

BMJ Open Examining the role of Scotland's telephone advice service (NHS 24) for managing health in the community: analysis of routinely collected NHS 24 data

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To cite: Elliott AM, McAteer A, Heaney D, *et al*. Examining the role of Scotland's telephone advice service (NHS 24) for managing health in the community: analysis of routinely collected NHS 24 data. *BMJ Open* 2015;**5**:e007293. doi:10.1136/bmjopen-2014-007293

► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2014-007293>).

Received 25 November 2014
Revised 1 June 2015
Accepted 15 June 2015



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ABSTRACT

Objectives: To examine the type, duration and outcome of the symptoms and health problems Scotland's nurse-led telephone advice service (NHS 24) is contacted about and explore whether these vary by time of contact and patient characteristics.

Design: Analysis of routinely collected NHS 24 data.

Setting: Scotland, UK.

Participants: Users of NHS 24 during 2011.

Main outcome measures: Proportion of the type, duration and outcome of the symptoms and health problems NHS 24 is contacted about.

Results: 82.6% of the calls were made out-of-hours and 17.4% in-hours. Abdominal problems accounted for the largest proportion of calls (12.2%) followed by dental (6.8%) and rash/skin problems (6.0%). There were differences in the type of problems presented in-hours and out-of-hours. Most problems (62.9%) had lasted <24 h before people contacted NHS 24. Out-of-hours calls tended to be for problems of shorter duration. Problems reported out-of-hours most commonly resulted in advice to visit an out-of-hours centre and in-hours advice to contact a general practitioner. Most of the service users were female and from more affluent areas. Use of the service declined with age in those over 35 years. The characteristics of users varied according to when NHS 24 was contacted. The number of calls made by an individual in the year ranged from 1 to 866, although most users (69.2%) made only one call. The type of problem presented varied by age and deprivation, but was broadly similar by gender, rural/urban status and geographic area. Call outcomes also varied by user characteristics.

Conclusions: This is the first study to examine how the public uses NHS 24. It has identified the patterns of problems which the service must be equipped to deal with. It has also provided important information about who uses the service and when. This information will help future planning and development of the service.

Strengths and limitations of this study

- The first study to explore how NHS 24 is used to manage symptoms or health problems.
- Most comprehensive study of NHS 24 to date with analysis of all NHS 24 activity data for the whole of Scotland for a full year.
- Validity checks undertaken to show the data were fit for answering the research questions.
- Sixteen per cent of data were excluded from analyses due to missing data, mainly due to calls that required simple advice and did not result in an algorithm being launched.

INTRODUCTION

Although many symptom episodes and health problems are managed in the community without seeking medical advice or care, symptoms such as cough, headache and fatigue remain common reasons for health-care utilisation.^{1 2} In the UK, general practitioners (GPs) have traditionally been the first point of contact for those seeking medical care or advice. However, in recent years, there have been a number of changes in the organisation of primary care, resulting in the introduction of new services including nurse-led telephone advice lines.

In Scotland, a new nurse-led telephone advice service, NHS 24, was announced in 2000 in the Scottish Executive White Paper, *Our National Health. A plan for action, a plan for change*.³ The service went live in 2002, with a national remit to 'provide an accessible, high-quality, consistent and sensitive healthcare service to the people of Scotland'.⁴ The service consists of a network of contact centres accessible through a single telephone number and is available 24 h a

day, 7 days a week. While NHS 24 has undergone several changes since its inception (due to its integration in different areas, changes in the General Medical Services contract, changes in the design of the service and a change in the phone number), it still provides the three core activities originally outlined in its blueprint.⁵ (A) telephone consultation aided and enhanced by evidence-based and professionally agreed clinical algorithms; (B) referral, where appropriate, to a range of integrated services (such as A&E, GPs, pharmacists, dentists and mental health practitioners) and advice about self-care to enable people to look after themselves and their families at home; and (C) health information.

There has been a steady increase in demand for NHS 24,⁶ with almost 1.5 million calls a year being received by 2012/2013.⁷ Telephone consultation services such as NHS 24 have great potential to help manage symptoms and health problems in the community (either through information and advice on appropriate self-care or through referral to appropriate clinical services), and to reduce demands on other NHS services if used optimally.⁸ While NHS 24 has undergone an independent evaluation examining its activity and performance,⁶ and a small number of studies have investigated specific components of the service,^{9–11} to date no research has examined how the public is using NHS 24 to manage their symptoms and health problems. Identifying the patterns of symptoms and health problems presented to NHS 24 will highlight the range of issues which the service must be equipped to deal with, and the associated experience and skills which NHS 24 staff need to have to successfully handle calls. It will also help to determine whether the service is being used as policymakers intended, that is, to deal with immediate and unexpected health problems and indicate whether the service could be optimised to better manage demands for healthcare, for example, through changes in staffing structures, service reconfiguration or examining ways to improve access.

The aim of this paper was to explore how the public is using NHS 24 to manage their symptoms and health problems. The paper describes findings from an analysis of routine NHS 24 call data. We examined the type, duration and outcome of symptoms and health problems NHS 24 is contacted about and explored whether these varied according to time of contact (in-hours or out-of-hours) and patient characteristics (sex, age, deprivation, etc). We also examined how often individuals used the service to determine whether there is a core group of frequent users.

METHODS

Data extraction from NHS 24

Under a data sharing agreement, NHS 24 activity data and associated patient characteristics from the NHS 24 Patient Relational Management system for January 2011 to December 2011 inclusive were supplied to the University of Aberdeen Data Management Team (DMT). Prior to full extraction, a 1-week sample of anonymised

data was extracted and examined to identify any issues with the extraction process. Discrepancies were resolved before the full data extraction was run. Data extracted from the NHS 24 system included: NHS 24 ID references (call ID and caller ID); date of the call; time of the call; in-hours or out-of-hours status; call reason (free-text field recording the health problem); primary algorithm launched (eg, abdominal pain algorithm, vomiting algorithm); call outcome (eg, referred to A&E, referred to GP, self-care advice); and patient demographics (eg, sex, age and geographical location). Since the purpose of the study was to examine the symptoms and health problems NHS 24 was contacted about, generic information calls to the service (eg, about surgery opening times) were not included in the data set. The DMT undertook data cleaning, matching of repeat callers (based on NHS 24 identifiers), assignment of new unique study identifiers to each user and anonymisation of the data. Postcodes were used to assign each patient a deprivation decile (based on the Scottish Index of Multiple Deprivation, SIMD 2009)¹² and an urban/rural status (based on the 6-fold Urban Rural Classification 2007–2008)¹³ before the postcode was removed from the data set during the anonymisation process. Two data sets were created. The ‘call data set’ consisted of rows representing each call to NHS 24. This data set allowed us to examine all of the calls made across the year in terms of type of symptom, duration of symptom and outcome of call for all in-hours and out-of-hours calls. An individual provided multiple rows for the ‘call data set’ if they had used NHS 24 on more than one occasion. This data set could not be used to examine demographics of the users of the service as some people appeared multiple times and the data were not mutually exclusive. The ‘user data set’ consisted of rows representing each unique user of NHS 24, that is, the person requiring advice from NHS 24, not necessarily the caller. This data set allowed us to examine the characteristics of NHS 24 users in terms of sex, age, deprivation, etc. The two anonymised data sets were then forwarded to the research team for analysis. The Grampian Research Ethics Committee confirmed that ethical approval was not required for the study since no new patient information was being collected, the data being analysed were fully anonymised and a data sharing agreement with NHS 24 had been established.

