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A study of urgent and emergency referrals from NHS Direct within England

E J Cook,[1] G Randhawa,[2] A Guppy,[1] S Large[3]

[1]Department of Psychology, University of Bedfordshire, Luton, UK
[2]Institute for Health Research, University of Bedfordshire, Luton, UK
[3]NHS England, South East, UK

Correspondence to
Dr Erica Cook;
erica.cook@beds.ac.uk

ABSTRACT

Objectives: The presented study aimed to explore referral patterns of National Health Service (NHS) Direct to determine how patients engage with telephone-based healthcare and how telephone-based healthcare can manage urgent and emergency care.

Setting: NHS Direct, England, UK

Participants: NHS Direct anonymised call data (N=1 415 472) were extracted over a representative 1-year period, during the combined month periods of July 2010, October 2010, January 2011 and April 2011. Urgent and emergency calls (N=269 558; 19.0%) were analysed by call factors and patient characteristics alongside symptom classification. Categorical data were analysed using the χ^2 test of independence with cross-tabulations used to test within-group differences.

Primary and secondary outcome measures: Urgent and emergency referrals to 999; accident and emergency or to see a general practitioner urgently, which are expressed as call rate per 100 persons per annum. Outcomes related to symptom variations by patient characteristics (age, gender, ethnicity and deprivation) alongside differences by patient characteristics of call factors (date and time of day).

Results: Urgent and emergency referrals varied by a range of factors relating to call, patient and symptom characteristics. For young children (0–4), symptoms related to 'crying' and 'colds and flu' and 'body temperature change' represented the significantly highest referrals to 'urgent and emergency' health services symptoms relating to 'mental health' alongside 'pain' and 'sensation disorders' represented the highest referrals to urgent and emergency health services for adults aged 40+ years.

Conclusions: This study has highlighted characteristics of 'higher likelihood' referrals to urgent and emergency care through the delivery of a national nurse-led telephone healthcare service. This research can help facilitate an understanding of how patients engage with both in and out of hours care and the role of telephone-based healthcare within the care pathway.

BACKGROUND

Understanding the characteristics of out-of-hours healthcare is essential to providing effective healthcare to patients.[1] Statistics suggest that there are over 100 million National Health Service (NHS) calls or visits a year related to urgent and emergency care in England alone.[2] In 2012/2013, there were in excess of 21.7 million accident and emergency (A&E) attendances, minor injury units and urgent and emergency care centres; however, 40% of these patients were discharged with no treatment needed,[3] suggesting they that could have been treated closer to their home.[4] Demand on overstretched services such as A&E are at an all-time high, with a recent report stating that A&E departments are in danger of 'falling down' within 6 months.[5]

NHS Direct was first established to meet this need. Introduced in 1998, NHS Direct symbolised an innovative UK development to modernise the NHS and to reduce demand on other NHS services.[6] NHS Direct provided 24 h/7-day a week nurse-led telephone-based healthcare advice and information to the public in England and Wales.[6] NHS Direct soon become a popular service, taking over 8 million calls/year by 2011, supported by high levels of satisfaction.[7]

NHS Direct helped to manage demand for urgent and emergency services (999, A&E and urgent general practitioner (GP) appointments) through the provision of highly skilled nurses to help assess and deal

with patients' clinical needs through the provision of clinical assessment.[8] However, the initial prediction that NHS Direct could reduce or limit the demand on other parts of the NHS, such as primary and emergency care, had been met with wide controversy.[9] Initial evaluations optimistically suggested in the pilot phase that NHS Direct had been effective in reducing the rise in demand for out-of-hours general practice. This was supported by prospective research which showed a reduction in urgent care referrals calls, with in excess of 40% of all calls without onward referral needed.[10] However, no evident effect was found on emergency services.[11]

Nonetheless, in 2011, the Royal Centre of General Practice argued the need for a 'whole system approach', outlining the need for urgent and emergency care pathways to provide the public in England with accessible, integrated and consistent urgent and emergency care.[2] A key component of the urgent and emergency care strategy was the national roll-out of NHS 111 which consequently replaced NHS Direct.[2] The new NHS 111 telephone-based service was introduced to simplify access to non-emergency healthcare through the provision of a memorable number —111—that is free to the caller.[12] The service, operated at the Clinical Commissioning Group (CCG) level, is designed to act as a 'filter' for all non-emergency (but urgent) calls, responding to non-life-threatening health requests where callers are unsure about what service they need, or if they need to access care out of hours.[12]

The more recent NHS 'transforming urgent and emergency care' report outlined the need to provide highly responsive urgent and emergency care service as close as possible to the patient's home. NHS 111 remains a core part of this vision through providing a modern entry point to the NHS and easy access to more integrated services as well as improving efficiency in the urgent and emergency care system by matching patient needs to the right service.[12] The expected benefit of the NHS 111 service is that it should improve the user experience through improved pathways, which are more integrated and accessible. However, the delivery model is distantly different from NHS Direct. For example, NHS Direct was primarily nurse-led, whereas NHS 111 is not. This reduction in expertise of the NHS 111 service consequently influences the type of advice that can be given.

