54%) were taken to the Emergency Department, most likely by ambulance. Some patients may have self-presented in the hours or days after the initial ambulance call. Smaller proportions were either admitted directly to hospital (5%), referred to alternative NHS services (6%) or remained at home without further care (26%). Around 73% of those taken to the Emergency Department had further hospital care (e.g. hospital admission or virology testing).

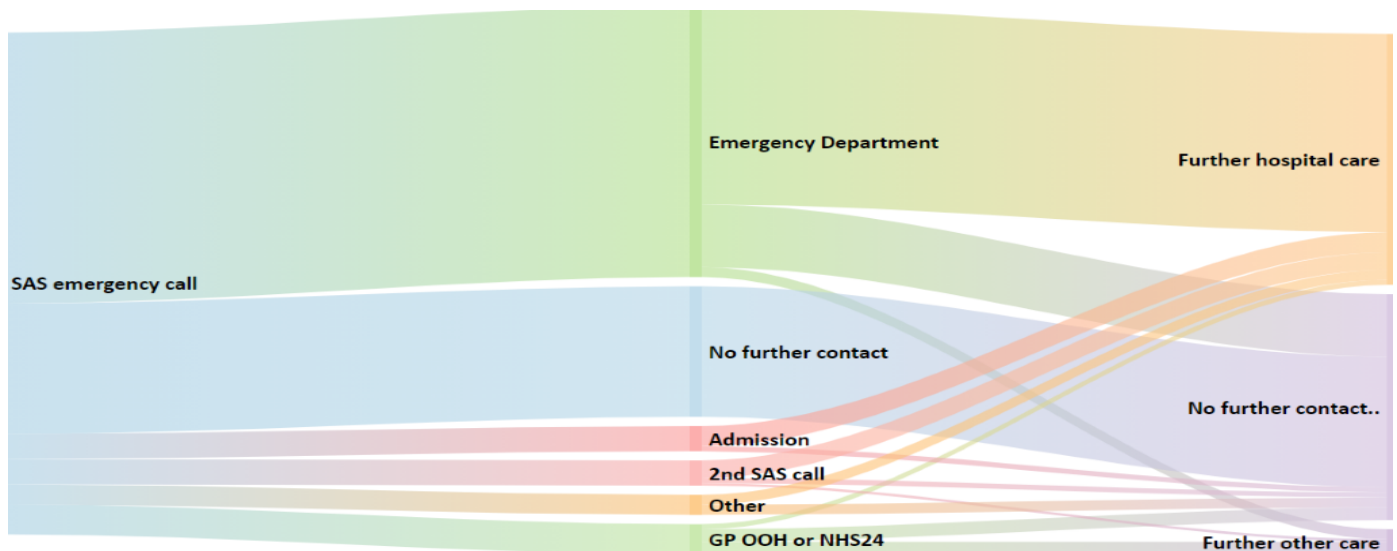


Figure 1: Healthcare events following initial ambulance service call where the initial call was either flagged Covid-19 or the patient tested positive within 10 days of the call.

iii) The outcomes of COVID-19 patients (admission and mortality)

68% of patient calls that were either flagged as suspected COVID-19 and/or where the patient tested COVID-19 positive within 10 days of the call (n=11437) were transported to hospital. The overall transportation rate was 68%. Repeat calls to the ambulance service within 3 days from a patient call, where the patient was transported or not, occurred in approximately 8% and 21% of patient calls respectively. For patient calls where the patient was not transported to hospital, the proportion where a patient died within 3 and 30 days was 2.4% and 9.0% respectively. Where the patient was transported to hospital, the proportion where a patient died within 3 and 30 days was higher at, 4.8% and 18.2% respectively. The proportion of patient calls admitted within 10 days of the call was 28% for those not transported to hospital against 82% for those transported to hospital.

iv) Paramedic experiences of practice during the COVID-19 study period

Forty-eight percent (16/33) of paramedics invited agreed to be interviewed, covering all three geographical service divisions. Paramedics reported that some aspects of practice changed rapidly, while others were new and challenging. Collectively, these data suggest that COVID-19 has placed considerable stress on the ambulance service at both organisational and individual levels.

a) Impact on clinical decision making: Deciding whether to take a patient to an Emergency Department is often challenging. Paramedics reported that COVID-19 increased the complexity of this process. This is primarily due to balancing the potential of unnecessarily taking a patient with COVID-19 symptoms to hospital and risk infecting others, with inappropriately leaving people at home who later require hospital admission. New clinical guidelines were rapidly developed to support this process. One of the challenges paramedics reported was the generality of symptom presentation. In addition to symptom presentation, paramedics also had to attend to patients' fears. Some patients/families were reported as being explicit in their desire to attend hospital for COVID-19 treatment when it did not appear to be indicated, while others, who presented with non COVID-19 symptoms, did not wish to attend hospital when it was indicated, for fearing of contracting the virus.