Ascertaining symptom and health problem information

The symptoms and problems NHS 24 is contacted about are not coded within its computer system. This information was therefore ascertained through the primary algorithm launched by call handlers at the time of first contact. As there were over 500 different algorithms launched, algorithms were grouped together for analyses. A number of approaches to grouping the algorithms were explored. Our final groupings were based on independent advice and then consensus from three clinicians which grouped the algorithms into 70

problem categories. For example, the algorithms 'abdominal', 'abdominal cramps', 'abdominal pain', 'heartburn' and 'indigestion' were grouped together as a single category labelled 'abdominal'. Since the duration of the symptom or problem being called about is also not routinely collected by NHS 24, we coded information recorded in the call reason free-text field to identify symptom duration whenever available. Outcomes accounting for at least 0.5% of in-hours calls or out-of-hours calls were analysed separately resulting in 14 call outcome groups (999 contacted for patient, patient sent to A&E via ambulance, patient advised to go to A&E, patient advised to visit out-of-hours centre, home visit to patient by doctor, patient advised to contact own GP practice, doctor to phone patient, patient advised to contact dentist, patient advised to contact pharmacist, patient advised to contact other health professional, service clinician to phone patient, nurse to phone patient, patient given self-care advice, information provided). Outcomes accounting for less than 0.5% of calls were grouped together under 'other'.

Validity checks

To determine if the information recorded on the NHS 24 database was an accurate representation of the symptoms or health problems people called about, two data validity checks were undertaken. In the first validity check (call listening), a random sample of 50 anonymised calls were listened to at the Aberdeen NHS 24 call centre by two members of the research team (AME and AM) who were blind to the information recorded in the NHS 24 database. Each researcher independently recorded details of the symptom information provided in the call and then identified what they believed to be the primary reason for the call and any secondary reason for the call. These data were then directly compared with the information recorded on the NHS 24 database and the proportion of mismatched data quantified. In the second validity check (free-text analysis), a random sample of free-text fields from 500 calls were directly compared with the initial algorithm launched by the call handlers to explore how well the algorithms launched reflected the actual problems reported by the user.

Analysis

Descriptive analyses were used to explore the type and duration of symptoms and health problems that NHS 24 was contacted about, as well as the range of call outcomes and how these varied by problem. We also investigated whether symptom patterns and outcomes varied between (1) in-hours (8:00 to 18:00 Monday to Friday) and out-of-hours (evenings, nights, weekends and all public, bank and local holidays) and (2) different patient groups. When looking at the data by patient group, data were aggregated so that an individual could contribute only once to each specific problem category, although they may contribute to a number of different problem categories. The denominator in each case was the

number of unique individuals who contacted NHS 24 for that problem during the study year. A priori we defined a frequent user as someone who used the service more than 24 times during the year. The χ^2 tests were used to determine if there were statistical differences between groups. Statistical analyses were carried out using SPSS and CI analysis. Owing to the large size of the data set, all proportions were found to be surrounded by very tight 95% CIs, and differences between proportions were all highly significant ($p < 0.001$), even when the proportions were very similar. For clarity of presentation, therefore, findings are reported as number and proportion only.

RESULTS

Validity checks

Call listening

The problem assigned to the call on the NHS 24 data set matched both of the independent reviewer's primary or secondary assessments of the problem in 80% of cases. Fourteen per cent of calls matched one of the reviewer's primary or secondary assessments and 6% did not directly match either reviewer's assessment of the call reason.

Free-text analysis

The primary algorithm launched reflected the problems reported by the callers in the free-text field in 100% of cases.

Call data set

During 2011, 1 342 010 calls were made to NHS 24 about a symptom or health problem. Of these, 1 285 038 had an NHS 24 identifier (which allowed matching of repeat users) and were included in the analyses. A total of 1 061 347 (82.6%) calls were made out-of-hours and 223 691 (17.4%) calls were made in-hours.

Problems presented to NHS 24

Problem categories could be assigned to 1 074 240 (83.6%) calls. The commonest 50 problems (table 1) accounted for 97.7% of all calls. Overall, abdominal problems accounted for the largest proportion of calls (12.2%), followed by dental (6.8%) and rash/skin (6.0%) problems. There were significant differences in the type of problems presented in-hours and out-of-hours. Out-of-hours, abdominal (13.2%), rash/skin (6.4%) and breathing (6.3%) problems were the most frequent reasons for contact, while in-hours, dental (37.2%), abdominal (6.9%) and medication (4.5%) problems were the most frequent reasons for contact.

Problem duration

We were able to assign a problem duration to 897 903 (69.9%) calls. Most problems (62.9%) had lasted <24 h before people contacted NHS 24 (table 2) with symptoms of a few hours (1–6 h) or a day (12–24 h) most common. Problems of short duration (≤ 1 h) were frequently related to medication issues, injuries/wounds and head-related problems, while those of long duration

Table 1 The commonest 50 problems presented to NHS 24 (out-of-hours, in-hours and total calls)