While NHS Direct has been able to support in excess of 40% of all calls without onward referral needed,[10] the number of symptomatic calls referred to urgent and emergency care (999, A&E and GP urgent) has not been widely published. Previous research has analysed symptom variation of NHS Direct patients for older[13] and young people (0–15 years old);[14] however, no research has explored referral to urgent and emergency healthcare services across the national population. This research therefore aims to provide an advanced understanding of the patient, call and symptom characteristics of patients who have used NHS Direct and were referred to urgent and emergency healthcare services. This evidence is essential in understanding how different models of telephone-based healthcare can support the wider NHS specifically out-of-hours care.

METHODOLOGY
Data set and participants
NHS Direct anonymised call data (N=1 415 472) were extracted from the Computerised Assessment System (CAS)[i].[15] After excluding missing cases (N=30 015), there were a total of 1 385 457 calls, which were included in analysis. The population for the study was all calls made by, or on behalf of, patients in England who used NHS Direct for a symptomatic consultation using the telephone clinical assessment 0845 4647 service in England over a representative 1-year period, during the combined month periods of July 2010, October 2010, January 2011 and April 2011.

Figure 1 presents the care pathway of all calls made to NHS Direct. The health advisor prioritised all calls. Emergency calls were referred straight to 999 if deemed high priority. Alternatively, non-emergency calls were dealt with either through the provision of health information or, if necessary, referred to the call centre nurse advisor. Nurse-referred patients would be clinically assessed with the support of CAS to identify the most appropriate outcome for the patient.

Urgent and emergency calls were defined as any call referred to 999 (48 963; 3.5%), A&E (118 802; 8.6%) and GP urgent (101 793; 7.3%), which contributed to 269 558 calls and 19% of all calls made (figure 2). All non-urgent calls (1 115 899; 81%) were managed through the provision of self-care (386 428; 27.9%) and health information (159 113; 11.5%). Other calls were either referred to a primary care service via a routine (137 754; 9.9%) or a same day (167 017; 12.1%) appointment, or to dental services (41 972; 3%), pharmacists (11 953; 0.9%) or other non-specified services (211 662; 15.3%).

Variables
Call factors
The date and time of day were extracted for all calls. Time was first recoded into three categories: 23:00–06:59, 07:00–14:59 and 15:00–22:59. To determine variation of calls in and out of hours by referral outcome, out of hours was defined as a call within the parameter of 18.00–07.59. This also included all calls made on either a weekend or bank holiday.

Patient characteristics
Patient characteristics included age, gender, ethnicity and deprivation. Age was divided into six groups (0–4, 5–19, 20–29, 30–44, 45–59, 60+) to explore outcome and symptomatic differences. The Index of Multiple Deprivation (IMD) 2007 score was used as a deprivation measure and matched to postcode using Geo Convert

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[i]CAS is an evidence-based algorithm tool used by NHS Direct nurses to clinically assess patients to identify the most appropriate outcome for the patient.
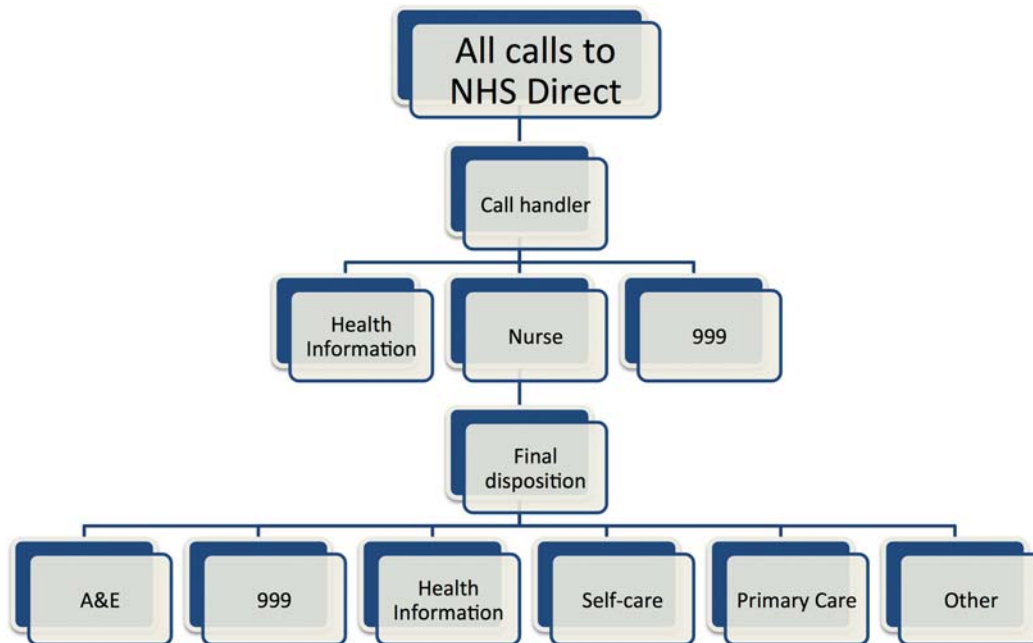
Figure 1 Care pathway through NHS Direct.