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“It’s just quite difficult to try and grasp what is what because the symptoms are so like many other conditions that it’s just...you can’t say yes and you can’t say no, and you’re putting people at risk taking them in and you’re putting them at risk leaving them at home, for example.” (Interview 3)

b) Decision Support: Some ambulance service divisions used enhanced decision support (EDS), where paramedics discuss the presentation of a patient with another relevant healthcare professional to support clinical decision making. Our data suggests EDS was accessed differentially across the ambulance service. However, where used several paramedics reported that it was highly valuable.

“So during the pandemic, we were far more...how to say this? Relaxed the way we were making decisions. Maybe relaxed, it’s probably the wrong word. Mainly due to the fact we were able to phone up consultants and GPs and get advice from them about if we should bring people to hospital or not. So for a lot of people, that was a new thing to do, even though we’ve been able to do that for years. I think, you know, it magnified the need for doing it at the beginning of the pandemic.” (Interview 14)

Several paramedics reported that ambulance service COVID-19 communication was fast paced (at times with several updates a day in response to rapidly changing national advice) and delivered in different ways: radio, email, printed documentation etc. They found this highly challenging. Several paramedics reported difficulties in keeping updated of these changes. Some also reported that clinical guidance was inconsistent across different NHS Health Boards, resulting in uncertainty regarding which hospitals paramedics could admit patients to. These issues impacted on paramedics’ workload and personal stress levels.

“This is a well-known problem within the ambulance service that they have difficulty communicating with all the staff, so they use different platforms. They email you. They update an online app. They put notices on our online website at SAS. They ask team leaders and managers to put paper notices up on stations, but when that was happening, at one point, three times a day...everybody... depending which site or information you had seen last, you knew a slightly different version to someone else, and that caused all sorts of problems.” (Interview 7)

c) Personal Protective Equipment (PPE): The routine use of extensive PPE was a new experience for all interviewees. Some reported that the number of calls initially exceeded PPE availability. Several paramedics stated that early COVID-19 media reports combined with paramedics appearing in full PPE increased levels of anxiety among many of the patients they attended. This anxiety was felt by some to impact on patients and relatives’ responses to paramedic clinical recommendations. Several paramedics reported that putting on PPE before seeing patients added an additional (though necessary) burden to practice. Some felt it contributed to delayed time arrival at patient locations.

“Cardiac arrests became quite a challenge. It’s always been the highest priority call and, you know, that’s the kind of job that you want to get to as quickly as you can and get in and deal with the patient as quickly as you can to give them the best possible chance of survival, whereas now we were having to stop at the scene, get kitted up, which isn’t a quick process ... and then carry all your equipment and then deal with a cardiac arrest.” (Interview 1)

d) Paramedics’ personal impact of dealing with COVID-19: Paramedics across all divisions reported fluctuations in workload. There was a perception that some of their usual caseload reduced in number at the start of the pandemic and that patients that would regularly attend were not calling anymore. A small number of paramedics felt that managerial support was lacking

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should a patient deteriorate after non-conveyance, fearing blame, and felt that more visible leadership was required. Other paramedics' stated that it was a stressful period but that they appreciated that the organisation was going through unprecedented times. At an individual level some paramedics were worried about catching COVID-19 from their patients or as a result of patients treatment and the possibility of taking the virus home to their families.

"There was so much unknown about the condition. We didn't know how it'd be transmitted; we're all scared of taking it home to our families (Interview 5).

WHAT IMPACT COULD THE FINDINGS HAVE?

- Understanding the clinical characteristics and outcomes of the COVID-19 patient could help inform the revision of ambulance service criteria for identifying query COVID-19 patient calls,
- Qualitative findings could inform implementation and communication processes on rapid clinical guideline development along-side focussed wellbeing support for ambulance clinicians.
- This study identified limitations in existing data contained in the Unscheduled Care Data Mart and will help inform future data requirements which is likely to enhance future research requiring similar data sets.
- This study has developed a unique data set that could be used to answer further focussed research questions at minimal cost.

HOW WILL THE OUTCOMES BE DISSEMINATED?

- We will share results within the Scottish Ambulance Service, the National Ambulance Service Research Group (NASRG), and the Association of Ambulance Chief Executives (AACE).
- We will disseminate lay summaries of results through media releases from the University of Stirling, our partner organisations, and research team member Twitter accounts.
- Academic papers will be submitted to peer reviewed prehospital emergency care journals.
- We will submit two abstracts to the 2021 EMS999 Research Forum annual conference.

CONCLUSION

Ambulance telephone triage systems are designed to identify clinical acuity and the speed of ambulance response, not provide a clinical diagnosis. This study found that telephone triage is not a reliable identifier of COVID-19 patients. This finding reinforces paramedics use of PPE safety guidance on every call. Once with patients, paramedics felt confident in identifying most COVID 19 related symptoms, but in the absence of virology results, decision making on most appropriate care remained difficult. Decisions about taking patients to hospital or leaving them at home are challenging. It requires assessment of immediate clinical need and risk, patient/relative preferences and consideration of ongoing care requirements. As a result, where enhanced decision support was available, it was valued and perceived to enhance patient safety and prehospital clinical decisions making. Further analysis of these and other data will support the refinement of future guidelines to aid prehospital clinical decision making.

RESEARCH TEAM & CONTACT

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ADDITIONAL INFORMATION

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