

An analysis of NHS 111 demand for primary care services

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Abstract

Background

The NHS 111 service triages over 16,650,745 calls per year and approximately 48% of callers are triaged to a primary care disposition, such as a telephone appointment with a general practitioner (GP). However, there has been little assessment of the ability of primary care services to meet this demand. If a timely service cannot be provided to patients, it could result in patients calling 999 or attending emergency departments (ED) instead.

This study aimed to explore the patient journey for callers who were triaged to a primary care disposition, and the ability of primary care services to meet this demand.

Methods

We obtained routine, retrospective data from the Connected Yorkshire research database, and identified all 111 calls between the 1st January 2021 and 31st December 2021 for callers registered with a GP in the Bradford or Airedale region of West Yorkshire, who were triaged to a primary care disposition. Subsequent healthcare system access (111, 999, primary and secondary care) in the 72 hours following the index 111 call was identified, and a descriptive analysis of the healthcare trajectory of patients was undertaken.

NOTE: This preprint reports new research that has not been certified by peer review and should not be used to guide clinical practice.

Results

There were 56,102 index 111 calls, and a primary care service was the first interaction in 26,690/56,102 (47.6%) of cases, with 15,470/26,690 (58%) commenced within the specified triage time frame. Calls to 999 were higher in the cohort who had no prior contact with primary care (58% vs 42%) as were ED attendances (58.2% vs 41.8), although the proportion of avoidable ED attendances was similar (10.5% vs 11.8%).

Conclusion

Less than half of 111 callers triaged to a primary care disposition make contact with a primary care service, and even when they do, call triage time frames are frequently not met, suggesting that current primary care provision cannot meet the demand from 111.

Introduction

The National Health Service (NHS) 111 service aims to assist members of the public with urgent medical care needs and is the successor to the NHS Direct service in England. Following pilots in four sites it was rolled out nationally, with the final site going live in England in 2014, and in 2019/20 111 received over 19 million calls (NHS England, 2020). Its key founding objective was to provide easy access to support for the public with urgent care needs, to ensure they received the “right care, from the right person, in the right place, at the right time” (UK Government, 2011). It is also the key component of the 24/7 Integrated Urgent Care Service outlined in the NHS Long Term Plan (England, 2019).

The proposed benefits of this system were to improve the public’s access to urgent healthcare, help people use the right service first time including self-care and provide commissioners with management information regarding the usage of services.

Initial evaluation of the four pilot sites reported that the public were generally satisfied with the service and followed the advice given, there were no significant impacts on emergency department or urgent care service utilisation, but there were increases in 999 ambulance service activity as a result of the introduction of the 111 service (Turner et al., 2013; Turner et al., 2012).

Subsequent evaluation of the service has explored the effect of clinical input on triage decisions with respect to patient compliance and avoidable emergency department attendance (Anderson & Roland, 2015; Egan et al., 2020; Robinson et al., 2017). However, no studies have been conducted using data collected following the publication of the Integrated Urgent Care Specification, published in 2017, which called for sufficient numbers of clinicians, working to approved guidelines and protocols, to support 111 call handlers (Integrated Urgent Care Delivery Team, 2017). In addition, there has been little scrutiny of the ability of primary care provision (particularly out-of-hours) to meet the demand of the NHS 111 service. This is particularly pertinent, since approximately 55% of all NHS 111 call dispositions result in a referral to a primary care service. If a timely service cannot be provided to patients, it is possible that this will result in patients calling 999 or attending emergency departments (ED) directly.

The aim of this study is to explore the patient journey for callers who are given a primary care disposition following a call to NHS 111, and the ability of primary care services to meet relevant 111 call dispositions. The analysis was undertaken using 12 months of data from a regional connected dataset.

Methods

111 call triage and disposition

111 uses the Clinical Decision Support System (CDSS) NHS Pathways to triage calls. It is not intended to be a diagnostic system, but instead is designed to assess symptoms and signpost to onward care, if required. Calls handlers are non-clinical, but work with clinicians who can provide support and, in some circumstances, take over the call (NHS Digital, 2021).

