



# Mapping the outcome of calls to the healthdirect helpline

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Centre for Big Data Research in Health

## Final Report

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## Executive summary

Healthdirect Australia procures and manages a telephone-based health care triage and advice service known as the healthdirect helpline, which is provided by a contractor, Medibank Health Solutions. This is a 24 hours a day, 7 days a week nurse triage service handling approximately 1,000,000 calls per year. In July-December 2013, 21% of calls were referred to the Commonwealth Government-funded after hours GP helpline, 20% were referred to self-care at home and 15% were advised to attend an emergency department (ED) immediately (Healthdirect Australia, 2014).

With the exception of two Western Australian studies, both of which were limited to patients attending a single hospital, i.e. Fremantle Hospital (Sprivulis, Carey & Rouse, 2004) and Royal Perth Hospital (Ng et al., 2012), we have little information about the outcomes of the service. We do not know the extent to which patients follow the advice of the healthdirect helpline to visit a GP or attend an ED. Nor do we know what happens to those patients who do, or do not, follow the advice given.

Linkage of healthdirect helpline operational call data with routinely collected data about subsequent service use and outcomes offers the potential to evaluate these services on a whole-of-population basis, and in a timely and efficient way.

## Project aims and objectives

This project aimed to use linked data to address four objectives:

- (i) quantify the extent to which healthdirect helpline advice is being followed;
- (ii) describe patient outcomes (including ED presentations, hospital admissions, deaths) following calls to the healthdirect helpline;
- (iii) identify the characteristics of patients (including demographics, geography, diagnoses) who are less likely to follow advice and/or who have unfavourable outcomes; and
- (iv) explore how features of Healthdirect Australia service provision (including guidelines used, who provided the advice, time of call) relate to (i) to (iii) above.

## Methods

This project linked healthdirect helpline and after hours GP helpline operational call data for New South Wales (NSW) and the Australian Capital Territory (ACT) with records of ED presentations, hospital admissions in NSW and ACT and death registrations in NSW. For a subset of callers who were aged 45 years and older and who participated in the 45 and Up Study, call records were also linked to a detailed self-completed questionnaire and Medicare Benefits Schedule (MBS) claims data. Data linkage was conducted by the Centre for Health Record Linkage (CHeReL).

Prior to data analysis, linked datasets were checked to ensure that all of the requested variables were present, and to identify duplicates, implausible dates and inconsistencies in the reporting of patient age and sex. Some healthdirect helpline calls were excluded on the basis of call type, final disposition, extremely frequent callers, records with extremely inconsistent information, and records where assessment of compliance or health outcomes was not possible.

Analyses included simple descriptive statistics (frequencies, percentages and contingency tables) and logistic regression modelling to examine factors associated with patient following the advice. The modelling and health outcome analyses were restricted to calls made in NSW only, because the linked data included records for only one (of two) major hospital in the ACT.

## Results

### Data linkage results

- During the study period (1 July 2008 and 31 December 2012), 1,346,521 calls were made to the healthdirect helpline in NSW and the ACT. These calls were for 773,741 individuals. Of these, 17,280 individuals were also participants in the 45 and Up Study.
- After data linkage and cleaning, a total of 1,202,599 calls to the healthdirect helpline in NSW and the ACT (714,502 individuals) were included in the analysis. Almost 90% of these calls were regarding patients who resided in NSW and 10% were for patients resident in the ACT. For participants in the 45 and Up Study, all of whom lived in NSW, 14,736 calls (10,446 participants) were included in the analysis.

### Descriptive characteristics of calls and patients

- Three-quarter of the calls were made after-hours with peak time of call being between 5PM and 10PM. The mean age of patients was 24 years (range 0 to 109) and 59% were female. Almost half (46%) of callers sought advice for their own health (i.e. the caller was also the patient), and 44% of callers were parents calling regarding their child under 5 years old.
- Fifty-eight percent of calls came from NSW metropolitan areas and 32% from NSW regional and rural areas. In NSW regional and rural areas, calls from the Hunter New England Local Health District (LHD) accounted for 51% of calls, which reflects the fact that 40% of the population of NSW regional and rural areas reside in the Hunter New England LHD catchment area.
- Overall, 41% of patients were advised to see a doctor in a given time frame, 23% were advised to self-care, 13% to attend ED immediately, and just over 3% were transferred to 000. Among patients advised to see a doctor, 20% were told to do so immediately, 30% within 4 hours, nearly 40% within 24 hours and 9% within 72 hours.
- The after hours GP helpline started from July 2011 and triaged 105,194 calls to December 2012 (NSW 92%, ACT 8%). After GP assessment, about 48% of patients received advice to self-care until they could see a GP in-hours, and 13% were instructed to attend ED immediately. About 12% were advised to see a GP immediately; and another 9% to see a GP immediately or to attend ED if a GP was not available. Nine percent of callers were given advice on self-care options without further referral.
- A total of 428 patient guidelines were used. The four most common guidelines were vomiting in children (4.2%), medication questions in an adult (3.3%), fever in children (3.0%) and abdominal pain or discomfort (2.7%).