software. All IMD measures were divided into five deprivation quintiles, each quintile comprising 20% of the population of England. A lower IMD deprivation quintile indicates increasing deprivation. Ethnicity was routinely recorded for each individual patient and categorised in line with the 2001 census.[16]

Symptoms

Patient symptom were recoded into 24 groups according to the classification and definition of Medical Subject Headings (MeSH)[17] and have been previously applied

to NHS Direct data to look at symptom variation.[14] There were also two additional groups included 'colds and flu' and 'crying' because of the large volume of calls with symptoms specific to this category.

Statistical analysis

IBM SPSS V.21 software was used to analyse all data. Categorical data were analysed using the χ^2 test of independence with cross-tabulations used to test within-group differences where there was a large number of cell sizes included in the cross-tabulations. As a means to capture
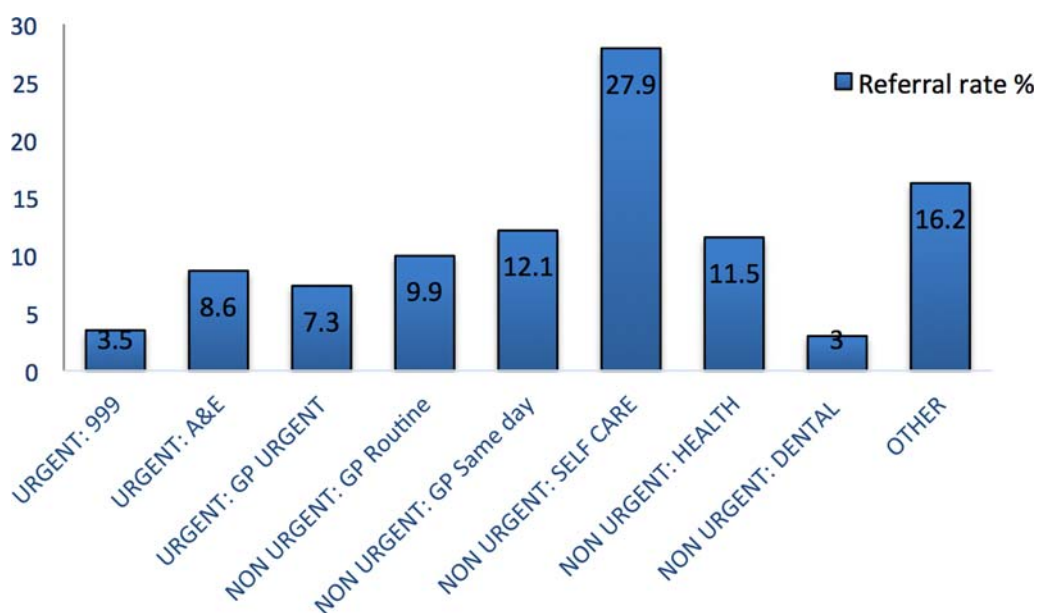

Figure 2 Disposition of all calls (%) made to NHS Direct in England during the combined month periods of July 2010, October 2010, January 2012 and April 2012.

which groups have significant differences within the analyses, standardised adjusted residuals were derived by dividing the standardised residual by the estimated SE calculated for each of the cells to determine the difference of contribution to the χ^2 test results.

RESULTS
Call factors
There were a total of 1 415 472 calls made. After excluding missing cases (N=30 015), there were a total of 1 385 457 calls of which 81% (N=1 115 899) were classified as non-urgent and emergency with the remaining 19% (N=269 558) classified as urgent and emergency.

