ABSTRACT

Objectives: National Health Service (NHS) Direct provides 24/7 expert telephone-based healthcare information and advice to the public in England. However, limited research has explored the reasons to why calls are made on behalf of young people, as such this study aimed to examine call rate (CR) patterns in younger people to enable a better understanding of the needs of this population in England.

Setting: NHS Direct, England, UK.

Participants and methods: CRs (expressed as calls/100 persons/annum) were calculated for all calls (N=358 503) made to NHS Direct by, or on behalf of, children aged 0–15 during the combined four ‘1-month’ periods within a year (July 2010, October 2010, January 2011 and April 2011). χ² Analysis was used to determine the differences between symptom, outcome and date/time of call.

Results: For infants aged <1, highest CRs were found for ‘crying’ for male (n=14, 440, CR=13.61) and female (n=13 654, CR=13.46) babies, which is used as a universal assessment applied to all babies. High CRs were also found for symptoms relating to ‘skin/hair/nails’ and ‘colds/flu/sickness’ for all age groups, whereby NHS Direct was able to support patients to self-manage and provide health information for these symptoms for 59.7% and 51.4% of all cases, respectively. Variations in CRs were found for time and age, with highest peaks found for children aged 4–15 in the 15:00–23:00 period and in children aged <1 in the 7:00–15:00 period.

Conclusions: This is the first study to examine the symptoms and outcome of calls made to NHS Direct for and on behalf of young children. The findings revealed how NHS Direct has supported a range of symptoms through the provision of health information and self-care support which provides important information about service planning and support for similar telephone-based services.

BACKGROUND

National Health Service (NHS) Direct introduced in 1997 provides 24/7 expert telephone-based healthcare advice and information which has aimed to support the public to care for themselves at home or access appropriate healthcare. However, following the recent white paper ‘Equity and Excellence: Liberating the NHS’ and Lord Darzi’s report ‘High Quality Care for All’, the way the public access healthcare information, advice and services on the telephone is set to change, with NHS Direct’s telephone service (08 454 647) being replaced by NHS 111 in England. The new ‘111’ service similar to NHS Direct provides 24/7 telephone-based health; however, marked differences focus on it being a free-to-call service, acting as a first port of call for all urgent but not emergency calls in an attempt to make it easier for the public to access local health services in and out of hours.

Children continue to represent one of the highest users of healthcare, for general practitioner (GP) consultations and hospital admissions with research suggesting that two-thirds of hospital admissions for children aged under five. This trend has steadily increased over the past 10 years with increased admissions of children aged <1 and 1–4 by 52%.

Strengths and limitations of this study

This is the first study to examine the symptoms and outcome of calls made to NHS Direct for and on behalf of young children (0–15).

National call data across four 1-month periods (July 2010, October 2010, January 2011 and April 2011) were linked to population statistics to determine symptom variations by the rates of calls/100 person/annum.

While patient data provide important information about the patient, they do not take into account the characteristics of the caller.

While this study uncovers the analysis of over 342 000 paediatric patients, there was a large sample of calls removed from the analysis (N=100 390) for symptom classifications, as these were dealt with by the front-end health advisor.


BMJ Open Young people’s use of NHS Direct: a national study of symptoms and outcome of calls for children aged 0–15

E J Cook, G Randhawa, S Large, A Guppy, A M Chater, D Pang

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Children continue to represent one of the highest users of healthcare, for general practitioner (GP) consultations and hospital admissions with research suggesting that two-thirds of hospital admissions (68%, 500 935 of 738 805) were for children aged under five. This trend has steadily increased over the past 10 years with increased admissions of children aged <1 and 1–4 by 52%.

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While this study uncovers the analysis of over 342 000 paediatric patients, there was a large sample of calls removed from the analysis (N=100 390) for symptom classifications, as these were dealt with by the front-end health advisor.

and 25%, respectively. However, NHS Direct has become a good way to support this population through its increased popularity with research highlighting that the highest users of this service are on behalf of children under five contributing to nearly 25% of all calls.