### Compliance with disposition “Attend ED immediately”

- Patients were considered to have complied with the advice “Attend ED immediately” if they had a linked ED or hospital admission record within 24 hours of the call.
- All estimates of compliance calculated using linked ED data are conservative because smaller rural EDs are not included in the data, and some patients may have crossed state borders to attend EDs outside NSW or the ACT. Additionally, linked data for the ACT included records of ED visits and hospital admissions for only one (of two) major hospital in the ACT.
- The triage nurse advised patients to attend ED immediately for 155,526 calls, and the compliance was 67.4% (95% CI 67.2-67.7) among NSW patients and 40.0% (95% CI 39.3-40.8) among ACT patients.
- The after hours GP helpline advised patients to attend ED immediately for 13,639 calls; the compliance was 70.2% (95% CI 69.4-71.0) among NSW patients and 40.8% (95% CI 37.9-43.7) among ACT patients.
- Among patients who participated in the 45 and Up Study (NSW residents), 1,638 patients were advised by a nurse or GP to attend ED immediately. The compliance among these patients was 68.6% (95% CI 66.4-70.9).
- These compliance rates were relatively stable over time but varied according to patient and call characteristics.
- Multivariable modelling showed that for all NSW calls, compliance was higher among those living in less disadvantaged areas compared with those living in the most disadvantaged area, for parents calling on behalf of their children, for those whose original intention was to attend ED or call 000, for calls made after hours, and for calls transferred to after hours GP.
- Conversely, compliance was lower among patients aged 18-54 years and those who lived in regional and remote areas, and decreased with increasing numbers of calls to the healthdirect helpline in the last 6 months.
- Among participants in the 45 and Up Study, for whom detailed questionnaire data were available, compliance was significantly lower in participants living in outer regional and remote areas, in those with high or very high levels of psychological distress. There were no significant associations between compliance and measures of lifestyle (smoking, alcohol drinking, obesity, physical activity), health status (physical functioning, number of health conditions, number of medications) and other socio-demographic factors (marital status, country of birth, education, household income, working status, private health insurance).

### Compliance with disposition “See doctor or GP immediately, within 4 hours or 24 hours”

- Compliance with the dispositions “See doctor or GP immediately, within 4 hours or 24 hours” could only be assessed for participants in the 45 and Up Study, for whom linked MBS data were available. Compliance was defined as patient having a linked ED or hospital record within 24 hours of the call or a linked MBS record for a medical attendance on the same day or the next day.
- Among 6,384 calls for patients in the 45 and Up Study, the compliance rate was 64.6% (95% CI 63.4-65.8).
- Participants who were older, working full-time, living in areas of middle and higher socioeconomic status, and were physically active were more likely to comply with

advice to see a doctor or GP. Those who lived in rural and remote areas or who took a larger number of medications were less likely to comply.

- Compliance was higher among calls transferred to after-hour GP helpline, calls initiated by another person on the patient's behalf and among those patients whose original intention was to call 000, self-refer to an ED, or contact a health care provider.

#### Compliance with disposition "Self-care only"

- Compliance with the disposition "Self-care only" could only be assessed for participants in the 45 and Up Study, for whom linked MBS data were available. Compliance was defined as having no linked ED, hospital or MBS records for a medical attendance within 48 hours of the call.
- Among 1,656 calls for patients in the 45 and Up Study, 77.5% (95% CI 75.5-79.5) met this definition of compliance.
- Patients who were aged 65 years and older were less likely to comply with advice to self-care at home. Those who were "non-compliant" are likely to experience health status changed in the period up to 48 hours following their healthdirect call. Compliance with this advice did not vary greatly according to patient socio-demographic, life style, health status or call-related factors.

#### Compliance with other dispositions

- Compliance with other dispositions could only be assessed for participants in the 45 and Up Study, for whom linked MBS data were available.
- Among 864 patients who were advised to "See doctor within 72 hours", 422 (48.8%, 95% CI 45.5-52.2) had a linked ED or hospital record within 72 hours of the call or a linked MBS medical attendance within 4 days.
- Among 304 patients who were given the advice "See doctor within 2 weeks", 195 (64.1%, 95% CI 58.8-69.5) had a linked ED, hospital or MBS medical attendance record within 2 weeks of the call.
- Among 322 patients were told to self-care and see a GP in-hours, 158 (49.1%, 95% CI 43.6-54.5), had no linked ED, hospital or MBS medical attendance records within 4 days of the call.