Time of day
The χ^2 analysis confirmed that there was a significant interaction between the time of call and referral (urgent or non-urgent and emergency; χ^2=16 843.7, df=2, p<0.001), which held consistent across all age groups. Urgent and emergency referrals were least common between 23:00 and 06:59 and most frequently observed between 15:00 and 22:59. However, when compared with non-urgent referrals by time of day, both the 23:00–06:59 and the 15.00–22.59 time periods were significantly over-represented (p<0.001). This was consistent across all six age groups.

Bank holiday and weekends
The χ^2 analysis revealed that there was a significant interaction between urgency and calls which were made out of hours (χ^2(1)=1544.4, p<0.001). A total of 44% of referrals were made at weekends and bank holidays, although this was significantly more than expected (39.3). Conversely, for patients aged 0–4 years (−6.0), there were significantly less urgent and emergency referrals at the weekend or during bank holidays (p<0.001). No significant difference was found for boys and girls aged 5–19-years.

Patient characteristics
Age, gender and deprivation
Age and gender data were available for 1 312 226 (Males: 591 236; Females 720 990) patients. For males, urgent and emergency calls contributed to 21% of calls (N=124, 290), with the remaining 79% (N=466, 946) of calls classified as non-urgent and emergency. For calls for and on behalf of females, 20% (N=144, 816) were classified as urgent and emergency with the remaining 576, 174 (80%) classified as non-urgent and emergency. The χ^2 analysis revealed a significant interaction between age and urgency of referral (χ^2(5)=2904.1, p<0.001), which held consistent by gender. The results suggested that males (13.2) were more likely to be referred to urgent and emergency care compared to females (−13.2) (χ^2(1)=174.9, p<0.001).

There were also age differences noted. For example, both males (23.7) and females (15.2) were significantly more likely to be classified as urgent and emergency.

Male patients aged 5–19 (4.1) and female patients aged 0–4 (2.8) were more likely to be classified as urgent and emergency. Similarly, male and female patients aged 60 years and older were more likely to be classified as urgent and emergency with residuals of 34.7 and 31.2, respectively. Conversely, calls for and on behalf of male patients aged 20–39 (−23.0) and female patients aged 20–39 (−21.0) were more likely to be classified as non-urgent and emergency (p<0.001; table 1).

Level of IMD 2010 deprivation (linked by unit postcode) and gender was available for 1 305 597 (Males: 587 446; Females: 718 151) patients. The χ^2 analysis revealed a significant interaction between deprivation and if the referral was urgent and emergency or non-urgent and emergency (χ^2(4)=153.5, p<0.001), which held consistent across gender. Standardised residuals confirmed that both male (5.4) and female patients (10.4) who had the highest level of deprivation (IMD quintile 1) were more likely to be referred for urgent and emergency care (p<0.001) compared to the least deprived (IMD quintile 5), who were more likely to be classified as non-urgent and emergency, which remained consistent for both males (−3.5) and females (−6.5) (p<0.001; table 2).

Ethnicity was analysed by age group and if the call was classified as 'urgent and emergency' or 'non-urgent and emergency'. A χ^2 test was performed and identified a significant interaction between urgency and ethnicity (χ^2(15) =1013. 2, p<0.001), which remained consistent across all age groups. Standardised residuals suggested for calls on behalf of children aged 0–4 years of White British (6.7) and Bangladeshi (3.2) ethnic groups were significantly more likely to be referred as needing urgent and emergency care. However, children characterised as Indian (−7.7) and White (other) (−7.2) were least likely to be referred to urgent and emergency care. For older patients (60 years+), those who were characterised as Bangladeshi (3.0) were most likely to be signposted to urgent and emergency care, White (other) (−3.4) were least likely to be referred to urgent and emergency services (table 3).

Symptom classification
Cross-tabulation was completed for each symptom classification to determine the standardised adjusted residuals between age groups for all patients who had an urgent and emergency outcome (table 4). The χ^2 analysis revealed a significant interaction between symptom and age group (χ^2(22)=35.054.8, p<0.001), which held consistent across gender.

Findings revealed that calls on behalf of young children (0–4 years) were most likely to be an urgent and emergency referral for symptoms relating to 'sleep problems' (92.1), 'crying' (165.1)[ii], 'colds and flu' (29.0)

[ii]'Crying' is a generic 'catch all' algorithm used in CAS for all young babies. It is also worth noting that for very young babies all symptomatic calls were face to face referrals in an urgent referral time scale.