| Problem category | Out-of-hours calls | | In-hours calls | | Total calls | |
|----------------------|--------------------|----------|----------------|----------|-------------|----------|
| | n | Per cent | n | Per cent | n | Per cent |
| Abdominal | 115 975 | 13.2 | 12 057 | 6.9 | 128 032 | 12.2 |
| Dental | 6276 | 0.7 | 64 642 | 37.2 | 70 918 | 6.8 |
| Rash/skin | 56 458 | 6.4 | 6191 | 3.6 | 62 649 | 6.0 |
| Breathing | 55 484 | 6.3 | 3828 | 2.2 | 59 312 | 5.7 |
| Genitourinary | 54 012 | 6.2 | 3117 | 1.8 | 57 129 | 5.4 |
| Chest pain | 42 886 | 4.9 | 5375 | 3.1 | 48 261 | 4.6 |
| Medication | 36 392 | 4.2 | 7804 | 4.5 | 44 196 | 4.2 |
| Vomiting/nausea | 31 636 | 3.6 | 3039 | 1.7 | 34 675 | 3.3 |
| Ear | 29 662 | 3.4 | 2368 | 1.4 | 32 030 | 3.1 |
| Throat | 28 724 | 3.3 | 2328 | 1.3 | 31 052 | 3.0 |
| Headache | 26 947 | 3.1 | 3250 | 1.9 | 30 197 | 2.9 |
| Back | 25 182 | 2.9 | 3423 | 2.0 | 28 605 | 2.7 |
| Mental health | 24 504 | 2.8 | 3753 | 2.2 | 28 257 | 2.7 |
| Cough | 25 743 | 2.9 | 2060 | 1.2 | 27 803 | 2.6 |
| Eye | 20 355 | 2.3 | 2786 | 1.6 | 23 141 | 2.2 |
| Pregnancy related | 18 977 | 2.2 | 3041 | 1.7 | 22 018 | 2.1 |
| Legs | 19 496 | 2.2 | 2465 | 1.4 | 21 961 | 2.1 |
| Fever | 19 754 | 2.3 | 1671 | 1.0 | 21 425 | 2.0 |
| Injury/wound | 18 355 | 2.1 | 2298 | 1.3 | 20 653 | 2.0 |
| Head related | 14 892 | 1.7 | 2610 | 1.5 | 17 502 | 1.7 |
| Feet | 13 605 | 1.6 | 2489 | 1.4 | 16 094 | 1.5 |
| Hand | 11 471 | 1.3 | 2275 | 1.3 | 13 746 | 1.3 |
| Baby/infant | 12 007 | 1.4 | 1228 | 0.7 | 13 235 | 1.3 |
| Vaginal | 11 069 | 1.3 | 2040 | 1.2 | 13 109 | 1.2 |
| Dizziness | 11 275 | 1.3 | 1531 | 0.9 | 12 806 | 1.2 |
| Face | 7684 | 0.9 | 3054 | 1.8 | 10 738 | 1.0 |
| Diarrhoea | 9515 | 1.1 | 1175 | 0.7 | 10 690 | 1.0 |
| Constipation | 8107 | 0.9 | 1080 | 0.6 | 9187 | 0.9 |
| Neck | 7121 | 0.8 | 1056 | 0.6 | 8177 | 0.8 |
| Knee | 6847 | 0.8 | 1301 | 0.7 | 8148 | 0.8 |
| Lumps | 6897 | 0.8 | 1131 | 0.7 | 8028 | 0.8 |
| Male genitalia | 6838 | 0.8 | 1004 | 0.6 | 7842 | 0.7 |
| Rectal/anal | 7033 | 0.8 | 794 | 0.5 | 7827 | 0.7 |
| Hip | 6955 | 0.8 | 843 | 0.5 | 7798 | 0.7 |
| Arms | 6734 | 0.8 | 946 | 0.5 | 7680 | 0.7 |
| Shoulder | 6804 | 0.8 | 963 | 0.6 | 7767 | 0.7 |
| Weakness | 6843 | 0.8 | 775 | 0.4 | 7618 | 0.7 |
| Confusion | 7098 | 0.8 | 477 | 0.3 | 7575 | 0.7 |
| Bites/stings | 6370 | 0.7 | 1032 | 0.6 | 7402 | 0.7 |
| Nose | 6360 | 0.7 | 983 | 0.6 | 7343 | 0.7 |
| Ankle | 5448 | 0.6 | 1180 | 0.7 | 6628 | 0.6 |
| Ingestion/inhalation | 4309 | 0.5 | 1581 | 0.9 | 5890 | 0.6 |
| Mouth | 3080 | 0.4 | 2393 | 1.4 | 5473 | 0.5 |
| Fainting | 4699 | 0.5 | 708 | 0.4 | 5407 | 0.5 |
| Diabetes | 4609 | 0.5 | 321 | 0.2 | 4930 | 0.5 |
| Burns | 3812 | 0.4 | 621 | 0.4 | 4433 | 0.4 |
| Death | 3957 | 0.5 | 67 | 0.1 | 4024 | 0.4 |
| Falls | 3124 | 0.4 | 546 | 0.3 | 3670 | 0.3 |
| Palpitations | 2904 | 0.3 | 320 | 0.2 | 3224 | 0.3 |
| Bleeding | 1310 | 0.1 | 1827 | 1.1 | 3137 | 0.3 |
| Total | 875 595 | 100 | 173 847 | 100 | 1 049 442 | 100 |

(>4 weeks) were commonly pregnancy-related problems. There was a significant difference in the problem duration between in-hours and out-of-hours calls with out-of-hours calls tending to be for problems of a shorter duration than in-hours calls.

Call outcome

Out-of-hours calls most commonly resulted in: advice to visit an out-of-hours centre (in 34.1% of cases), a home visit by a doctor (12.2%) or provision of self-care advice (10.2%; table 3). In comparison, in-hours calls most

Table 2 Frequency of problem duration (out-of-hours, in-hours and total calls)

| Problem duration | Out-of-hours calls | | In-hours calls | | Total calls | |
|------------------|--------------------|----------|----------------|----------|-------------|----------|
| | n | Per cent | n | Per cent | n | Per cent |
| ≤15 min | 62 137 | 8.2 | 10 413 | 7.4 | 72 550 | 8.1 |
| >15–30 min | 50 967 | 6.7 | 7515 | 5.4 | 58 482 | 6.5 |
| >30–60 min | 56 688 | 7.5 | 7628 | 5.4 | 64 316 | 7.2 |
| >1–6 h | 131 223 | 17.3 | 16 541 | 11.8 | 147 764 | 16.5 |
| >6–12 h | 53 304 | 7.0 | 7814 | 5.6 | 61 118 | 6.8 |
| >12–24 h | 133 458 | 17.6 | 26 152 | 18.7 | 159 610 | 17.8 |
| >1–2 days | 93 283 | 12.3 | 21 267 | 15.2 | 114 550 | 12.8 |
| >2–4 days | 86 807 | 11.5 | 20 301 | 14.5 | 107 108 | 11.9 |
| >4–7 days | 54 509 | 7.2 | 12 884 | 9.2 | 67 393 | 7.5 |
| >1–2 weeks | 19 723 | 2.6 | 5163 | 3.7 | 24 886 | 2.8 |
| >2–4 weeks | 7192 | 0.9 | 1981 | 1.4 | 9173 | 1.0 |
| >4 weeks | 8500 | 1.1 | 2453 | 1.8 | 10 953 | 1.2 |
| Total | 757 791 | 100 | 140 112 | 100 | 897 903 | 100 |

commonly resulted in: advice to contact a dentist (in 27.6% of cases), a NHS 24 service clinician phoning the patient (21.1%) or advice to contact the patient's GP (19.2%). Outcomes were broadly similar for most of the symptoms and health problems examined. Exceptions to this were for dental problems, which resulted in advice to contact a dentist in 87.0% of in-hours calls and 43.1% of out-of-hours calls; problems with hands, which resulted in advice to go to A&E in 29.6% of in-hours calls and 29.5% of out-of-hours calls; head-related problems, which resulted in advice to go to A&E in 46.2% of in-hours calls and 38.8% of out-of-hours calls; and medication problems, which resulted in self-care advice or information in 28.6% of in-hours calls and 29.0% of out-of-hours calls.

User data set

There were 791 178 users of NHS 24 during 2011 (table 4). Most users were female (57.8%). Over half of the users were under 35 years of age, with use of the service declining in those aged 35 years and older. There was a higher proportion of users from more affluent areas than less affluent areas. Most callers lived in urban areas, and in central belt locations.