However, while children are the highest users of NHS Direct, there has been limited research that has explored how this subgroup has engaged with this service. With the opportunity of using NHS Direct call data, the present study aims to examine call rate (CR) differences in symptoms of younger people (0–15) who have used this service, additionally exploring the impact of age and gender on uptake. Moreover, this study aims to investigate the outcome of how these symptoms are managed in this subgroup which will provide useful information to current policy-makers to know how the NHS better manages demand for healthcare following the ongoing interest to manage non-urgent emergency admission.

METHODOLOGY
Dataset and participants
NHS Direct calls (N=358 503) were extracted from the computerised assessment system (CAS) which is used to enable the nurse and health advisor to support and record consultations with patients. The sample in this research is all calls about children aged 0–15 who used NHS Direct for a symptomatic consultation using the core health and information telephone advice line (08 454 647) in England over a 1-year period, during the combined month periods of July 2010, October 2010, January 2011 and April 2011.

Variables
Date and time of day
The data included the date and time of day of the call and were recoded into three categories: day (7:00–15:00), evening (15:00–23:00) and night (23:00–7:00). Calls were also calculated to identify whether they were a normal working day or a weekend/bank holiday.

Age
The threshold of age taken followed previous research that has focused on young cohorts. Children’s ages were divided into three groups (<1, 1–3 and 4–15 years) to take into account school age as well as to explore symptomatic differences between the large number of calls on behalf of young children (0–3) which together represent 66.2% of all childhood calls.

Gender
The gender of the patient of the calls was taken to look at gender differences in relation to symptom and outcome. Gender was analysed for 342 641 patients, with 15 862 missing cases where gender was not reported. There were 50.8% (N=173 982) of calls for or on behalf of male patients with the remaining 49.2% (N=168 659) for or on behalf of female patients.

Symptom classification
The symptoms logged were categorised into 14 groups (see table 3) according to the classification and definition of medical subject headings (MeSH) and have been previously applied to NHS Direct data. However, there was one additional group added which included ‘colds and flu’ because of the large volume of calls with symptoms that were specific to this category. Symptom classifications logged were analysed for 258 113 patients, whereby there were 100 390 missing cases which were excluded from analysis. Missing data reflect that are closed by the front-end advisor as they are related to simple quick-health information-related calls that do not warrant a symptom classification or to be discussed with a nurse advisor.

Outcome of calls
Following the assessment by nurses (supported using the CAS), patients are given an outcome following their call. The outcome of calls was categorised into 11 groups: self-care, GP urgent, GP same day, GP routine, health/medication information, accident and emergency service (A&E), 999, community, walk in centre, dental and other (see table 1).

STATISTICAL METHODS
Descriptive statistics were used to examine the use of NHS Direct. To facilitate data analysis and reporting, variables were categorised into appropriate groups. Rates of calls/100 persons/annum were calculated to measure the call usage using population estimates based on the Office for National Statistics (ONS) population projections for England.

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Table 1 Definitions of outcome

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Description</th>
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<tbody>
<tr>
<td>Self-care</td>
<td>Advice given on how to look after the problem</td>
</tr>
<tr>
<td>GP urgent</td>
<td>Seek urgent appointment with GP</td>
</tr>
<tr>
<td>GP same day</td>
<td>Seek appointment with GP on the same day</td>
</tr>
<tr>
<td>GP routine</td>
<td>Seek next available appointment with GP</td>
</tr>
<tr>
<td>Information</td>
<td>Either information given over telephone or leaflets posted</td>
</tr>
<tr>
<td>A&amp;E</td>
<td>Advised to attend accident and emergency appointment</td>
</tr>
<tr>
<td>999</td>
<td>Call directed to 999</td>
</tr>
<tr>
<td>Community</td>
<td>Referred to community service (includes pharmacy, mental health services, social services and community nursing)</td>
</tr>
<tr>
<td>Dental</td>
<td>Referred to a dental service</td>
</tr>
<tr>
<td>Walk-in-centre</td>
<td>Advised to attend a local walk-in-centre</td>
</tr>
<tr>
<td>Other</td>
<td>Aborted calls, no action required and also where the agency referred to is not specified</td>
</tr>
</tbody>
</table>

A&E, accident and emergency service; GP, general practitioner.
on the 2006 single-age population statistics which were revised using 2011 census data.\textsuperscript{17} \(\chi^2\) Test with adjusted standardised residuals (ASRs) was carried out to compare between-group differences for outcome alongside age and time of day.

