



Using linked data to plan and evaluate policies and programs

Louisa Jorm 22 June 2016

Never Stand Still

Medicine

Centre for Big Data Research in Health





<http://www.datanetwork.org/about-us/>



UNSW
AUSTRALIA



CENTRE FOR
BIG DATA RESEARCH
IN HEALTH

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

Lain SJ, Ford JB, Raynes-Greenow CH et al. The impact of the Baby Bonus payment in New South Wales: who is having “one for the country”? *Med J Aust* 2009; 190 (5): 238-241.



UNSW
AUSTRALIA



CENTRE FOR
BIG DATA RESEARCH
IN HEALTH

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.

Lain SJ, Ford JB, Raynes-Greenow CH et al. The impact of the Baby Bonus payment in New South Wales: who is having “one for the country”? *Med J Aust* 2009; 190 (5): 238-241.

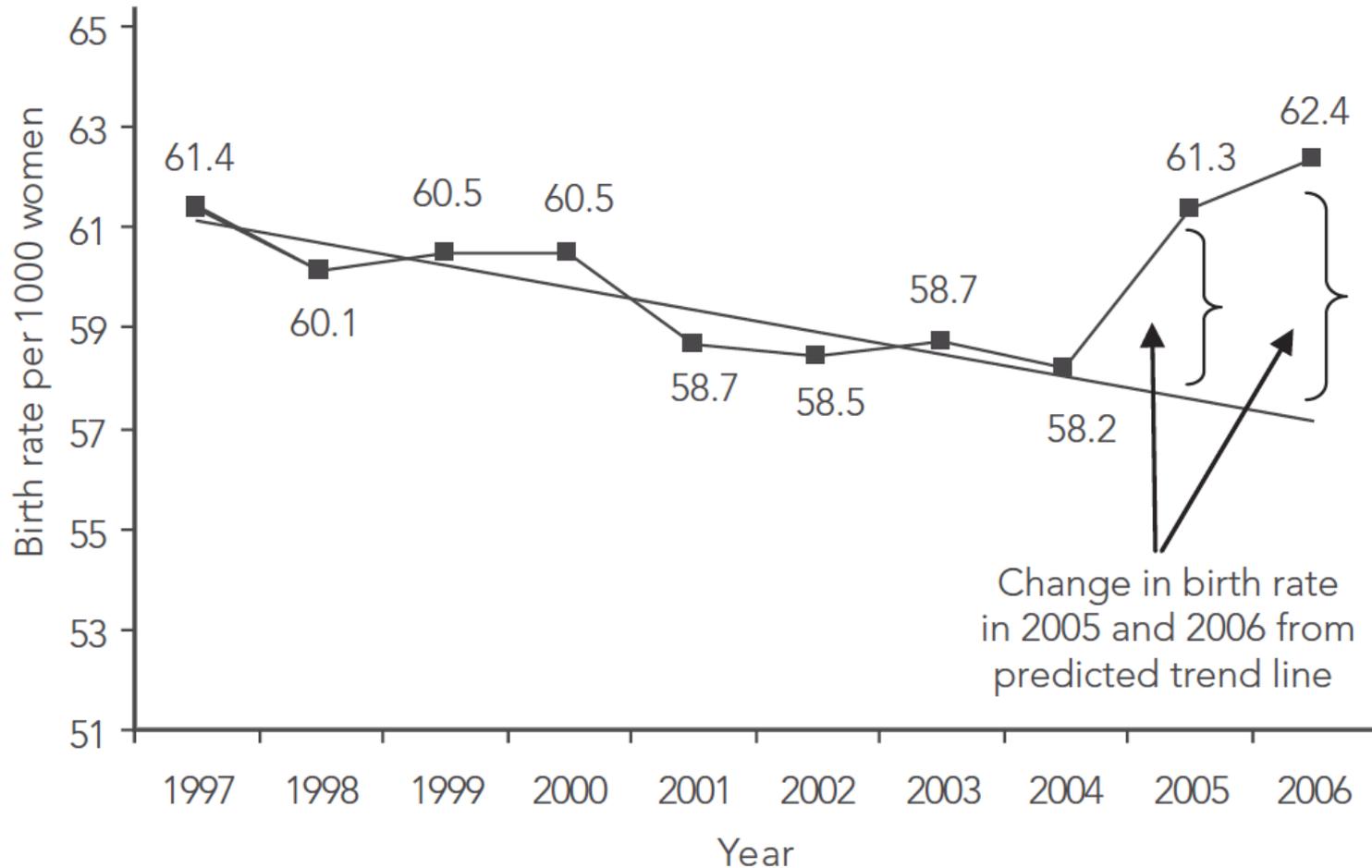