In-hours and out-of-hours use

The service was used out-of-hours by 682 622 people (86.3% of all users) and in-hours by 184 617 people (23.3% of all users; table 4), with 9.6% using the service during both periods. Compared with in-hours users, a significantly higher proportion of out-of-hours users

Table 3 Call outcomes (out-of-hours and in-hours)

| Outcomes | Out-of-hours | | In-hours | |
|--|-----------------|-------------------|-----------------|-------------------|
| | Number of calls | Per cent of calls | Number of calls | Per cent of calls |
| 999 contacted for patient | 73 117 | 6.9 | 5743 | 2.6 |
| Patient sent to A&E via ambulance | 7759 | 0.7 | – | – |
| Patient advised to go to A&E | 54 046 | 5.1 | 11 825 | 5.3 |
| Patient advised to visit out-of-hours centre | 361 918 | 34.1 | – | – |
| Home visit to patient by doctor | 129 306 | 12.2 | – | – |
| Patient advised to contact own GP practice | 88 850 | 8.4 | 42 876 | 19.2 |
| Doctor to phone patient | 74 809 | 7.0 | – | – |
| Patient advised to contact dentist | – | – | 61 803 | 27.6 |
| Patient advised to contact pharmacist | 23 988 | 2.3 | 4052 | 1.8 |
| Patient advised to contact other HP* | 7230 | 0.7 | 1648 | 0.7 |
| Service clinician to phone patient | 74 356 | 7.0 | 47 268 | 21.1 |
| Nurse to phone patient | 34 534 | 3.3 | – | – |
| Patient given self-care advice | 108 152 | 10.2 | 16 084 | 7.2 |
| Information provided | – | – | 20 418 | 9.1 |
| Other† | 23 282 | 2.2 | 11 974 | 5.4 |
| Total | 1 061 347 | 100 | 223 691 | 100 |

*Other HP (eg, midwife, dentist, optician, etc).

†Outcomes occurring in less than 0.5% of out-of-hours calls or less than 0.5% of in-hours calls were grouped together as 'other'. GP, general practitioner; HP, health professional; N, number.

Table 4 Total, out-of-hours and in-hours users by sociodemographic group

| Sociodemographic group | Total users n=791 178 | | Out-of-hours users n=682 622 | | In-hours users n=184 617 | |
|--------------------------------|--------------------------|----------|---------------------------------|----------|-----------------------------|----------|
| | n | Per cent | n | Per cent | n | Per cent |
| Gender | | | | | | |
| Female | 457 051 | 57.8 | 400 839 | 58.7 | 101 801 | 55.1 |
| Male | 334 127 | 42.2 | 281 783 | 41.3 | 82 816 | 44.9 |
| Age category (years) | | | | | | |
| 0–1 (baby/infant) | 37 299 | 4.7 | 35 302 | 5.2 | 6706 | 3.6 |
| 1–4 (toddler) | 79 088 | 10.0 | 72 799 | 10.7 | 13 904 | 7.5 |
| 5–15 (child) | 81 839 | 10.3 | 72 165 | 10.6 | 14 562 | 7.9 |
| 16–24 (young adult) | 103 165 | 13.0 | 82 318 | 12.1 | 34 280 | 18.6 |
| 25–34 | 109 891 | 13.9 | 86 074 | 12.6 | 36 154 | 19.6 |
| 35–44 | 89 714 | 11.3 | 73 397 | 10.8 | 24 273 | 13.1 |
| 45–54 | 79 752 | 10.1 | 67 117 | 9.8 | 18 993 | 10.3 |
| 55–64 | 63 426 | 8.0 | 55 905 | 8.2 | 12 167 | 6.6 |
| 65–74 | 55 367 | 7.0 | 50 907 | 7.5 | 8904 | 4.8 |
| 75–84 | 56 732 | 7.2 | 53 352 | 7.8 | 9040 | 4.9 |
| 85–94 | 31 486 | 4.0 | 29 988 | 4.4 | 5179 | 2.8 |
| 95+ | 3412 | 0.4 | 3294 | 0.5 | 452 | 0.2 |
| Deprivation decile* | | | | | | |
| 1 (most affluent) | 95 754 | 12.3 | 82 398 | 12.1 | 24 066 | 13.0 |
| 2 | 90 891 | 11.7 | 78 288 | 11.5 | 22 450 | 12.2 |
| 3 | 87 296 | 11.2 | 75 037 | 11.0 | 21 479 | 11.6 |
| 4 | 83 574 | 10.7 | 72 016 | 10.5 | 19 882 | 10.8 |
| 5 | 77 443 | 9.9 | 66 878 | 9.8 | 17 929 | 9.7 |
| 6 | 72 015 | 9.2 | 62 417 | 9.1 | 16 115 | 8.7 |
| 7 | 71 186 | 9.1 | 61 837 | 9.1 | 15 421 | 8.4 |
| 8 | 73 268 | 9.4 | 63 814 | 9.3 | 15 558 | 8.4 |
| 9 | 66 704 | 8.6 | 57 900 | 8.5 | 14 200 | 7.7 |
| 10 (least affluent) | 60 857 | 7.8 | 53 009 | 7.8 | 12 917 | 7.0 |
| Urban/rural classification† | | | | | | |
| Large urban areas (most urban) | 319 321 | 41.0 | 271 895 | 39.8 | 80 520 | 43.6 |
| Other urban areas | 252 797 | 32.5 | 219 479 | 32.2 | 57 993 | 31.4 |
| Accessible small towns | 66 568 | 8.5 | 58 568 | 8.8 | 13 915 | 7.5 |
| Remote small towns | 23 214 | 3.0 | 20 785 | 3.0 | 4330 | 2.3 |
| Accessible rural | 81 885 | 10.5 | 71 559 | 10.5 | 16 932 | 9.2 |
| Remote rural (most rural) | 35 203 | 3.0 | 31 308 | 4.6 | 6327 | 3.4 |
| Geographic location‡ | | | | | | |
| Ayrshire and Arran | 61 120 | 7.7 | 53 438 | 7.8 | 13 208 | 7.2 |
| Borders | 13 377 | 1.7 | 11 335 | 1.7 | 3179 | 1.7 |
| Dumfries and Galloway | 20 453 | 2.6 | 17 931 | 2.6 | 4055 | 2.2 |
| Fife | 58 867 | 7.5 | 50 494 | 7.4 | 14 378 | 7.8 |
| Forth Valley | 47 760 | 6.0 | 40 943 | 6.0 | 11 770 | 6.4 |
| Greater Glasgow and Clyde | 196 123 | 24.8 | 166 864 | 24.4 | 48 024 | 26.0 |
| Grampian | 78 111 | 9.9 | 66 420 | 9.7 | 18 710 | 10.1 |
| Highland | 35 650 | 4.5 | 32 147 | 4.7 | 6375 | 3.5 |
| Lanarkshire | 89 582 | 11.3 | 77 353 | 11.3 | 21 001 | 11.4 |
| Lothian | 125 456 | 15.9 | 109 693 | 16.1 | 29 428 | 15.9 |
| Orkney | 2065 | 0.3 | 1868 | 0.3 | 335 | 0.2 |
| Shetland | 1997 | 0.3 | 1722 | 0.3 | 452 | 0.2 |
| Tayside | 56 611 | 7.2 | 49 434 | 7.2 | 12 310 | 6.7 |
| Western Isles | 2870 | 0.4 | 2615 | 0.4 | 443 | 0.2 |

Numbers do not always add up to 100% due to missing data in subgroups.

*Deprivation is based on the Scottish Index of Multiple Deprivation 2009.

†Urban/rural classification is based on the sixfold Urban Rural Classification 2007–2008.

‡Geographic location is based on the 14 Scottish health boards.

were female, younger or older, living in less affluent areas and living in remote and rural areas. Conversely, a significantly higher proportion of in-hours users were

males, those aged 16–44, those living in more affluent areas and those living in large urban areas than out-of-hours users.