Cross-tabulations (\(\chi^2\) tests) were used to test outcome differences by symptom classification. Missing responses were excluded on an analysis-by-analysis basis (ie, total responses included will vary across analyses). With a large number of cell sizes for some of the cross-tabulations, it can be difficult to determine which groups have significant differences within the analyses; therefore, ASRs were calculated for each of the cells in order to determine which cell differences contribute to the \(\chi^2\) test results. All statistical analyses were carried out using SPSS.

**RESULTS**

**Age, gender and symptoms**

For male patients, CR for the population of children was analysed according to the symptom classification and age groupings (table 2). For children aged <1, the highest CR was for ‘crying’ for male (n=14 440, CR=13.61) and female (n=13 654, CR=13.46) children, alongside ‘digestive problems’ for male (n=3976, CR=3.75) and female (n=3637, CR=3.58) children, and ‘skin/hair/nails’ for male (n=3887, CR=3.66) and female (n=3864, CR=3.81) children. This was also supported for ‘colds/flu/sickness’ for male (n=3765, CR=3.55) and female (n=3861, CR=3.63) children, all demonstrating a higher CR. However, CR for ‘body temperature’ (n=3238, CR=3.04) was substantially higher for male patients than for female patients (n=6323, CR=2.19).

CR decreased with increasing age. For ages 1–3, CR was highest (excluding other) for ‘skin/hair/nails’ for male (n=6853, CR=2.26) and female (n=6531, CR=2.26) children, alongside body temperature change for male (n=6378, CR=2.10) and female (6329, CR=2.19) children. Lowest CRs for both genders were ‘neurological disorders’, ‘crying’ and ‘lumps’. For ages 4–15, CR continued to decrease; however, highest CRs aside from ‘other’ were found for ‘pain’ for male (n=5415, CR=0.43) and female (n=5571, CR=0.44) children, ‘wounds and injuries’ for male (n=4742, CR=0.35) and female (n=4238, CR=0.35) children and ‘skin/hair/nails’ for male (n=4025, CR=0.32) and female (n=3906, CR=0.32) children.

**Symptom and outcome**

Figure 1 presents all outcomes for all three age groups. The highest percentage of calls across all age groups were given health information and/or self-care advice, suggesting that a combined 47% of all calls made on behalf of children aged <1, 48.7% of calls on behalf of children 1–3 and 43.9% of all calls made by or on behalf of children aged 4–15 were managed with no onward referral needed. For children aged <1, only 7% of calls were forwarded to A&E, which was markedly higher for children aged 1–3 (12.3%) and for children aged 4–15 (13.5%). However, for GP outcomes (urgent/same day/routine), this was higher for children aged <1 (30%) than for children aged 1–3 (24.5%) and 4–15 (23.5%).

For each symptom, cross-tabulation was completed to determine the ASRs between groups for outcome (table 3). ‘Dental’ and ‘mental health’ were excluded due to the small number of cases. \(\chi^2\) Analysis confirmed that there was a significant interaction between symptom × outcome for male (\(\chi^2=7141.77, df=1,20; p<0.001\)) and female (\(\chi^2=633 157, df=1,20; p<0.001\)) children. However, as there was little variation, this was reported for both genders combined for all ages (\(\chi^2=1 320 913, df=1,20; p<0.001\)).

The symptoms which contributed to the highest number for urgency was ‘respiratory tract’ (n=840, 5.1%, ASR=32.7) and ‘neurological disorders’ (n=51, 8.4%, ASR=12.1) with the highest number of outcomes being 999. There were a range of symptoms which required the highest number for GP referral outcome. These symptoms included ‘crying’ (n=5473, 16.5%, ASR=84.8) and ‘pain’, where the highest outcome was GP urgent (n=1536, 12%, ASR=28.9). Both ‘sensation disorders’ (n=1399, 23.4%, ASR=26) and ‘lumps’ (n=424, 33.6%, ASR=23.2) showed GP routine as the highest outcome. Finally, ‘urogenital disorders’ (n=935, 31.3%, ASR=25.6), ‘body temperature change’ (n=4913, 23%, ASR=35.3) and ‘digestive problems’ (n=2938, 19.3%, ASR=16) all had the highest outcome of GP same day.