NHS Pathways comprises an interlinked series of algorithms (pathways) that link questions and care advice resulting in a clinical endpoint known as a disposition. This specifies the general category of service and the time frame that this should be available to the caller. These pathways correspond to a symptom group (SG), such as chest pain or headache, and a symptom discriminator, which describes the level of care required. Triage questioning continues until a relevant symptom related to a condition cannot be safely excluded and the patient is allocated a symptom discriminator which describes the appropriate level of care required, for example 'full Primary Care assessment and prescribing capability' (NHS Digital, 2019).

Data

We obtained routine, retrospective data from the Connected Yorkshire research database, which provides linked data for approximately 1.2 million citizens across the Bradford and Airedale region of Yorkshire. Datasets include 111 and 999 call data, as well as primary and secondary care (including emergency department and in-patient activity).

We identified all 111 calls between the 1st January 2021 and 31st December 2021 for patients who were triaged to a primary care disposition and registered with a General Practitioner (GP) in the Bradford area at the time of the call. Depending on perceived acuity as determined by the NHS Pathways system, patients are allocated to either a face-to-face or telephone consultation with a primary care clinician within a specified time frame. Subsequent healthcare system access in the following 72 hours following the first (index) call was identified, by searching the 111 and 999 call, primary care, and hospital emergency department and in-patient admission datasets.

Analysis

We conducted a descriptive analysis comparing patient demographic, triage characteristic and patient trajectory data for patients who did, and did not, receive a timely contact with a primary care service. Counts and proportions were reported for categorical data and continuous data was reported as median values and inter-quartile ranges. To visualise the patient's trajectories, we generated chord and sankey diagrams. All analysis was conducted using the statistics package, R (R Core Team, 2022).

Ethical approval

This study was approved by the Bradford Learning Health System Board in accordance with the Connected Yorkshire NHS Research Ethics Committee (REC) and Confidentiality Advisory Group (CAG) approvals relating to the Connected Yorkshire research database (17/EM/0254). No separate Health Research Authority (HRA) approval was required for this study.

PPI

The application and protocol for this study was review by the Yorkshire Ambulance Service NHS Trust patient research ambassador. In addition, Connected Bradford have an active patient and public involvement group who were involved in the decision to approve this study.

Results

Between the 1st January 2021 and 31st December 2021, there were 56,102 index 111 calls with a primary care disposition. The first healthcare interaction following the call was a primary care service in 26,690/56,102 (47.6%) of cases. However, in 21,749/56,102 (38.8%) of cases, the caller had no further healthcare contact in the 72 hours following the index 111 call (Table 1).

During the week, calls were most commonly made after 18:00, consistent with coinciding with a working-age demographic finishing a 'typical' working day, whereas calls were spread more widely across the day at the weekend (Figure 1). There were 190 distinct symptom groups in the data, although the most common were pain and/or frequency when passing urine, unwell infants and rashes (Table 1, Supplementary 1). The median age of callers was 29 years (IQR 8–50 years), although the distribution of ages was bimodal, with peaks seen in patients less than a year old, and in patients aged between 20–30 years (Supplementary 2). Callers were more commonly female across virtually the entire age range.