#### Self-referral to ED or hospital within 24 hours

- Self-referral to ED or hospital was defined as having a linked record for an ED presentation or hospital admission within 24 hours of the call among patients who were given advice to self-care or to seek care from providers other than in ED or hospital settings within a less urgent time frame.
- Among all NSW calls, the rate of self-referral to ED or hospital was 6.9% (95% CI 6.8-7.0).
- Self-referral to ED or hospital was more likely in males, older patients, when the call to the healthdirect helpline was made after hours, where the caller's original intention was to call 000 or attend ED, where they were transferred to the after hours GP, and where the caller was the child, grandchild or spouse of the patient. Self-referral was less likely for those in higher socio-economic status areas, those in remote and very remote areas, and for those whose carers were calling on their behalf.
- Among 45 and Up Study participants, the rate of self-referral to ED or hospital was 7.5% (95% CI 6.7-8.4, 261 out of 3,458). Self-referral to ED or hospital was more

likely among older patients, calls made to the healthdirect helpline after hours, where the caller was a carer, parent or grandchild, and among callers whose original intention was to call 000 or attend ED. Self-referral varied little according to patient health status.

#### Acuity among healthdirect helpline patients who attended ED or hospital within 24 hours

- Among all NSW patients who were advised “Attend ED immediately” by the nurse or GP, 94.5% and 93.6%, respectively, did so within 4 hours. Among patients in the 45 and Up Study, 95.7% of patients who were told “Attend ED immediately” and 87.6% of patients who were told “See a doctor or a GP immediately, within 4 or 24 hours” visited ED or hospital in 4 hours from call.
- Attending ED or hospital within 4 hours from call was significantly less frequent among patients who were given advice to self-care or seek care from providers other than in ED or hospital settings. Only 46.6% of all NSW patients and 52.1% of 45 and Up participants who self-referred to ED or hospital presented within 4 hours.
- In relation to “emergency” ED presentations (care required within 10 minutes), healthdirect patients who presented to ED within 24 hours of the call were less likely to be assessed as emergency than the general population who attended public EDs in NSW during the same period (8.6%). The figure was 6.5% and 5.4% among all healthdirect patients in NSW who were told “Attend ED immediately”, respectively, by the nurse or GP, 4.9% among 45 and Up Study patients who were told “See a doctor or a GP immediately, within 4 or 24 hours”, 3.5% among all NSW patients and 4.7% among 45 and Up Study patients who self-referred to ED. The exception was 12.5% of 45 and Up Study patients who were told “Attend ED immediately” had emergency presentations.
- With regards to “urgent” ED presentations (care required within 30 minutes), healthdirect helpline patients who received the advice “Attend ED immediately” had proportionately more urgent presentations (37.1% among all patients and 40.8% among 45 and Up Study patients) than the general population (30.5%). The proportions of urgent presentations among patients who were told “See a doctor or GP immediately, within 4 or 24 hours” (29.5%) and those who self-referred to ED (30.0% for all patients and 27.7% for patients in the 45 and Up Study) were similar to the general population (30.5%).
- In terms of “non-urgent” ED presentation (care required within 120 minutes), healthdirect helpline patients had proportionately fewer non-urgent presentations than the general population (15.6%). The figure was 14.5% among all patients who self-referred, 12.8% among 45 and Up Study patients who self-referred, 11.7% among 45 and Up Study patients who were told “See a doctor or GP immediately, within 4 or 24 hours”, 9.0% among all patients” and 6.9% of 45 and Up Study patients who received the advice “Attend ED immediately.
- Overall, the patterns of acuity among NSW patients who received complete triage by the nurse and those who were transferred to after hours GP helpline were similar.
- The patterns of acuity among patients who were given advice by triage nurse were relatively stable over time.

## Health outcomes

- Patient health outcomes were examined among 1,081,836 calls made to the healthdirect helpline for NSW patients between 1 July 2008 and 31 December 2012, including those transferred to the after hours GP helpline. Of these, 327,427 calls (30.3%) were followed by an ED visit within 7 days, and 95,230 calls (8.8%) were followed by a hospital admission within 7 days. Those calls most likely to be followed by an ED or hospital visit within 7 days were those that received the most urgent dispositions, “Activate 000” (72.1%) or “Attend ED immediately” (69.2%).
- The likelihood of a call being followed by an ED or hospital visit increased with increasing age, and was higher for calls where children or grandchildren were calling on behalf of parents or grandparents. This probably reflects the fact that older people have an underlying higher rate of ED and hospital admissions than younger people.
- 542 patients who were the subject of a call to the NSW healthdirect helpline died within seven days of the call. These patients had a mean age of 72 years (range 0 to 99 years), 81% were aged 60 years and older, and 52% were male.

