Using linked data to plan and evaluate policies and programs

Louisa Jorm 22 June 2016
Summary

• Strengths of linked data for evaluation
• Limitations of linked data for evaluation
• Examples
  – Evaluating impact of the Baby Bonus on birth rates
  – IHOPE: improving access to cataract surgery
  – Mapping the outcomes of calls to healthdirect Australia
Strengths of linked data for evaluation

- Complete, population-based
- Data already available
- Supports a range of study designs
  - Interrupted time series
  - Comparison of exposed and unexposed (geographic areas, hospitals, hospital wards etc)
  - Long-term follow-up of randomised controlled trials
- Cost-effective
Limitations of linked data for evaluation

• Data were collected for other purposes
  – May lack information on key outcomes, exposures, confounders
• Data may be of questionable quality, reliability, and validity
• Data may not be readily accessible for evaluation purposes
  – Cumbersome approval processes
Impact of the Baby Bonus

• Objective:
  – Assess change in birth rates after the introduction of the Baby Bonus payment in Australia on 1 July 2004.

• Data:
  – Birth data (numerator) from NSW Perinatal Data Collection
  – Population data (denominator) from ABS ERPs
  – Stratified by age group, statistical local area and parity

• Analysis:
  – Poisson regression analysis
  – Continuous variable for year to assess underlying time trend
  – Dummy variables for 2005 and 2006 to assess deviations from the previous years’ trend

Impact of the Baby Bonus

• Results:
  – Crude annual birth rate showed a downward trend from 1997 to 2004
  – After 2004 this trend reversed with a sharp increase in 2005 and a further increase in 2006.
  – All age-specific birth rates increased after 2004, with the greatest increase in birth rate, relative to the trend before the Baby Bonus, being seen in teenagers.
  – Rates of first births were not significantly affected by the bonus
  – Rates of third or subsequent births increased across all age, socioeconomic and geographical subgroups.

IHOPE: improving access to cataract surgery

• Procedure rates in NSW 2001 to 2008:
  – 641 per 100000 for Aboriginal people
  – 863 per 100000 for non-Aboriginal people
  – Rate ratio of 0.74 (0.71-0.77)

• Despite evidence that Aboriginal people have a higher prevalence of cataracts

Disparity by SES and remoteness

Socio-economic status of area of residence

Disparity is greatest in less disadvantaged and more urban areas

Remoteness of area of residence
How do rates of cataract surgery for Aboriginal people vary by area?

*Rates of cataract surgery by Statistical Local Area*

How does the disparity in rates of cataract surgery vary by area?

The rate of cataract surgery is lower for Aboriginal people in almost all areas in NSW, with notable exceptions.

Areas with higher rates of cataract surgery in Aboriginal people

Summary - Cataract surgery rates

Where are the gaps?

Rates of cataract surgery

Aboriginal people are less likely to get cataract surgery than non-Aboriginal people, particularly in major cities, despite evidence that rates of cataract higher in Aboriginal people.

Areas with targeted services for Aboriginal people go against the trend!

To increase the numbers of cataract surgeries provided, issues of availability and accessibility of public services, cost, and cultural competency in each region, particularly in major cities, need to be improved.
Mapping the outcomes of calls to healthdirect Australia
Project objectives

- Quantify the extent to which healthdirect Australia advice is being followed
- Describe patient outcomes (including ED presentations, hospital admissions, deaths) following calls to healthdirect Australia
- Identify the characteristics of patients who are less likely to follow advice and/or who have unfavourable outcomes
- Explore how features of healthdirect Australia service provision relate to (i) to (iii)
healthdirect Australia

- Telephone triage service which caters for six of the eight Australian States and Territories
- Operates 24 hours a day, seven days a week
- Between 2009 and 2012, handled an average of 785,720 calls per
- Calls are mostly triaged by registered nurses, but since July 2011 some calls are transferred to an After-hours GP for triage
- Triage staff members assess health symptoms using a computerised clinical decision support system (CareEnhance Call Centre Software).
## Results of data linkage