Number of calls and frequent users

The total number of calls for each user ranged between 1 and 866, with most reporting 1 (69.2%) or 2 (18.5%) calls and only 2.0% having more than five calls in the year. Females, younger and older users, more affluent individuals, and those living in urban areas were significantly more likely to make more than one call. Some 568 (0.1%) users met our definition of a frequent user, and there was no clear pattern in the characteristics of these users.

Problems presented by user characteristics

There were few clear differences in the problems presented by females and males (although many of the differences in proportions were significant due to the large size of the data set). Abdominal problems, dental problems and rash/skin problems were the top three problems in both men and women. There were clear differences in the problems presented by each of the 12 different age groups, with rash/skin problems commonest in the under 5s, abdominal problems commonest in those aged 5–74 and breathing problems commonest in those aged 75 and over (table 5). The proportion of people using NHS 24 for injuries/wounds, leg and breathing problems significantly increased with age. Less affluent users tended to contact NHS 24 less often for most problems than more affluent users; exceptions were for genitourinary, throat problems, eye problems and fever (table 6). There were no clear differences in the problems presented by different urban/rural groups or people living in different geographical areas.

Out-of-hours outcomes by user characteristics

Advice to visit an out-of-hours centre was the commonest out-of-hours outcome for females and males, under 65s and all deprivation, urban/rural and geographic area groups. Males were significantly more likely than females to be sent to or advised to go to A&E (20.0% vs 16.9%), while females were significantly more likely than males to have a doctor visit or call them (23.3% vs 20.8%). Children (<16 years) were significantly more likely to receive self-care advice than adults (21.7% vs 11.6%). The proportion of patients advised to visit an out-of-hours centre decreased across each of the 12 age groups examined from 71.0% for 0–1 years to 1.9% for 95+ years. The proportion of patients being sent to A&E, having a home visit or having a nurse phone them all significantly increased across the 12 different age groups (from 5.6% to 20.8%, 1.5% to 69.0% and 0.1% to 10.3%, respectively). The proportion of patients being sent to or advised to go to A&E significantly increased with affluence (from 15.6% for deprivation decile 10 to 19.8% for deprivation decile 1).

In-hours outcomes by user characteristics

Advice to contact a dentist was the commonest in-hours outcome for both males and females. Those calling about infants (0–1 years) were most often advised to

contact the GP, those aged between 5 and 64 to contact a dentist, and all other age groups (1–4, 65–74, 75–84, 85–94 and 95+ years) to await a service clinician call. Children (<16 years) were significantly more likely to receive advice to go to A&E and receive self-care advice than adults (9.1% vs 5.6% and 14.6% vs 7.0%, respectively). Similarly, those aged 65+ were significantly more likely to have 999 contacted for them and significantly more likely to receive provision of information than other age groups (7.1% vs 2.4% and 20.1% vs 9.0%, respectively). The pattern of in-hours outcomes was similar across deprivation and urban/rural groups. Advice to contact a dentist was commonest in each of the geographic areas except Lothian, Highlands and Islands, where advice to contact own GP or await a service clinician call was most common.

DISCUSSION

Summary of main findings

People used NHS 24 for a wide range of problems, with abdominal problems most common, followed by dental and rash/skin problems. Problems presented differed according to whether the calls were made in-hours or out-of-hours. This was particularly true for dental problems which accounted for <1% of out-of-hours calls, but over a third of in-hours calls. Duration of problem varied depending on whether the call was made in-hours or out-of-hours. Problems reported out-of-hours most commonly resulted in advice to visit an out-of-hours centre and in-hours resulted in advice to contact a GP. Females, those aged 16–34 and those from more affluent areas were more likely to use the service than others. The sociodemographic characteristics of users varied according to when NHS 24 was contacted. Most users made only one call during the year. Types of problems presented varied by age and deprivation, but were broadly similar by gender, rural/urban status and geographic area. Call outcomes varied according to the characteristics of users.

Strengths and limitations of the study

No previous studies have examined the symptoms and outcomes presented to NHS 24. Previous studies exploring UK telephone advice services have either been based on specific age groups,^{14 15} examined specific geographical areas^{16 17} or have not had access to a full year of data.¹⁴ We had access to all NHS 24 activity data for the whole of Scotland for a full year. This is therefore the most comprehensive study of a UK telephone advice service to date and the first study to explore how NHS 24 is used by the general population to manage symptoms or health problems. As with all studies using secondary data, there are limitations in what we were able to examine due to the nature of the data collected and the fact that it was not collected for this purpose. We undertook two validity checks to assess whether the data were fit for answering our research questions. We found