Table 1: Summary data for index 111 calls with a primary care disposition

Characteristic	Primary care first contact, N = 26,690	Other healthcare service first contact, N = 7,663	No healthcare contact in 72 hours, N = 21,749	Overall, N = 56,102
Triaged primary care contact timeframe (N, %)				
1hr	6,100 (23%)	1,695 (22%)	2,553 (12%)	10,348
2hrs	9,966 (37%)	2,893 (38%)	6,921 (32%)	19,780
6hrs	6,137 (23%)	1,570 (20%)	5,187 (24%)	12,894
>6hrs	4,487 (17%)	1,505 (20%)	7,088 (33%)	13,080
Patient age in years (median, IQR)	28 (5, 50)	30 (13, 51)	30 (15, 49)	29 (8–50)
Patient sex (N, %)				
Female	15,978 (60%)	4,618 (60%)	13,462 (62%)	34,058
Male	10,711 (40%)	3,045 (40%)	8,286 (38%)	22,042
Unknown	1 (<0.1%)	0 (0%)	1 (<0.1%)	2
Time of index 111 call (N, %)				
Out-of-hours	21,314 (80%)	5,656 (74%)	14,360 (66%)	41,330
In-hours	5,376 (20%)	2,007 (26%)	7,389 (34%)	14,772
Primary care consultation type (N, %)				
Face to face	17,879 (67%)	5,219 (68%)	16,603 (76%)	39,701
Telephone	8,811 (33%)	2,444 (32%)	5,146 (24%)	16,401
Primary care appointment made by 111 (N, %)				
No	24,862 (93%)	7,020 (92%)	18,181 (84%)	50,063
Yes	1,828 (6.8%)	643 (8.4%)	3,568 (16%)	6,039
Clinical advisor involved in call (N, %)				

Characteristic	Primary care first contact, N = 26,690	Other healthcare service first contact, N = 7,663	No healthcare contact in 72 hours, N = 21,749	Overall, N = 56,102
No	22,178 (83%)	6,352 (83%)	17,749 (82%)	46,279
Yes	4,512 (17%)	1,311 (17%)	4,000 (18%)	9,823
Initial disposition service rejected (N, %)				
No	23,036 (86%)	6,549 (85%)	17,344 (80%)	46,929
Yes	3,654 (14%)	1,114 (15%)	4,405 (20%)	9,173
Triage symptom group (N, %)				
Other	15,392 (58%)	4,822 (63%)	13,197 (61%)	33,411
Pain and/or Frequency	1,622 (6.1%)	292 (3.8%)	1,340 (6.2%)	3,254
Passing Urine				
Unwell, Under 1 Year Old	1,291 (4.8%)	364 (4.8%)	840 (3.9%)	2,495
Skin, Rash	1,205 (4.5%)	247 (3.2%)	988 (4.5%)	2,440
Earache	1,313 (4.9%)	174 (2.3%)	915 (4.2%)	2,402
Sore Throat or Hoarse Voice	1,174 (4.4%)	273 (3.6%)	871 (4.0%)	2,318
Chest and Upper Back Pain	984 (3.7%)	331 (4.3%)	793 (3.6%)	2,108
Vomiting	1,046 (3.9%)	366 (4.8%)	644 (3.0%)	2,056
Lower Back Pain	895 (3.4%)	248 (3.2%)	805 (3.7%)	1,948
Cough	859 (3.2%)	244 (3.2%)	762 (3.5%)	1,865
Abdominal Pain	898 (3.4%)	301 (3.9%)	590 (2.7%)	1,789
First service contacted following index 111 call (N, %)				
GP	26,690 (100%)	0 (0%)	0 (0%)	26,690
No further healthcare contact	0 (0%)	0 (0%)	21,749 (100%)	21,749
ED	0 (0%)	3,803 (50%)	0 (0%)	3,803
IUC	0 (0%)	2,602 (34%)	0 (0%)	2,602
999	0 (0%)	739 (9.6%)	0 (0%)	739
IP	0 (0%)	519 (6.8%)	0 (0%)	519

Referral services and clinical advisor involvement in call handling

While all included cases received a triage disposition of contact with a primary care service, services in this category do not only include GPs and integrated urgent care (IUC) centres. Pharmacists, opticians and maternity, mental health and community-based services are also included. In this cohort, 'alternatives' to GP or IUC services were frequently rejected for a variety of reasons including patient preference and service-based constraints, such as capacity issues (Table 2). Only GP appointments appeared to be bookable by the 111 call handler based on the data in this cohort, although this was infrequently undertaken and mostly 'in-hours' (Supplementary 3).