<table>
<thead>
<tr>
<th>Data sets</th>
<th>No of records</th>
<th>No of persons (%)</th>
<th>Time period</th>
</tr>
</thead>
<tbody>
<tr>
<td>healthdirect helpline</td>
<td>1,346,521</td>
<td>773,741 (100%)</td>
<td>1/7/2008 – 31/12/2012</td>
</tr>
<tr>
<td>ED data NSW</td>
<td>3,013,608</td>
<td>568,907 (73.5%)</td>
<td>1/1/2006 – 31/3/2014</td>
</tr>
<tr>
<td>ED data ACT</td>
<td>122,770</td>
<td>42,536 (5.5%)</td>
<td>1/1/2006 – 30/6/2013</td>
</tr>
<tr>
<td>Admitted data NSW</td>
<td>2,502,318</td>
<td>547,848 (70.8%)</td>
<td>1/1/2006 – 31/3/2014</td>
</tr>
<tr>
<td>Admitted data ACT</td>
<td>105,569</td>
<td>35,022 (4.5%)</td>
<td>1/1/2006 – 30/6/2013</td>
</tr>
<tr>
<td>RBDM NSW</td>
<td>16,068</td>
<td>15,965 (2.1%)</td>
<td>1/1/2006 – 31/3/2014</td>
</tr>
<tr>
<td>45 and Up Questionnaire</td>
<td>17,280</td>
<td>17,280 (2.2%)</td>
<td>2006 – 12/2009</td>
</tr>
<tr>
<td>45 and Up MBS</td>
<td>4,074,521</td>
<td></td>
<td>1/1/2006 – 31/12/2011</td>
</tr>
</tbody>
</table>
Data preparation

Original unlinked *healthdirect* dataset
1,386,691 calls

CHeReL provision of PPN

**Number of calls (persons) excluded**

- 19,418: without a corresponding PPN
- 130,115: Non-triaged calls (for health information and/or referral only)
  - 10,533: Quick calls,
  - 84: Unknown type of call
  - 125: Nurse triaged calls with non-assessable dispositions
- 533 (113 persons): Likely wrong linkages
- 6,298 (11 persons): "Extremely frequent callers"
- 16,986 (4,141 persons): Inconsistent caller-patient information

**Included: “All subjects of calls”**
1,202,599 calls  (714,502 persons)

Subjects in the 45 and Up Study
17,280 persons – 26,392 calls

- 1,673: met above exclusion criteria
- 240: inconsistent sex-age
- 286: DVA card holder
- 5: Did not have any call
- 4,666: the first call was after 15 Dec 2011

**Included: “45 and Up Study participants”**
10,446 persons – 14,736 calls

**Included: “All subjects of calls”**
1,202,599 calls  (714,502 persons)
Definitions

• “Attend ED immediately”
  – By triage nurse: “Attend ED immediately” or “Attend ED with obstetric facility immediately”
  – By after hours GP: “Attend ED immediately” or “Attend ED immediately if GP not available”.

• Compliance: having a linked ED presentation or hospital admission record within 24 hours of the call.

• Non-compliance: absence of any ED presentation or hospital admission records within 24 hours of the call.
Factors associated with compliance

Patient characteristics

Patient age
- 0-4 years
- 5-9 years
- 10-14 years
- 15-17 years
- 18-34 years
- 35-44 years
- 45-54 years
- 55-64 years
- 65-74 years
- 75+ years

Patient sex
- Females
- Males

SEIFA
- Quintile 1 (Lowest SES)
- Quintile 2
- Quintile 3
- Quintile 4
- Quintile 5 (Highest SES)

Lowest compliance in patients aged 18-54 yrs

Higher compliance in SES quintiles 2 and 3

Call characteristics

Triage staff and call time
- Nurse in hours
- Nurse after hours
- GP after hours

Original intention
- Attend ED
- Call OOO
- Contact Dr
- Home, self-care
- Did not know what to do
- Non-professional advice
- Missing intention