Table 5 Commonest problems presented to NHS 24 by age group

| Problem category | n | 0–1 years n=36 962 | 1–4 years n=78 022 | 5–15 years n=80 398 | 16–24 years n=101 156 | 25–34 years n=107 550 | 35–44 years n=87 925 | 45–54 years n=78 203 | 55–64 years n=62 081 | 65–74 years n=54 217 | 75–84 years n=55 629 | 85–94 years n=30 890 | 95+ years n=3348 |
|-------------------|----------|-----------------------|-----------------------|------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------------|
| Abdominal | n | 84 | 9690 | 13 911 | 16 586 | 15 355 | 11 746 | 10 640 | 8523 | 7387 | 6825 | 3232 | 265 |
| | Per cent | 0.2 | 12.4 | 17.3 | 16.4 | 14.3 | 13.4 | 13.6 | 13.7 | 13.6 | 12.3 | 10.5 | 7.9 |
| Dental | n | 150 | 1135 | 5116 | 13 094 | 14 807 | 10 160 | 7969 | 3858 | 1509 | 641 | 163 | 6 |
| | Per cent | 0.4 | 1.5 | 6.4 | 12.9 | 13.8 | 11.6 | 10.2 | 6.2 | 2.8 | 1.2 | 0.5 | 0.2 |
| Rash/skin | n | 8888 | 16 448 | 9062 | 5379 | 4655 | 3250 | 2750 | 1996 | 1388 | 1226 | 590 | 52 |
| | Per cent | 24.0 | 21.1 | 11.3 | 5.3 | 4.3 | 3.7 | 3.5 | 3.2 | 2.6 | 2.2 | 1.9 | 1.6 |
| Breathing | n | 1333 | 3827 | 3538 | 4823 | 4930 | 4950 | 5311 | 5255 | 5980 | 7022 | 3959 | 438 |
| | Per cent | 3.6 | 4.9 | 4.4 | 4.8 | 4.6 | 5.6 | 6.8 | 8.5 | 11.0 | 12.6 | 12.8 | 13.1 |
| Genito-urinary | n | 314 | 3285 | 2682 | 5528 | 4883 | 4089 | 4279 | 4241 | 4413 | 5268 | 3061 | 278 |
| | Per cent | 0.8 | 4.2 | 3.3 | 5.5 | 4.5 | 4.7 | 5.5 | 6.8 | 8.1 | 9.5 | 9.9 | 8.3 |
| Chest pain | n | 0 | 68 | 2105 | 13 154 | 12 719 | 2912 | 2849 | 2261 | 2040 | 2266 | 1159 | 91 |
| | Per cent | 0.0 | 0.1 | 2.6 | 13.0 | 11.8 | 3.3 | 3.6 | 3.6 | 3.8 | 4.1 | 3.8 | 2.7 |
| Medication | n | 895 | 2202 | 1873 | 3655 | 4510 | 4775 | 4459 | 3951 | 3919 | 4381 | 2456 | 221 |
| | Per cent | 2.4 | 2.8 | 2.3 | 3.6 | 4.2 | 5.4 | 5.7 | 6.4 | 7.2 | 7.9 | 8.0 | 6.6 |
| Vomiting/nausea | n | 5465 | 8264 | 2421 | 2497 | 2191 | 1466 | 1434 | 1519 | 1783 | 2329 | 1574 | 182 |
| | Per cent | 14.8 | 10.6 | 3.0 | 2.5 | 2.0 | 1.7 | 1.8 | 2.4 | 3.3 | 4.2 | 5.1 | 5.4 |
| Ear | n | 939 | 6863 | 6902 | 3617 | 3467 | 2702 | 2034 | 1103 | 531 | 321 | 147 | 9 |
| | Per cent | 2.5 | 8.8 | 8.6 | 3.6 | 3.2 | 3.1 | 2.6 | 1.8 | 1.0 | 0.6 | 0.5 | 0.3 |
| Throat | n | 217 | 2396 | 5548 | 6675 | 5494 | 3626 | 1965 | 1164 | 673 | 485 | 224 | 34 |
| | Per cent | 0.6 | 3.1 | 6.9 | 6.6 | 5.1 | 4.1 | 2.5 | 1.9 | 1.2 | 0.9 | 0.7 | 1.0 |
| Headache | n | 3 | 1165 | 4191 | 5012 | 5249 | 3944 | 3047 | 1770 | 1131 | 958 | 371 | 27 |
| | Per cent | 0.0 | 1.5 | 5.2 | 5.0 | 4.9 | 4.5 | 3.9 | 2.9 | 2.1 | 1.7 | 1.2 | 0.8 |
| Back | n | 1 | 76 | 574 | 3291 | 4475 | 4431 | 3948 | 2628 | 1938 | 2109 | 1253 | 112 |
| | Per cent | 0.0 | 0.1 | 0.7 | 3.3 | 4.2 | 5.0 | 5.0 | 4.2 | 3.6 | 3.8 | 4.1 | 3.3 |
| Mental health | n | 7 | 199 | 521 | 2493 | 2884 | 3089 | 2663 | 1608 | 1269 | 1646 | 1084 | 127 |
| | Per cent | 0.0 | 0.3 | 0.6 | 2.5 | 2.7 | 3.5 | 3.4 | 2.6 | 2.3 | 3.0 | 3.5 | 3.8 |
| Cough | n | 5879 | 7372 | 2752 | 1242 | 1569 | 1359 | 1313 | 1263 | 976 | 1010 | 638 | 111 |
| | Per cent | 15.9 | 9.4 | 3.4 | 1.2 | 1.5 | 1.5 | 1.7 | 2.0 | 1.8 | 1.8 | 2.1 | 3.3 |
| Eye | n | 1830 | 2739 | 2141 | 2688 | 3164 | 2586 | 2315 | 1798 | 1123 | 794 | 420 | 41 |
| | Per cent | 5.0 | 3.5 | 2.7 | 2.7 | 2.9 | 2.9 | 3.0 | 2.9 | 2.1 | 1.4 | 1.4 | 1.2 |
| Pregnancy related | n | 0 | 0 | 97 | 6850 | 7989 | 2208 | 72 | 1 | 0 | 0 | 0 | 0 |
| | Per cent | 0.0 | 0.0 | 0.1 | 6.8 | 7.4 | 2.5 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Legs | n | 52 | 525 | 754 | 1350 | 2075 | 2497 | 2636 | 2366 | 2075 | 2760 | 1953 | 249 |
| | Per cent | 0.1 | 0.7 | 0.9 | 1.3 | 1.9 | 2.8 | 3.4 | 3.8 | 4.2 | 5.0 | 6.3 | 7.4 |
| Fever | n | 3440 | 7349 | 2620 | 1073 | 1267 | 838 | 706 | 649 | 666 | 886 | 503 | 54 |
| | Per cent | 9.3 | 9.4 | 3.3 | 1.1 | 1.2 | 1.0 | 0.9 | 1.0 | 1.2 | 1.6 | 1.6 | 1.6 |
| Injury/wound | n | 294 | 853 | 1583 | 2476 | 2629 | 2228 | 1854 | 1652 | 1573 | 1823 | 1300 | 188 |
| | Per cent | 0.8 | 1.1 | 2.0 | 2.4 | 2.4 | 2.5 | 2.4 | 2.7 | 2.9 | 3.3 | 4.2 | 5.6 |
| Head related | n | 1369 | 3787 | 2727 | 1510 | 1195 | 855 | 783 | 623 | 731 | 1373 | 1426 | 207 |
| | Per cent | 3.7 | 4.9 | 3.4 | 1.5 | 1.1 | 1.0 | 1.0 | 1.0 | 1.3 | 2.5 | 4.6 | 6.2 |
| Feet | n | 145 | 747 | 1828 | 2016 | 2235 | 1861 | 1736 | 1519 | 1055 | 997 | 500 | 58 |
| | Per cent | 0.4 | 1.0 | 2.3 | 2.0 | 2.1 | 2.1 | 2.2 | 2.4 | 1.9 | 1.8 | 1.6 | 1.7 |
| Hand | n | 184 | 716 | 1660 | 2096 | 2027 | 1719 | 1425 | 1094 | 752 | 722 | 455 | 62 |
| | Per cent | 0.5 | 0.9 | 2.1 | 2.1 | 1.9 | 2.0 | 1.8 | 1.8 | 1.4 | 1.3 | 1.5 | 1.9 |
| Baby/infant | n | 8922 | 2108 | 0 | 42 | 243 | 142 | 0 | 0 | 1 | 0 | 0 | 0 |
| | Per cent | 24.1 | 2.7 | 0.0 | 0.0 | 0.2 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Vaginal | n | 97 | 626 | 580 | 3427 | 2836 | 1692 | 1053 | 435 | 343 | 426 | 236 | 30 |
| | Per cent | 0.3 | 0.8 | 0.7 | 3.4 | 2.6 | 1.9 | 1.3 | 0.7 | 0.6 | 0.8 | 0.8 | 0.9 |
| Dizziness | n | 1 | 44 | 420 | 1349 | 1661 | 1424 | 1385 | 1442 | 1356 | 1764 | 916 | 65 |
| | Per cent | 0.0 | 0.1 | 0.5 | 1.3 | 1.5 | 1.6 | 1.8 | 2.3 | 2.5 | 3.2 | 3.0 | 1.9 |