Greater emphasis has been placed on the availability of skilled clinicians to support the non-clinical call handlers (Integrated Urgent Care Delivery Team, 2017). However, in patients with a primary care service disposition, clinicians infrequently take over calls, irrespective of triage acuity (Supplementary 4). However, it is possible that clinical advice is provided to call handlers without the clinician actually taking over the call themselves, which would not appear in our data.

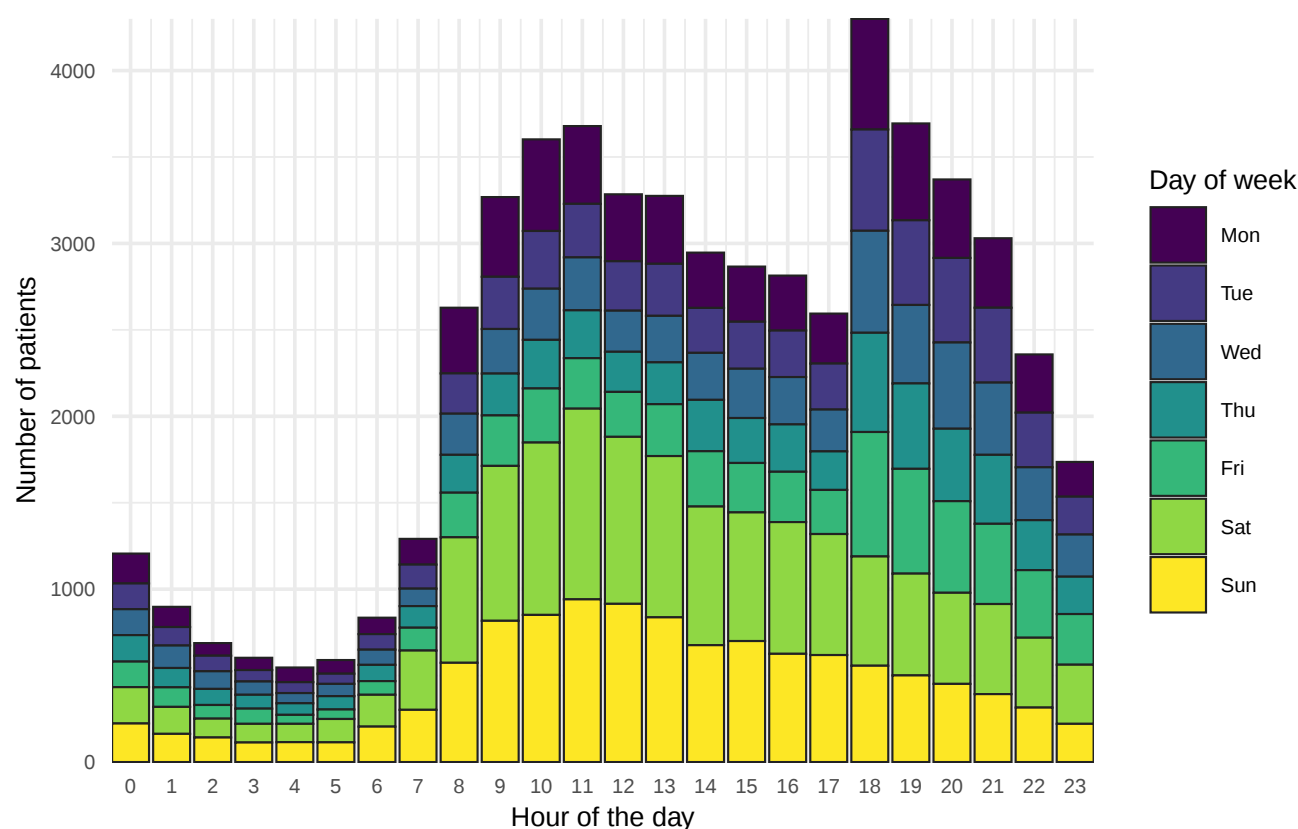


Figure 1: 111 call volume by hour and day of week

Table 2: Healthcare services referred to or rejected following 111 call triage

Service category	Service accepted	Service rejected	Total Services Offered	Proportion rejected (%)
IUC/GP	54,016	2,854	56,870	5.0
Pharmacy	1,145	4,073	5,218	78.1
Community service	355	1,976	2,331	84.8
Mental health service	40	119	159	74.8
Optician	18	117	135	86.7
Maternity service	11	29	40	72.5