Table 1 Referral outcome (urgent and non-urgent) by age and gender

| | Males | | | | | | | | Females | | | | | | | |
| | Urgent | | | | Non-urgent | | | | Urgent | | | | Non-urgent | | | |
Age	Total	Per cent	R	Sig	Total	Per cent	R	Sig	Total	Per cent	R	Sig	Total	Per cent	R	Sig
0–4	27 411	22.1	1.1	NS	102 323	21.9	−1.1	NS	25 386	17.5	2.8	***	99 188	17.2	−2.8	***
5–19	16 458	13.2	4.1	***	59 797	12.8	−4.1	NS	18 202	12.6	0.7	NS	72 027	12.5	−0.7	***
20–29	20 035	16.1	−23.0	***	88 540	19.0	23.0	***	29 143	20.1	−21.0	***	130 698	22.7	21.0	***
30–39	15 248	12.3	−15.2	***	65 061	13.9	15.2	***	20 218	14.0	−12.8	***	88 180	15.3	12.8	***
40–59	21 877	17.6	−0.7	NS	82 589	17.7	0.7	***	25 524	17.6	1.8	NS	100 385	17.4	−1.8	NS
60+	23 261	18.7	34.7	***	68 636	14.7	−34.7	***	26 343	18.2	31.2	***	85 696	14.9	−31.2	***

***p<0.001; **p<0.01; *p<0.05; NS p>0.05.

Table 2 Referral outcome (urgent and non-urgent) by IMD quintile and gender

| | Males | | | | | | | | Females | | | | | | | |
| | Urgent | | | | Non-urgent | | | | Urgent | | | | Non-urgent | | | |
IMD	Total	Per cent	R	Sig	Total	Per cent	R	Sig	Total	Per cent	R	Sig	Total	Per cent	R	Sig
1	24 210	19.8	5.4	***	88 752	19.1	−5.4	***	29 150	20.4	10.4	***	110 301	19.2	−10.4	***
2	23 010	18.8	−0.4	NS	87 571	18.8	0.4	NS	27 173	19.0	.9	NS	108 780	18.9	−0.9	NS
3	25 061	20.5	−1.2	NS	95 906	20.6	1.2	NS	29 348	20.5	0.0	NS	118 097	20.5	0.0	NS
4	26 110	21.3	−0.2	NS	99 282	21.4	0.2	NS	29 957	21.0	−4.6	***	123 778	21.5	4.6	***
5	24 073	19.7	−3.5	***	93 471	20.1	3.5	***	27 302	19.1	−6.5	***	114 265	19.9	6.5	***

***p<0.001; **p<0.01; *p<0.05; NS p>0.05 (1 is the most deprived and 5 is the least deprived)
IMD, Index of Multiple Deprivation.