Table 6 Commonest problems presented to NHS 24 by deprivation decile

| Problem category | | Most affluent n=94 060 | 2 n=89 309 | 3 n=85 817 | 4 n=82 083 | 5 n=76 073 | 6 n=70 632 | 7 n=69 845 | 8 n=71 868 | 9 n=65 430 | Least affluent n=59 667 |
|-------------------|----------|---------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------------------|
| Abdominal | n | 12 965 | 12 275 | 11 760 | 11 196 | 10 494 | 9330 | 9216 | 9373 | 8639 | 7637 |
| | Per cent | 13.8 | 13.7 | 13.7 | 13.6 | 13.8 | 13.2 | 13.2 | 13.0 | 13.2 | 12.8 |
| Dental | n | 7784 | 7705 | 7063 | 6474 | 5778 | 5215 | 4980 | 4760 | 4208 | 3225 |
| | Per cent | 8.3 | 8.6 | 8.2 | 7.9 | 7.6 | 7.4 | 7.1 | 6.6 | 6.4 | 5.4 |
| Rash/skin | n | 7361 | 6775 | 6052 | 5911 | 5277 | 4863 | 4630 | 5124 | 4648 | 4102 |
| | Per cent | 7.8 | 7.6 | 7.1 | 7.2 | 6.9 | 6.9 | 6.6 | 7.1 | 7.1 | 6.9 |
| Breathing | n | 6984 | 6471 | 6200 | 5820 | 4976 | 4500 | 4440 | 4300 | 3748 | 3356 |
| | Per cent | 7.4 | 7.2 | 7.2 | 7.1 | 6.5 | 6.4 | 6.4 | 6.0 | 5.7 | 5.6 |
| Genitourinary | n | 4396 | 4374 | 4485 | 4341 | 4205 | 3909 | 3983 | 4313 | 3917 | 3885 |
| | Per cent | 4.7 | 4.9 | 5.2 | 5.3 | 5.5 | 5.5 | 5.7 | 6.0 | 6.0 | 6.5 |
| Chest pain | n | 6277 | 5600 | 5149 | 4608 | 4010 | 3520 | 3331 | 3246 | 2809 | 2388 |
| | Per cent | 6.7 | 6.3 | 6.0 | 5.6 | 5.3 | 5.0 | 4.8 | 4.5 | 4.3 | 4.0 |
| Medication | n | 4846 | 4413 | 4387 | 3978 | 3723 | 3318 | 3178 | 3190 | 2882 | 2778 |
| | Per cent | 5.2 | 4.9 | 5.1 | 4.8 | 4.9 | 4.7 | 4.6 | 4.4 | 4.4 | 4.7 |
| Vomiting/nausea | n | 4159 | 3726 | 3453 | 3337 | 3075 | 2779 | 2582 | 2730 | 2555 | 2313 |
| | Per cent | 4.4 | 4.2 | 4.0 | 4.1 | 4.0 | 3.9 | 3.7 | 3.8 | 3.9 | 3.9 |
| Ear | n | 3526 | 3295 | 3078 | 2964 | 2616 | 2486 | 2581 | 2653 | 2612 | 2366 |
| | Per cent | 3.7 | 3.7 | 3.6 | 3.6 | 3.4 | 3.5 | 3.7 | 3.7 | 4.0 | 4.0 |
| Throat | n | 3291 | 3178 | 3168 | 2972 | 2674 | 2477 | 2411 | 2852 | 2583 | 2436 |
| | Per cent | 3.5 | 3.6 | 3.7 | 3.6 | 3.5 | 3.5 | 3.5 | 4.0 | 3.9 | 4.1 |
| Headache | n | 3570 | 3201 | 3062 | 2859 | 2606 | 2390 | 2379 | 2364 | 2141 | 1878 |
| | Per cent | 3.8 | 3.6 | 3.6 | 3.5 | 3.4 | 3.4 | 3.4 | 3.3 | 3.3 | 3.1 |
| Back | n | 3202 | 2963 | 2921 | 2730 | 2504 | 2202 | 2226 | 2175 | 1926 | 1674 |
| | Per cent | 3.4 | 3.3 | 3.4 | 3.3 | 3.3 | 3.1 | 3.2 | 3.0 | 2.9 | 2.8 |
| Mental health | n | 2726 | 2452 | 2181 | 1971 | 1714 | 1487 | 1360 | 1332 | 1077 | 972 |
| | Per cent | 2.9 | 2.7 | 2.5 | 2.4 | 2.3 | 2.1 | 1.9 | 1.9 | 1.6 | 1.6 |
| Cough | n | 3225 | 3030 | 2746 | 2655 | 2392 | 2246 | 2193 | 2384 | 2285 | 1965 |
| | Per cent | 3.4 | 3.4 | 3.2 | 3.2 | 3.1 | 3.2 | 3.1 | 3.3 | 3.5 | 3.3 |
| Eye | n | 2304 | 2265 | 2153 | 2140 | 2125 | 1992 | 2016 | 2164 | 2067 | 2062 |
| | Per cent | 2.4 | 2.5 | 2.5 | 2.6 | 2.8 | 2.8 | 2.9 | 3.0 | 3.2 | 3.5 |
| Pregnancy related | n | 2785 | 2255 | 2102 | 1857 | 1614 | 1364 | 1399 | 1375 | 1126 | 972 |
| | Per cent | 3.0 | 2.5 | 2.4 | 2.3 | 2.1 | 1.9 | 2.0 | 1.9 | 1.7 | 1.6 |
| Legs | n | 2434 | 2255 | 2150 | 2218 | 1942 | 1745 | 1776 | 1718 | 1612 | 1450 |
| | Per cent | 2.6 | 2.5 | 2.5 | 2.7 | 2.6 | 2.5 | 2.5 | 2.4 | 2.5 | 2.4 |
| Fever | n | 2333 | 2224 | 2105 | 2036 | 1934 | 1776 | 1807 | 1962 | 1816 | 1765 |
| | Per cent | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.6 | 2.7 | 2.8 | 3.0 |
| Injury/wound | n | 1978 | 2021 | 1978 | 2037 | 1845 | 1792 | 1739 | 1676 | 1573 | 1556 |
| | Per cent | 2.1 | 2.3 | 2.3 | 2.5 | 2.4 | 2.5 | 2.5 | 2.3 | 2.4 | 2.6 |
| Head related | n | 1999 | 1846 | 1810 | 1703 | 1656 | 1515 | 1450 | 1594 | 1415 | 1326 |
| | Per cent | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 |

Continued

Table 6 Continued

| Problem category | Most affluent n=94 060 | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Least affluent n=59 667 | |
|------------------|---------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------------------------|----------|
| | n | Per cent | n=89 309 | n=85 817 | n=82 083 | n=76 073 | n=70 632 | n=69 845 | n=71 868 | n=65 430 | n | Per cent |
| Feet | 1709 | 1.8 | 1648 | 1598 | 1591 | 1544 | 1344 | 1296 | 1353 | 1223 | 1164 | 2.0 |
| Hand | 1440 | 1.5 | 1468 | 1364 | 1352 | 1328 | 1221 | 1157 | 1195 | 1121 | 1058 | 1.8 |
| Baby/infant | 1530 | 1.6 | 1389 | 1234 | 1182 | 1097 | 952 | 971 | 1102 | 944 | 839 | 1.4 |
| Vaginal | 1704 | 1.8 | 1438 | 1359 | 1248 | 1107 | 1038 | 984 | 992 | 854 | 871 | 1.5 |
| Dizziness | 1374 | 1.5 | 1303 | 1319 | 1305 | 1236 | 1021 | 1090 | 1059 | 996 | 961 | 1.6 |