Patient healthcare trajectory

In most cases, patients either had contact with a primary care service and no further healthcare interaction, or did not have contact with a healthcare service at all (41,529/56,102, 74%) (Figure 2). However, despite the short follow-up (72 hours), there were 1,091/56,102 (1.9%) of patients who received more than 5 healthcare interactions in that period.

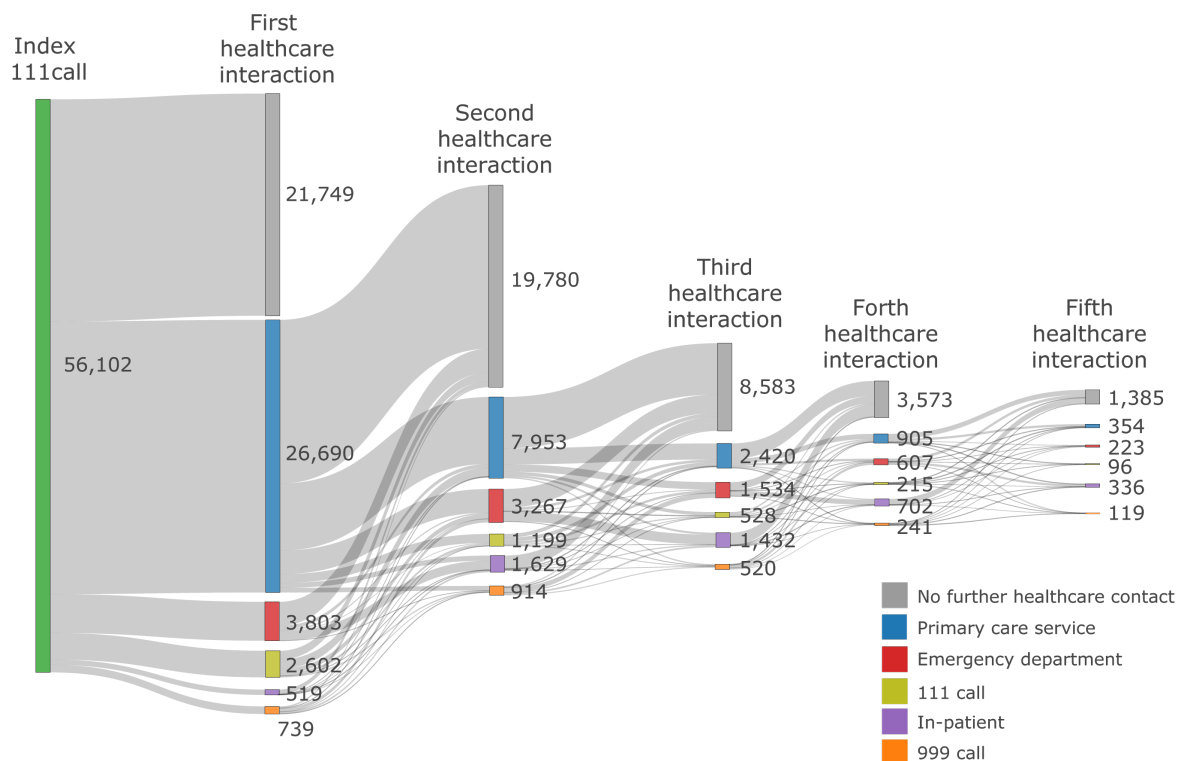


Figure 2: Sankey diagram of healthcare service access by patients following index 111 call

GP contacts

Following the index call, the first healthcare service contact was with a primary care service in 26,690 of callers (Table 3). Perhaps unsurprisingly, triage contact times of one hour were the most challenging to meet with only 2,273/6,100 (37%) occurring within the specified triage time frame, despite representing callers triaged to the highest acuity. There was a higher proportion of callers who visited an ED following contact with a primary care service within the time frame (1,442/2,311, 62%), although it is unclear from the data why this should be the case.