NHS Direct supported a wide range of callers to self-manage their symptoms; the health information was the highest recorded outcome for these calls. These symptoms included ‘poisoning and overdose’ (low-risk unintentional overdose with low-toxic substance), where the highest number for outcome was self-care (n=5458, 56.6%, ASR=42.4%) and health information (n=1930, 20%, ASR=23.4). This was similar for ‘skin/hair/nail’, where the highest number for outcome was also self-care (n=12526, 62.6%, ASR=29.9) as did ‘wounds and injuries’ (n=7928, 33.6%, ASR=7.5). For ‘colds and flu/sickness’, the number for outcome of the outcome was for health information (n=4156, 16.9%, ASR=22.7).

**Time and date of call**

There was a significant interaction between age and date of call, that is, whether the call was on a bank holiday or on a weekend compared with a normal working day (\(\chi^2=14.83, df=2,1; p<0.001\)). From the total number of calls (N=342 641), 59.7% (N=20 671) were made on a weekday with the remaining 40.3% (N=137 970) of calls made on a weekend or bank holiday during GP closure days, this finding remains consistent across the three age groups. To identify which cell differences contribute to the \(\chi^2\) test results, ASRs were calculated for each of the cells. It was found that for calls taken during weekdays represented the highest number of calls made on behalf of children aged <1 (n=55271, 27%, ASR=2.8); however,
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CR, call rate.
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<th>Symptom</th>
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<th>A&amp;E</th>
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<th>Health information</th>
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<th>GP same day</th>
<th>GP urgent</th>
<th>Community</th>
<th>Walk-in-centre</th>
<th>Total</th>
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<td>Pain</td>
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<td>7.1</td>
<td>9 0.1</td>
<td>1257</td>
<td>9.7</td>
<td>3356 25.9</td>
<td>484</td>
<td>3.7</td>
<td>1901 14.6</td>
<td>2722 21.0</td>
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<td>381</td>
<td>2.5</td>
<td>1 0.0</td>
<td>2419</td>
<td>15.8</td>
<td>4800 31.5</td>
<td>810</td>
<td>5.3</td>
<td>2539 16.6</td>
<td>2938 19.3</td>
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<td>0 0.0</td>
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<td>3286 20.1</td>
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<td>5477</td>
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<td>2322</td>
<td>11.3</td>
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<td>1066 5.2</td>
<td>1053 5.1</td>
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<td>3</td>
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<td>6 0.1</td>
<td>709</td>
<td>12.4</td>
<td>1465 25.6</td>
<td>448</td>
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<td>912 15.9</td>
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<td>61</td>
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<td>108 3.6</td>
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<td>1.6</td>
<td>1694</td>
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<td>2 0.0</td>
<td>1930</td>
<td>20.0</td>
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<td>Skin/hair/nail</td>
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<td>1053</td>
<td>3.6</td>
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<td>4859</td>
<td>16.7</td>
<td>12 526 43.2</td>
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<td>95</td>
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<td>170</td>
<td>13.5</td>
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<tr>
<td>Neurological disorders</td>
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<td>8.4</td>
<td>94</td>
<td>15.4</td>
<td>0 0.0</td>
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<td>4.3</td>
<td>65 10.7</td>
<td>22</td>
<td>3.6</td>
<td>96 15.8</td>
<td>168 27.6</td>
</tr>
<tr>
<td>Colds and flu/sickness</td>
<td>223</td>
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<td>1651</td>
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<td>5 0.0</td>
<td>4156</td>
<td>16.9</td>
<td>8497 34.5</td>
<td>504</td>
<td>2.0</td>
<td>3335 13.5</td>
<td>4827 19.6</td>
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<tr>
<td>Crying</td>
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<td>3.5</td>
<td>2810</td>
<td>8.5</td>
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<td>2164</td>
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<td>6671 20.2</td>
<td>1344</td>
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<td>3722 11.2</td>
<td>8489 25.7</td>
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<tr>
<td>Total (N)</td>
<td>4087</td>
<td>16 573</td>
<td>114</td>
<td>25 286</td>
<td>64 295</td>
<td>6339</td>
<td>22 634</td>
<td>34 641</td>
<td>14 817</td>
<td>3474</td>
<td>4108</td>
<td>196 368</td>
</tr>
</tbody>
</table>