100% match in the free-text analysis and 94% match in the call listening analysis. This indicated that we could use, with a high degree of certainty, the primary algorithms launched by the call handlers to examine the symptoms and health problems people present to NHS 24. The algorithms could have been categorised in a number of different ways. Our approach grouped the algorithms together in the way that was most meaningful for the data we had and was based on independent advice and then consensus from three clinicians. Our approach means that symptoms are not categorised in the same way as some other studies have used, making direct comparison between studies difficult. It has however enabled us to explore a wider range of symptoms and health problems than previous studies have been able to examine. We did not double count individuals in the user data set analyses. Individuals who had phoned on more than one occasion could contribute to different problem categories, but only once to each specific problem category. We were unable to code 210 798 calls (16.4%) into a problem category, resulting in these calls being excluded from the analyses. This was mainly because the call did not have any record of an algorithm being launched (99.5% of uncoded calls). These missing data are likely to reflect calls that are closed quickly by the call handler as they required simple, quick health advice that did not warrant an algorithm being launched. The remaining 0.5% of uncoded calls had an algorithm launched, but the algorithm was uncommon and did not fit with one of the 70 defined problem categories used in this study. It is difficult to estimate how these missing data may have affected our results. In order to explore this, the free-text field of a random sample of 500 of these missing calls was undertaken. Analysis of this subsample of calls showed that there did not appear to be a consistent pattern in the types of symptoms called about suggesting no systematic bias had occurred, although clearly the symptoms in these calls are likely to have been less severe, reflecting health problems that could be given simple management advice. Deprivation deciles and urban/rural classifications of users were based on the postcodes logged on the NHS 24 system. The NHS 24 system automatically logs an address and postcode based on the location of the caller, not necessarily the user. Since calls are usually either made for the caller themselves or on behalf of the caller's partner or child, the caller and patient's postcode would be the same in the majority of cases. In some cases, however, (eg, calls made for a visiting relative) the caller's postcode will not match that of the patient and users will have been incorrectly allocated the postcode of the caller.

Comparison with existing literature

No previous studies have examined the symptoms and outcomes presented to NHS 24. Studies of NHS Direct data^{14 15} have examined age-specific samples and classified symptoms and outcomes in a different way to this

study, making direct comparison difficult. Broadly speaking, we found similar symptoms among children in our study as Cook *et al*,¹⁴ with infant-specific symptoms (such as crying) and skin problems commonest in those under 1 and skin problems commonest in those aged 1–4. For older children, we found abdominal problems to be most common while Cook *et al* found pain most common. Differences between the studies in coding abdominal pain may account for this apparent difference. In the over 65s, we found abdominal problems and breathing problems to be the commonest call reasons. These findings are broadly in line with Hsu *et al*,¹⁵ who reported pain, digestive problems and respiratory problems as the top three problems in this age group.

Several of the symptoms and health problems frequently reported in the community^{18–20} were not commonly found in the NHS 24 data set (eg, cold/flu, feeling tired/run down, joint pain and difficulty sleeping). In contrast, some infrequently reported symptoms in community surveys were relatively common in the NHS 24 data set (eg, chest pain and breathing problems). This suggests that people are selective about the types of problems they present to NHS 24; presenting symptoms that are more severe or more acute, particularly out-of hours. For most problems, onward referral to another healthcare professional or service was relatively common. Overall, only 10% of out-of-hours calls and 16% of in-hours calls resulted in self-care advice or information provision. This suggests that either, for the most part, people are using the service to deal with problems which require clinical care or that triage within the service remains relatively cautious.

We found that use of NHS 24 varied among different population groups and by time of call. Most calls (82.6%) were made out-of-hours and we found significant differences in the type, duration and outcome of symptoms presented in-hours compared with out-of-hours. Our findings suggest that people use NHS 24 very differently over these two periods with out-of-hours calls more frequently made for more urgent health problems, while in-hours calls tend to be for less urgent issues, requiring more general advice. This finding highlights that people appear to be using the service as policymakers intended, that is, predominantly out-of-hours to deal with immediate and unexpected health problems. However, differences in the use of the service at different times has important implications for the future planning and development of the service and our findings provide important information for health service planners on issues such as staffing structures and the skill-sets staff require at different times. The fact that people have limited alternative healthcare options out-of-hours (visiting an out-of-hours centre or A&E and calling an ambulance) will also influence what people do in this time period. A smaller proportion of males used the service than females, consistent with the use of primary care services in general² and use of telephone advice lines in

particular.^{15 21–23} However, when males did use NHS 24, a larger proportion of them used it in-hours rather than out-of-hours. We found that a smaller proportion of older users than younger users used the service. This contrasts with the use of many other healthcare services (in which older people are high users²), but is consistent with findings from studies examining use of NHS Direct, England's discontinued telephone advice line,^{23–25} replaced in 2014 with NHS 111.²⁶ This may reflect an unfamiliarity among older people with this type of service or an unwillingness to use telephone advice lines. Over time, this apparent age disparity is likely to reduce as younger adults, who seem more comfortable with using the service, age. This in turn should lead to a change in the characteristics of individuals using NHS 24 and will require the service to adapt, since older users are likely to have more complex health needs and use the service for different symptoms than younger age groups. Our data showed that less affluent individuals were less likely to use NHS 24. This is contrary to the use of other healthcare services in which deprivation is frequently associated with higher use.^{27 28} Studies of NHS Direct have also reported an association between high deprivation and low use of the telephone advice service,^{16 17 24 29} although there is some evidence that the relationship may not be linear. When those living in less affluent areas did use NHS 24, a higher proportion of them used the service out-of-hours than in-hours. As both older adults and less affluent individuals are likely to have poorer health than their counterparts, our finding of lower NHS 24 use in these potentially more vulnerable groups is interesting. Similar findings have been reported in relation to NHS Direct use.¹⁹ Improved education about NHS 24 and the range of services it offers may be of particular benefit to these groups to improve access to the service and should be explored by policymakers.

The outcome of both in-hours and out-of-hours calls varied among different population groups. While in many cases this may be a reflection of the nature of the problems being experienced or the general health of the user (eg, older people requiring more home visits and more ambulances), there were also some less obviously explicable trends. For example, those who were more affluent were more likely to be sent to or referred to A&E than those in the more deprived areas. Given the link between increasing deprivation and poorer health, this pattern seems counter-intuitive. Reasons for this finding are unclear; the more affluent may be better able to articulate their symptoms over the telephone or may be more specific in their demands for healthcare than less affluent individuals.

CONCLUSION

This is the first study to examine how the public uses NHS 24. It has identified the patterns of health problems and outcomes of calls presented to NHS 24 and

explored how these vary by time of call (in-hours and out-of-hours) and characteristics of the user (age, sex deprivation, etc). As such, it provides important new insights into how NHS 24 is currently being used, identifies the number and range of problems the service has to deal with and highlights the importance of NHS 24's role for managing symptoms and health problems in the community. This information will help with the future planning and development of the service (both in-hours and out-of-hours) to support healthcare across Scotland.

Contributors AME and PCH planned the study. All authors contributed to the design of the study and were grant holders. AME and AM conducted the analyses. AME produced the first draft of the paper. AM, PCH, DH and LDR read and commented on the paper. All authors have seen and approved the final version of the paper.

Funding This work was supported by the Chief Scientist Office, Scottish Executive (grant no. CZH/4/692).

Competing interests LDR served as a Non-Executive Director of NHS 24 from November 2001 to October 2007.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

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