## What this study adds to the international literature

- To our knowledge, this is the most comprehensive research project worldwide that evaluates compliance, factors associated with compliance, and health outcomes of patients seeking health advice from a telephone triage service. This project is one of only a few that has linked call data to other health services for a whole population, thus providing more reliable and generalizable findings than those that focused on a subgroup of the population (such as hospital patients, people using health insurance funds).
- Rates of compliance with advice found in this project are generally within the range reported in the international literature (56%-98%) (Blank et al., 2012). Compared to a Canadian study (De Coster et al., 2010) which used similar data linkage methods and definitions of compliance, healthdirect helpline patients had higher rates of compliance with advice to attend an ED immediately (67.6% vs 52.3%), to see a doctor or a GP immediately, within 4 hours or 24 hours (64.6% vs 43.2%), but slightly lower compliance with “self-care only” advice (77.5% vs 83.7%).
- Compared to previous findings about self-referral to ED among healthdirect helpline patients, our finding (6.9% for all patients) was slightly lower than that reported by Sprivulis and colleagues in 2004 (i.e. 9.0% of calls within 2km from Fremantle Hospital in Western Australia) and slightly higher than that reported by Ng and colleagues in 2012 (4.9% of patients who attended Royal Perth Hospital ED were given advice to see a GP within 2 weeks or self-care). Although Ng and colleagues reported that 52.4% of patients (n=280 out of 534) who contacted the healthdirect helpline had a subsequent visit to the ED of Royal Perth Hospital despite advice to the contrary, the majority of these patients (n=254) were given advice to see GP urgently or within 24 hours which were not defined as self-referral in our study.
- Our findings were consistent with literature that compliance is strongly related with patient age, residential location, after-hours time of call and patient original intention. Our project was the first, to our knowledge, to examine the relationship between numbers of previous calls and compliance, and we found a strong and negative relationship between the number of previous calls in a six-month period and

compliance with advice to attend ED but no relationship between numbers of calls in the past six months with self-referral to ED or hospital.

- This project also for the first time examined the potential influence of self-reported health related factors and found that patients with high or very high levels of psychological distress were significantly less likely to comply with advice to attend an ED, while compliance did not vary markedly according to other health- and lifestyle-related factors.

### Implications for practice

- The findings suggest that patient compliance with healthdirect advice is driven both by patient factors (demand-side) and factors relating to service accessibility (supply-side).
- Knowledge of the types of patient who are less likely to comply ( working age, living in rural and remote areas, multiple calls to healthdirect, high levels of psychological distress) will assist in refining patient guidelines and training triage staff to give advice that best encourages patient compliance.
- The importance of the patient's original intention in driving their compliance and non-compliance suggest that there may be value in building in an extra check for those patients whose original intention is very divergent from their triaged disposition. Such divergence may suggest that important information was not elicited or discussed during the triage process.
- Knowledge about the importance of supply-side factors (calls made after-hours, patients in regional and remote areas) will assist in refining patient guidelines and training triage staff to give dispositions that are appropriate based on the services available to that patient.
- The project findings with regard to variation in compliance and patient outcomes according to patient guideline provide pointers to those guidelines that should be prioritised for review and revision.

### Implications for research

- The findings of this research project suggest that patients referred to ED by the healthdirect helpline have a higher level of clinical urgency or acuity than the general population of ED patients. However, only aggregate statewide data for the general population of ED patients was available, so this study could not investigate how patients referred by healthdirect compared with other patients of similar age and sex attending the same ED. These comparisons would assist in evaluating the appropriateness of healthdirect referrals.
- A larger-scale data linkage study, incorporating data from Western Australia, South Australia and New South Wales, and comprehensive linkage of Medicare data for patients of all ages, would allow exploration of how healthdirect services operate within the broader system dynamics of primary care and acute services, and their impacts on ED waiting times, and GP and ED casemix.

Using routinely collected data to explore in depth the appropriateness of healthdirect referrals is not possible, in particular because these data contain no information about the

progression of the patient's symptoms following a healthdirect call. Study designs involving analysis of recorded calls for real and/or mock patients, and comparison of the triaged dispositions with expert opinion or a "gold standard" could be used to investigate the appropriateness of healthdirect referrals.