Table 3 Referral outcome by ethnicity and age

Ethnicity	0–4				5–19				20–29				30–39				40–59				60+			
	Total (N)	Percentage of REF	R	Sig	Total (N)	Percentage REF	R	Sig	Total (N)	Percentage of REF	R	Sig	Total (N)	Percentage of REF	R	Sig	Total (N)	Percentage of REF	R	Sig	Total (N)	Percentage of REF	R	
White British	39 613	82.3	6.79	***	26 890	87.4	15.2	***	37 087	84.8	18.0	***	26 084	83.0	11.2	***	36 165	89.0	7.5	***	38 490	92.9	1.9	NS
White Irish	131	0.3	−1.9	NS	99	0.3	−0.9	NS	231	0.5	−2.0	*	232	0.7	−0.9	NS	320	0.8	−1.5	NS	521	1.3	1.1	NS
White: other	1305	2.7	−7.2	***	502	1.6	−7.0	***	1327	3.0	−11.0	***	1339	4.3	−7.3	***	907	2.2	−3.7	***	696	1.7	−3.4	***
Mixed: Caribbean	598	1.2	0.7	NS	278	0.9	−2.0	*	273	0.6	−1.6	NS	131	0.4	−1.2	NS	123	0.3	−0.4	NS	34	0.1	−0.7	NS
Mixed: African	425	0.9	1.5	NS	186	0.6	−1.1	NS	178	0.4	−1.1	NS	83	0.3	−1.8	NS	86	0.2	−0.3	NS	18	0.0	−0.3	NS
Mixed: Asian	475	1.0	−0.2	NS	183	0.6	−2.1	***	161	0.4	−1.6	NS	116	0.4	−0.2	NS	80	0.2	−1.7	NS	27	0.1	−0.9	NS
Mixed: Other	1090	2.3	−1.8	NS	464	1.5	0.3	NS	374	0.9	−1.5	NS	219	0.7	−0.2	NS	159	0.4	−1.6	NS	50	0.1	−0.9	NS
Asian: Indian	1001	2.1	−7.7	***	507	1.6	−6.9	***	926	2.1	−9.7	***	908	2.9	−5.2	***	778	1.9	−3.3	***	520	1.3	0.0	NS
Asian: Pakistani	1157	2.4	1.8	***	574	1.9	−3.1	**	976	2.2	−4.7	***	682	2.2	−1.8	NS	554	1.4	0.0	NS	276	0.7	0.5	NS
Asian: Bangladeshi	337	0.7	3.2	**	132	0.4	−3.1	**	245	0.6	−2.2	*	161	0.5	−0.3	NS	117	0.3	2.8	*	82	0.2	3.0	**
Asian: other	421	0.9	−1.52	NS	150	0.5	−6.9	***	346	0.8	−4.0	***	296	0.9	−3.0	**	224	0.6	34.6	***	130	0.3	−0.6	NS
Black: Caribbean	353	0.7	0.0	NS	278	0.9	−2.0	*	451	1.0	−0.8	NS	277	0.9	−1.6	NS	406	1.0	−3.2	**	219	0.5	1.2	NS
Black: African	494	1.0	0.4	NS	197	0.6	−5.8	***	437	1.0	−2.8	*	337	1.1	−2.8	*	240	0.6	−2.3	*	58	0.1	−0.3	NS
Black: other	171	0.4	0.8	NS	93	0.3	−2.6	*	148	0.3	−1.6	NS	94	0.3	−1.0	NS	109	0.3	−1.4	NS	34	0.1	0.1	NS
Chinese	102	0.2	−2.1	*	43	0.1	−2.3	*	96	0.2	−5.2	***	100	0.3	−1.6	NS	50	0.1	−2.9	**	39	0.1	0.0	NS
Other	458	1.0	−2.8	**	194	0.6	−4.7	***	464	1.1	−4.3	***	374	1.2	−3.0	**	320	0.8	−1.7	NS	217	0.5	−0.4	NS
Total	48 131	100			30 770	100			43 720	100			31 433	100			40 638	100			41 411	100		

*p<0.05; **p<0.01; ***p<0.001; NS, not significant at p>0.05.