Table 3: Summary data for primary care contacts following index 111 call

Characteristic	no, N = 11,220	yes, N = 15,470	Overall, N = 26,690
Time of index 111 call (N, %)			
In-hours	1,927 (17%)	3,449 (22%)	5,376 (20%)
Out-of-hours	9,293 (83%)	12,021 (78%)	21,314 (80%)
Triaged primary care contact timeframe (N, %)			
1hr	3,827 (34%)	2,273 (15%)	6,100 (23%)
2hrs	4,840 (43%)	5,126 (33%)	9,966 (37%)

Characteristic	no, N = 11,220	yes, N = 15,470	Overall, N = 26,690
6hrs	1,806 (16%)	4,331 (28%)	6,137 (23%)
>6hrs	747 (6.7%)	3,740 (24%)	4,487 (17%)
Next service following primary care contact (N, %)			
Ambulance service	210 (1.9%)	237 (1.5%)	447 (1.7%)
Emergency department	869 (7.7%)	1,442 (9.3%)	2,311 (8.7%)
In-patient	183 (1.6%)	306 (2.0%)	489 (1.8%)
No further healthcare contact in 72 hours	6,582 (59%)	9,438 (61%)	16,020 (60%)
Primary care	3,022 (27%)	3,537 (23%)	6,559 (25%)
Subsequent 111 call	354 (3.2%)	510 (3.3%)	864 (3.2%)

Emergency department attendance

There were 9,290 emergency department attendances and 1,029 (11.1%) met the O’Keeffe et al. (2018) definition of an avoidable attendance. In summary, a patient is defined as meeting this definition when they present to a consultant-led ED which provides a 24-hour service with full resuscitation facilities and designated accommodation for the reception of emergency care patients (referred to as a type 1 ED (NHS Digital, 2023b)), but do not receive investigations, treatments or referral that requires the facilities of a type 1 ED.

The proportion of avoidable attendances was higher in cases where the patient had made contact with a primary care service after the index 111 call (Table 4). Patients who had not previously made contact with a primary care service prior attended sooner than those who had, and this trend was more pronounced out-of-hours.

Table 4: Summary data for first ED attendance following index 111 call

Time of attendance	Primary care service contacted prior to attendance	Avoidable attendance	Total attendances	Proportion of avoidable attendances	Median time from index call to ED attendance (hrs, IQR)
In-hours	Yes	115	1,105	10.4	4.4 (2.3–20)
In-hours	No	121	1,457	8.3	3.5 (1.6–17)
Out-of-hours	Yes	345	2,778	12.4	7 (3.4–21.2)
Out-of-hours	No	448	3,950	11.3	4 (1.8–15)

Discussion

In our study, just under half (47.6%) of callers to 111 who were triaged to a primary care service disposition made contact with a primary care service as their first post-call healthcare interaction. In addition, triaged time frames of 2 hours or less were frequently not met even when contact with a primary care service was made, suggesting primary care services are struggling to meet the demand from 111. However, despite this, the rate of contact with primary care services was higher in this study than has been reported elsewhere. For example, Nakubulwa et al. (2022) linked 111 call data with primary and secondary services in London between 2013–2017 and reported only 35% of callers triaged to a primary care disposition had contact with a GP. In contrast, experimental statistics from NHS Digital suggest that patients in the Bradford area were less likely to attend a planned GP appointment than elsewhere in England in 2021. Did-not-attend (DNA) rates for Bradford at that time were 24.7% (35.3% if cases where an appointment attendance was unknown are excluded) compared to an English mean of 8.6% (NHS Digital, 2023a). Direct booking of a primary care service by 111 call handlers was associated with a higher proportion of no further healthcare system contacts, although numbers were relatively small and bookable appointments being limited mostly to in-hours consultations with a GP. Clinical advisors were involved in approximately 17.5% of all calls, although there appeared to be little to differentiate calls which did, or did not, have a clinician involved.