A&E, accident and emergency service; GP, general practitioner.
for calls during weekends and bank holidays, the largest number of calls was made on behalf of children 1–3 years (n=52694, 8.2%, ASR=3.7).

\[ \chi^2 = 13.209.13, \text{df}=20, p<0.001 \]

From the total number of calls (n=342641), 11.9% of calls were made during 7:00–23:00 (n=40817), with this finding remaining consistent across the three age groups (figure 2).

To identify which cell differences contribute to the \( \chi^2 \) test results, ASRs were calculated for each of the cells. The findings highlighted that there were clear age and time differences, whereby, for the time period 23:00–7:00, the highest number of calls was made on behalf of children aged 1–3 (n=15711, 38.5%, ASR=3). However, for the time period 7:00–15:00, the highest number of calls was on behalf of children aged <1 (n=43352, 27.8%, ASR=9.4), with the highest number of calls made by or on behalf of children aged 4–15 for the time period 15:00–23:00 (n=64726, 36.3%, ASR=12.6).

**DISCUSSION**

**Main findings of this study**

There has been much controversy surrounding the extent that NHS Direct has managed to relieve the pressure of overstretched healthcare services. However, NHS Direct survey data show that they are alleviating A&E and GP services, with 41% of respondents being advised to treat themselves at home with 11% to A&E and 28% to a GP, whereby it was reported that if these individuals did not phone, 44% would have gone to their GP with 29% to A&E. Therefore, this research engages with this debate, providing a current understanding of how children use NHS Direct, in particular what symptoms they present and how these are managed.

Highest CRs to NHS Direct for children aged <1 were for ‘crying’, with this group using the service mostly between 7:00 and 15:00. It is important to note that NHS Direct advisors use the crying symptom classification for all children under 3 months old and is used as a catch-all algorithm for safety for children <1 which would have influenced this finding. However, this finding remains consistent with emergency admissions, with ‘crying’ contributing as a main symptom which new borns present at emergency departments nationally.

While excessive crying has been viewed as a normal developmental phenomenon in babies, there is little agreement to the treatment or prevalence. Smith suggests that parents of persistently crying babies need instant reassurance and support to cope, whereby health visitors have been viewed as best placed to offer this support. However, nurses at NHS Direct have also been well placed to use their clinical judgement in decision-making, instantly reassuring parents to help them cope where telephone-based health services may be best suited to provide mainly parents with more knowledge and information.

As supported by internal audits, the highest outcome of calls across all age groups was health information and/or self-care advice, with statistics suggesting around 40–50% of all calls made by or on behalf of children aged 0–15 were managed with no onward referral needed, which supports previous audits. CRs were particularly high for symptoms relating to ‘skin/hair/nails’ and ‘colds/flu/sickness’ for all age groups, whereby, NHS Direct was able to support patients to self-manage and provide health information to these symptoms for 59.7% and 51.4% of all cases, respectively. This suggests that NHS Direct is able to support more callers at home than previously reported, with only 7% of calls on behalf of children aged <1 advised to attend A&E and less children aged 1–3 and 4–15 advised to attend a GP.

The symptoms which contributed to the highest urgency were ‘respiratory tract’ and ‘neurological disorder’, with the highest outcomes being 999. Respiratory tract infections are the most frequent acute problems contributing around 25% of patients who consult within primary care and around 40% of admissions to emergency services. However, NHS Direct has shown to safely support 38.4% of all children with this symptom through the provision of telephone-based self-care support and health information. Research has
highlighted this to be an effective way of management, where medical information has proven successful in not only supporting children with respiratory tract infections, but ultimately also leading to important reductions in antibiotic prescribing and reduced intention to consult without reducing satisfaction with care.\textsuperscript{28}