Table 4 Urgent outcome by age of patient and symptom classification

Symptom	0–4				5–19				20–29				30–39				40–59				60+			
	Total (N)	Percentage of REF	R	Sig	Total (N)	Percentage of REF	R	Sig	Total (N)	Percentage of REF	R	Sig	Total (N)	Percentage of REF	R	Sig	Total (N)	Percentage of REF	R	Sig	Total (N)	Percentage of REF	R	Sig
Pain	744	2.9	−98.1	***	3300	29.2	7.2	***	5784	35.9	30.0	***	4222	36.5	26.4	***	6444	38.6	26.4	***	5352	31.3	16.2	***
Digestive	1306	5.2	−0.5	***	379	3.3	−9.6	***	857	5.3	.5	NS	562	4.9	−1.9	NS	861	5.2	−0.5	NS	1165	6.8	10.3	***
Respiratory Tract	3269	12.9	26.9	***	1070	9.5	2.6	*	843	5.2	−17.5	***	618	5.3	−14.0	***	987	5.9	−14.5	***	1848	10.8	10.2	***
Wounds and injuries	2872	11.4	−8.0	***	2315	20.5	25.9	***	2133	13.2	1.8	NS	1566	13.5	2.5	**	2007	12.0	−3.3	***	1661	9.7	−13.3	***
Sensation disorders	138	0.5	−33.3	***	263	2.3	−8.8	***	718	4.5	2.2	NS	608	5.3	6.4	***	1062	6.4	15.8	***	1271	7.4	23.8	***
Urogenital Disorders	5	0.0	−27.8	***	145	1.3	−8.2	***	566	3.5	11.6	***	366	3.2	6.9	***	430	2.6	3.0	**	708	4.1	18.2	***
Medicine enquiries	29	0.1	−17.3	***	64	0.6	−7.2	***	113	0.7	−5.2	***	115	1.0	−1.0	NS	268	1.6	7.1	***	479	2.8	23.8	***
Dental Problems	88	0.3	−18.4	***	161	1.6	0.3	NS	444	2.8	12.8	***	308	2.7	9.7	***	393	2.4	8.6	***	152	0.9	−8.1	***
Mental health	7	0.0	−42.2	***	355	3.1	−8.2	***	1006	6.2	7.7	***	882	7.6	13.6	***	1384	8.3	21.1	***	1298	7.6	16.9	***
Poisoning and overdose	1295	5.1	−1.3	NS	1146	10.1	27.1	***	995	6.2	5.5	**	575	5.0	−1.6	***	714	4.3	−6.4	***	453	2.7	−16.9	***
Skin/hair/nails	100	0.4	−9.8	***	94	0.8	−2.7	**	205	1.3	5.6	NS	150	1.3	4.9	***	222	1.3	6.1	***	106	0.6	−4.2	***
Diabetes	3	0.0	−12.7	***	29	0.3	−3.6	***	29	0.2	−6.3	***	59	0.5	0.2	NS	133	0.8	6.1	***	234	1.4	17.9	***
Body temp change	1307	5.2	25.2	***	533	4.7	12.8	***	271	1.7	−10.0	***	177	1.5	−9.2	***	231	1.4	−12.7	***	307	1.8	−9.3	***
Heart disorders	2	0.0	−26.7	***	109	1.0	−7.8	***	383	2.4	3.1	***	278	2.4	2.8	**	547	3.3	12.1	***	703	4.1	20.8	***
Muscular disorders	19	0.1	−18.0	***	114	1.0	−2.5	*	147	0.9	−2.3	*	122	1.1	−0.3	NS	268	1.6	7.1	***	394	2.3	17.0	***
Falls	1	0.0	−7.0	***	5	0.0	−2.9	**	4	0.0	−4.5	***	12	0.1	−1.4	NS	13	0.1	−2.7	*	114	0.7	19.0	***
Fatigue	0	0.0	−4.1	***	0	0.0	−3.3	***	1	0.0	−2.7	**	1	0.0	−2.1	*	10	0.1	0.7	NS	36	0.2	10.5	***
Sleep problems	3125	12.4	92.1	***	166	1.5	−14.7	***	1	0.0	−25.9	***	1	0.0	−21.3	***	3	0.0	−26.3	***	3	0.0	−26.7	***
Lumps	44	0.2	−1.0	***	12	0.1	−2.3	*	38	0.2	1.2	***	33	0.3	2.3	***	41	0.2	1.5	NS	26	0.2	−1.5	NS
Neurological disorders	128	0.5	−7.9	***	128	1.1	6.6	***	186	1.2	3.5	*	102	0.9	−0.4	NS	142	0.9	−0.9	NS	208	1.2	4.6	***
Pregnancy	0	0.0	−22.1	***	146	1.3	0.6	NS	754	4.7	38.5	***	419	3.6	21.5	***	64	0.4	−12.4	***	0	0.0	−17.2	***
Colds and Flu	2147	8.5	29.0	***	755	6.7	12.1	***	636	3.9	−7.0	***	385	3.3	−9.0	***	470	2.8	−14.5	***	562	3.3	−11.6	***
Crying	8641	34.2	165.1	***	6	0.1	−35.3	***	0	0.0	−43.2	***	0	0.0	−35.6	***	0	0.0	−44.1	***	0	0.0	−44.7	***
Total	25271	100			11315	100			16114	100			11561	100			16694	100			17080	100		

*p<0.05; **p<0.01; ***p<0.001; NS, not significant at p>0.05.

and 'body temperature change' (25.2) and symptoms classified as 'respiratory tract' (26.9; p<0.001). Highest referrals for urgent and emergency care were for patients aged 5–19 years with symptoms related to 'poisoning and overdose' (27.1), 'wounds and injuries' (25.9), 'body temperature change' (12.8) and 'colds and flu' (12.1; p<0.001). Patients aged 20–29 were more likely to be referred to urgent and emergency care if the symptoms were classified as 'pregnancy' (38.5; p<0.001), 'pain' (30.0; p<0.001), 'urogenital disorder' (11.6; p<0.001) and 'dental problems' (12.8; p<0.001), with a similar pattern found for patients aged 30–39 with highest referrals shown for 'pain' (26.4), 'pregnancy' (26.5), dental (9.7) and 'urogenital disorders' (6.9; p<0.001).

The highest urgent and emergency referrals for patients aged 40–59 years were related to symptoms classified as pain (26.4), sensation disorders (15.8), mental health (21.1) and heart disorders (12.1; p<0.001). For all older adults, patients aged 60+ years, highest urgent and emergency referrals were found for symptoms categorised as sensation disorders (23.8), muscular disorders (17.0) mental health (16.9; p<0.001), falls (19.0), diabetes (17.9) and pain (16.2).