Remoteness
- Major city
- Inner regional
- Outer regional
- Remote or very remote

Healthdirect calls in past 6 months
- 0
- 1
- 2-3
- 4-9
- 10-19
- 20+

Highest compliance when original intention was to attend ED

Compliance lower in more remote areas

More frequent callers are less compliant
Definition: Self-referral

- Presence of a record for an ED presentation or hospital admission within 24 hours of the call among patients who were given the following dispositions:
  - Self-care only (nurse or GP helpline)
  - See a doctor within 72 hours and within 2 weeks (nurse)
  - See a dentist within 4 hours, 24 hours, 72 hours or 2 weeks (nurse)
  - See an appropriate health provider within 72 hours or 2 weeks (nurse)
## Self-referral to ED

<table>
<thead>
<tr>
<th>State/Territory</th>
<th>Number</th>
<th>Self-referral rate % (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>NSW Overall</td>
<td>19,214</td>
<td>288,636</td>
</tr>
</tbody>
</table>
Factors associated with self-referral

**Patient characteristics**
- **Patient age**
  - 0-4 years
  - 5-9 years
  - 10-14 years
  - 15-17 years
  - 18-34 years
  - 35-44 years
  - 45-54 years
  - 55-64 years
  - 65-74 years
  - 75+ years
- **Patient sex**
  - Females
  - Males
- **SEIFA**
  - Quintile 1 (Lowest SES)
  - Quintile 2
  - Quintile 3
  - Quintile 4
  - Quintile 5 (Highest SES)

**Call characteristics**
- **Triage staff and call time**
  - Nurse in hours
  - Nurse after hours
  - GP after hours
- **Original intention**
  - Attend ED
  - Call OOO
  - Contact Dr
  - Home, self-care
  - Did not know what to do
  - Non-professional advice
  - Missing intention
- **Remoteness**
  - Major city
  - Inner regional
  - Outer regional
  - Remote or very remote
- **Healthdirect calls in past 6 months**
  - 0
  - 1
  - 2-3
  - 4-9
  - 10-19
  - 20+

- More likely in older callers
- Less likely in SES quintiles 4 and 5
- More likely if original intention was to call 000 or attend ED
- Less likely in remote or very remote areas
Most patients referred to ED attended within 4 hours

Self-referrals attended over a more extended period after the call
ED triage categories

Triage categories at ED attendance (age-standardised)

- Healthdirect compliant attenders
  - Fewer non-urgent patients than general population
  - More ATS 3 (30 min) patients than general population

- Healthdirect self-referred
  - Similar non-urgent patients to general population

- NSW Population ED attenders
  - Similar non-urgent patients to general population

Percentage

- ATS 5
- ATS 4
- ATS 3
- ATS 2
- ATS 1
Triage categories among compliant patients presenting to ED

*healthdirect helpline patients living in NSW who attended an ED within 24 hours (compliant with disposition)

**All patients attending all public EDs in NSW. Source: Australian Institute of Health and Welfare
Implications for practice

• 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 will assist in refining patient guidelines and training triage staff to give advice that best encourages patient compliance
  – live in rural and remote areas
  – multiple calls to healthdirect
  – high levels of psychological distress
Implications for practice

• Knowledge about the importance of supply-side factors will assist in refining patient guidelines and training triage staff to give dispositions that are appropriate based on the services available to that patient
  – calls made after-hours
  – patients in regional and remote areas
Implications for practice

• Patient’s original intention is a key driver of compliance and non-compliance
  – 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.
• Variation in compliance and patient outcomes according to patient guideline provides pointers to those guidelines that should be prioritised for review and revision.
Research team

- Amy Gibson
- Deborah Randall
- Duong (Danielle) Tran
- Alys Havard
- Mary Byrne
- Maureen Robinson
- Anthony Lawler
- Louisa Jorm
Useful references

• Medical Research Council 2012. Using natural experiments to evaluate population health interventions: guidance for producers and users of evidence. Available at: www.mrc.ac.uk/naturalexperimentsguidance