An interesting finding was that NHS Direct was able to successfully manage around 60\% and 20\% of calls relating to ‘poisoning and overdose’ characterised as low-risk unintentional overdose with low-toxic substances through the provision of self-care and health information, respectively. With ingestion of harmful substances being the most common causes of injury, and subsequently a common reason for referral to A&E, this finding highlights that NHS Direct and essentially telephone-based healthcare can safely support parents and caregivers to appropriately and safely manage the child’s symptoms within their own home.\textsuperscript{29}

There were time differences noted, for example, calls on behalf of children aged 1–3 were highest throughout the night 23:00–7:00 However, for children aged <1, calls peaked during the hours of 7:00–15:00, this may suggest that NHS Direct is able to provide parents with instant reassurance of how to support a wide range of symptoms with the possibility of avoiding unnecessary GP visits. For children aged 4–15, CRs were found highest during the times of 15:00–23:00, where they had higher reporting of symptoms relating to ‘wounds and injuries’. This may be a reflection of when school finishes, whereby NHS Direct was able to support 50\% of all children through the provision of self-care support and health information. However, this finding could highlight a gap of knowledge to how parents of children can be best supported to look after children following school in relation to the provision of health information to help manage symptoms more effectively.

\textbf{LIMITATIONS}

This research focused on patient (child participant of the call) data rather than caller (usually the parent/caregiver) data which does not provide useful information relating to the characteristics of the caller, whereby there is evidence that use of this service is dependent on the sociodemographic characteristics of the caller.\textsuperscript{10} 30–32 Furthermore, while previous research has suggested that there is an upward trend of access associated with deprivation.\textsuperscript{36} However, this finding is not consistent across age, whereby deprivation is shown to be related to lower usage for or on behalf of children (<15).\textsuperscript{9} 12 Therefore, it would be useful to explore the role of deprivation on the utilisation of this service in this cohort, which hopefully clarifies the point being made.

Although this study used a large sample of call data from 358,503 child-patients, there were a number of cases managed and closed by front-end advisors, therefore (N=100,390) which were removed from analysis for symptom classifications. Nonetheless, following pre-checking, the remaining calls used within the analysis met the requirements of the research aim.

This study focused on four ‘1-month’ periods across a 1-year period; while it would have been more robust to have captured a full year sample, it was felt that the data would have been excessive, with the 4 months felt to still remain representative of the population uptake in England. There are no national studies to compare this with; however, previous studies that have used a 1-year sample have only had data on that population, for example, older people\textsuperscript{16} or have focused on a specific geographical area.\textsuperscript{12} 51

Over the 4-month period, there could have been seasonality differences, which may have caused some bias towards some symptoms recorded, and it would have been interesting to have explored seasonality differences for this cohort. Nonetheless, while telephone-based healthcare systems such as NHS Direct have the potential for informing public health regarding the epidemiology of communicable diseases for common viruses such as influenza and norovirus\textsuperscript{33–36} in the community, this research provides an overview of how these symptoms are managed and the representativeness of these data.

\textbf{CONCLUSION}

This is the first study to examine the symptoms and outcome of calls made to NHS Direct for and on behalf of young children. It has highlighted that NHS Direct has supported a wide range of symptoms through the provision of health information and self-care support and provides important data relating to symptoms outcome and time of call. Moreover, it highlights the increasing role of telephone-based healthcare in England and how the use of technology can provide instant support and reassurance to parents through the provision of clinical knowledge and information to empower them to support many symptoms. As the new 111 telephone-based service is rolled out nationally, research should now focus on how this new service can further support the health of younger population groups and the impact this has on demand for other health services.

\textbf{Contributors} All authors contributed to the study conception/design. EJC, AG, GR and SL contributed to the data collection. EJC, AG, AMC, DP and SL conducted the data analysis, critically revised the article and reviewed the draft of the article.

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\textbf{Provenance and peer review} Not commissioned; externally peer reviewed.

\textbf{Data sharing statement} No additional data are available.
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Young people's use of NHS Direct: a national study of symptoms and outcome of calls for children aged 0–15
E J Cook, G Randhawa, S Large, A Guppy, A M Chater and D Pang

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