DISCUSSION

A total of 269 558 patients were signposted to access urgent and emergency healthcare, which accounted for 19% of all cases. These referrals varied by a range of factors relating to call, patient and symptom characteristics. The highest number of urgent and emergency calls related to those received between the hours 15:00 and 22:59 and this finding held across all age groups. It was also observed that urgent calls during this time period as well as those between 23:00 and 06:59 were significantly higher than expected by chance. Similarly, urgent and emergency calls were significantly more likely on weekends and bank holidays, although this result only held for adult age groups. The findings also revealed a variation of urgency referral by age, ethnicity and level of deprivation, with calls relating to patients who are older, White British and Bangladeshi and who reside in a deprived area being those most likely to be signposted to urgent and emergency healthcare. Symptom classifications related to urgent and emergency referrals varied as expected by age group.

The highest referral symptoms for young children (0–4 years) included 'crying' and 'colds and flu', a finding which supports previous research,[14] and remains consistent with emergency admissions.[18] Smith[19] argues that parents of persistently crying babies need instant reassurance and support to cope. NHS Direct was able to provide parents with a wide range of symptoms through the provision of health information and self-care. It may be that NHS Direct nurses were well placed through their clinical knowledge to provide this level of reassurance, a feature not present in NHS 111. Nonetheless, it provides useful information about service planning for similar telephone-based services.

Symptoms relating to 'mental health' represented one of the highest referral symptoms to urgent and emergency health services for all adults aged 40+ years. Individuals with common mental health problems (CMHP) represent both a vulnerable and resource intensive group, whom account for 25% of all ill health.[20] Further, this subgroup is associated with higher levels of emergency department attendances alongside outpatient and inpatient episodes.[21] However, despite this, it is estimated that 75% of those with a CMHP receive no treatment or support.[22] Therefore, to reduce the burden on already overstretched services, both service providers and policymakers should take account of this vulnerable subgroup within the out-of-hours care pathway to endeavour to meet their service needs.

Telephone-based healthcare has been presented as not only a cost-effective way to increase healthcare accessibility but also a socially accepted integration delivery system that has become indispensable within healthcare practice.[23] Telephone driven healthcare services have gained popularity internationally with countries now such as the USA,[24] New Zealand,[25] Australia,[15 16] Hong Kong,[23] Canada[26 27] and Europe[6 28] taking an international lead. Thus, the view of telephone triage has also changed dramatically, from a supplementary means of medical practice to a complementary service located within international health policy.[29 30] It has therefore become increasingly important to determine how nurse-led telephone healthcare can support urgent and emergency care, in the UK and worldwide.

However, some limitations are noteworthy. While the data available were representative of the national population (N=1 415 472), missing data did represent an issue that varied across the analysis. Missing data relating to referral by day and time of day (6.43%; N=90 952), age and gender (7.29%; N=103 246), and deprivation and gender (7.75%; 109 696) was markedly less than 10%. Missing data for ethnicity were markedly higher, with 15.69% (N=222 030) of cases missing and consequently excluded from analysis. However, only 1.35% (N=8809) of these missing cases would have met the exclusion criteria.

Symptom classification represented the highest level of missing data with 52.62% (N=744 802), which may be due to no algorithms being launched in CAS. A secondary reason for the missing data could be attributable to calls that require health information and medication advice where symptomatic algorithms do not need to be followed. From the remaining 650 372, 62.27% (N=424 477) were classified as 'quick calls', that is, calls which were handled by the health advisor whereby no further action is needed and would not have met the inclusion criteria. A detailed validation was performed on the remaining cases (N=225 895), whereby symptom classification was only missing for 10.85% (N=70 579) of cases.

A further limitation is where data do not capture if the patient adhered to the referral and followed the

NHS Direct advice. Nonetheless, there is a surge of evidence which suggests high levels of compliance of advice given, with earlier research suggesting that 85% of callers complied with all advice given, and a further 13% with some of it[31] comparable with other studies of compliance with telephone healthcare advice.[9][32–34] Moreover, intentional non-compliance has been strongly related to lower urgency with 100% and 92% of compliance shown for 999 and A&E, respectively.[34]

CONCLUSION

This research provides useful information to policy-makers to help manage the demand of the population in England, which can help facilitate an understanding of how patients engage with both in and out of hours care, and the role of telephone-based healthcare. This research highlights characteristics of a 'higher likelihood' of referrals to urgent and emergency care and identifies how a nurse-led service referred patents to urgent and emergency services. Analysis of NHS 111 call data is now essential in understanding how a non-clinically led telephone service varies in patient referrals, as well as the effectiveness of this service within the urgent and emergency care pathway. The authors further suggest that a more targeted approach is required to educate the public about how to use urgent and emergency care services.

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