A systematic review by Parsons et al. (2021) identified a number of reasons why patients do not attend GP appointments, including work or family/childcare commitments, transport issues (including weather-related) and demographic factors such as younger age, female sex and low socio-economic background, which are disproportionately represented in our data. In addition, over 70% of planned contacts with a primary care service were face-to-face, during the third English lock down for COVID-19, and some patients may have been reluctant to attend.

While this might have resulted in the easing of the workload of primary care (and other healthcare) services, it does raise the concern that callers are not having their healthcare needs met. For example, during 2021 the incidence per patient of cardiovascular conditions such as atrial fibrillation, congestive heart disease and stroke remained below pre-pandemic levels, suggesting new diagnoses had not been made (and therefore treatment not commenced) with potential implications for patient morbidity (Department of Health and Social Care, 2022).

Where contact was made with another service after the index call, this was most commonly presentation at an ED, which occurred in around 7% of cases and is similar to other studies using linked data (Lewis et al., 2021; Nakubulwa et al., 2022). Over 10% of these attendances were classed as non-urgent, i.e. an avoidable attendance; a similar rate to those who had made contact with a primary care service before attending an ED. The reasons for this are not clear in our data, but have been explored elsewhere, and include risk minimisation by patients and carers, perceived need for a prompt healthcare intervention, compliance with instructions from healthcare professionals (in the case of those who did speak to a primary care service) and a perception that care provided by an ED is superior to alternatives (O’Cathain et al., 2020).

Strengths and weaknesses

To our knowledge, this study represents the most up-to-date analysis of the 111 service. Previous studies utilising linked data to undertake analysis of caller trajectories following a 111 call are dated, using data from 2017 or earlier. However, the provision of urgent and emergency care remains challenging, due in part to the COVID-19 pandemic (Department of Health and Social Care, 2023) and the data presented here was collected during

the third English lock down. As such, caller behaviours and presentations might be different if the study was repeated now.

While the Connected Yorkshire research database has great utility for researchers wishing to explore how patients traverse the wider healthcare system, it is restricted to a discrete geographical region in West Yorkshire, which may affect the generalisability of the results we have reported. Bradford is mainly a urban area and the 13th most deprived local authority in England (out of 333) based on the Index of Multiple Deprivation (City of Bradford Metropolitan District Council, 2019).

Primary care disposition includes services in addition to GP and IUC centres, meaning that interactions between a caller and healthcare service provided, for example a pharmacist, would not have been captured in the data. This means that there will be gaps in our understanding of patient journeys post-call. However, given the high proportion of alternative services which were rejected by patients in our data, this may not be a significant issue.

Finally, the reasons why many patients did not adhere to their allocated 111 dispositions can only be surmised from this data. While the study had assistance from a PPI group, this was not extended to the analysis due to lack of funding, which could have provided useful insights how patient decision making contributed to the results we have observed.

Conclusion

Less than half of 111 callers triaged to a primary care disposition make contact with a primary care service, and even when they do, call triage time frames are frequently not met, suggesting that current primary care provision cannot meet the demand from 111.

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Contributors

RP and DC conceived and designed the study. RP obtained the research approvals to access the datasets and acts as guarantor for the paper. RP and MS developed the code necessary to extract the data. JG conducted a literature review to inform the discussion. All authors drafted the manuscript and contributed substantially to its revision.

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Disclaimer

The views expressed in this publication are those of the author(s) and not necessarily those of the National Institute for Health Research or the Department of Health and Social Care.

Data sharing

The data used in this study was derived from the Connected Yorkshire research database and as such cannot be freely shared. However, access to source data can be obtained by following the Connected Yorkshire research database application process.

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