UNSW
AUSTRALIA



CENTRE FOR
BIG DATA RESEARCH
IN HEALTH

2 Birth rate per 1000 women aged 15–44 years in 1997–2006 in New South Wales, and birth-rate trend line before the introduction of the Baby Bonus policy



IHOPE: improving access to cataract surgery

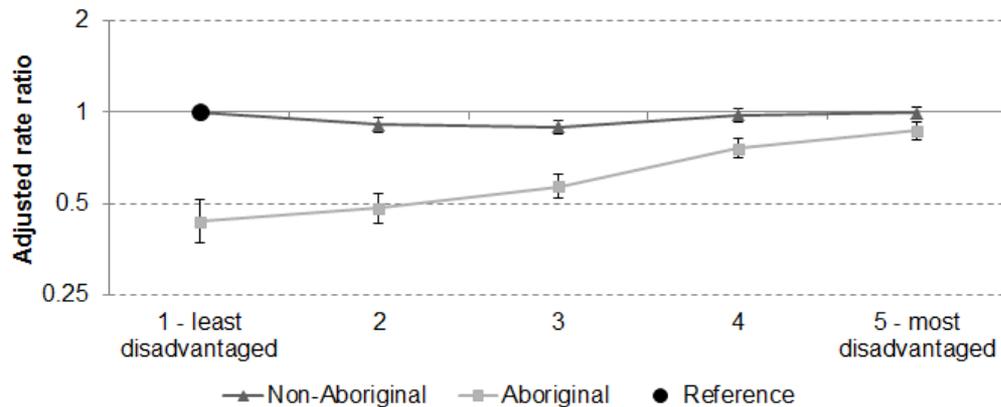
- Procedure rates in NSW 2001 to 2008:
 - 641 per 100000 for Aboriginal people
 - 863 per 100000 for non-Aboriginal people
 - Rate ratio of 0.74 (0.71-0.77)
- Despite evidence that Aboriginal people have a higher prevalence of cataracts

Randall DA, Reinten T, Maher L, Lujic S, Stewart J, Keay L, Leyland AH, Jorm LR. *Clinical and Experimental Ophthalmology* 2013. DOI: 10.1111/ceo.12274



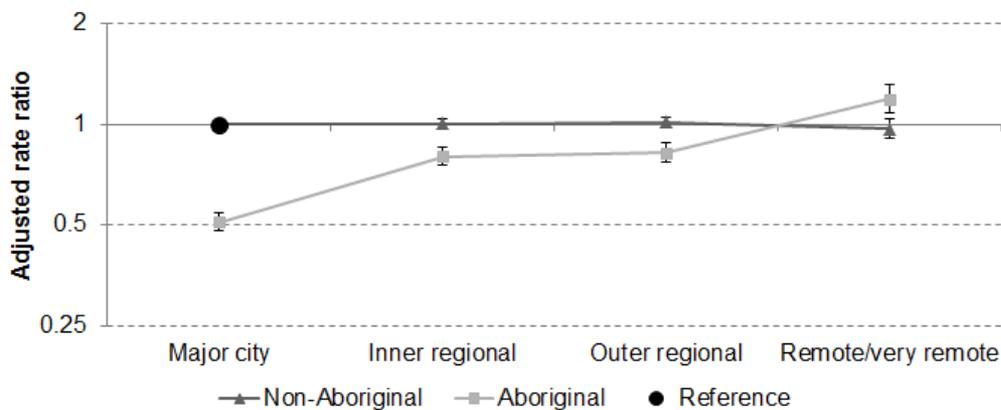
Disparity by SES and remoteness

Socio-economic status of area of residence



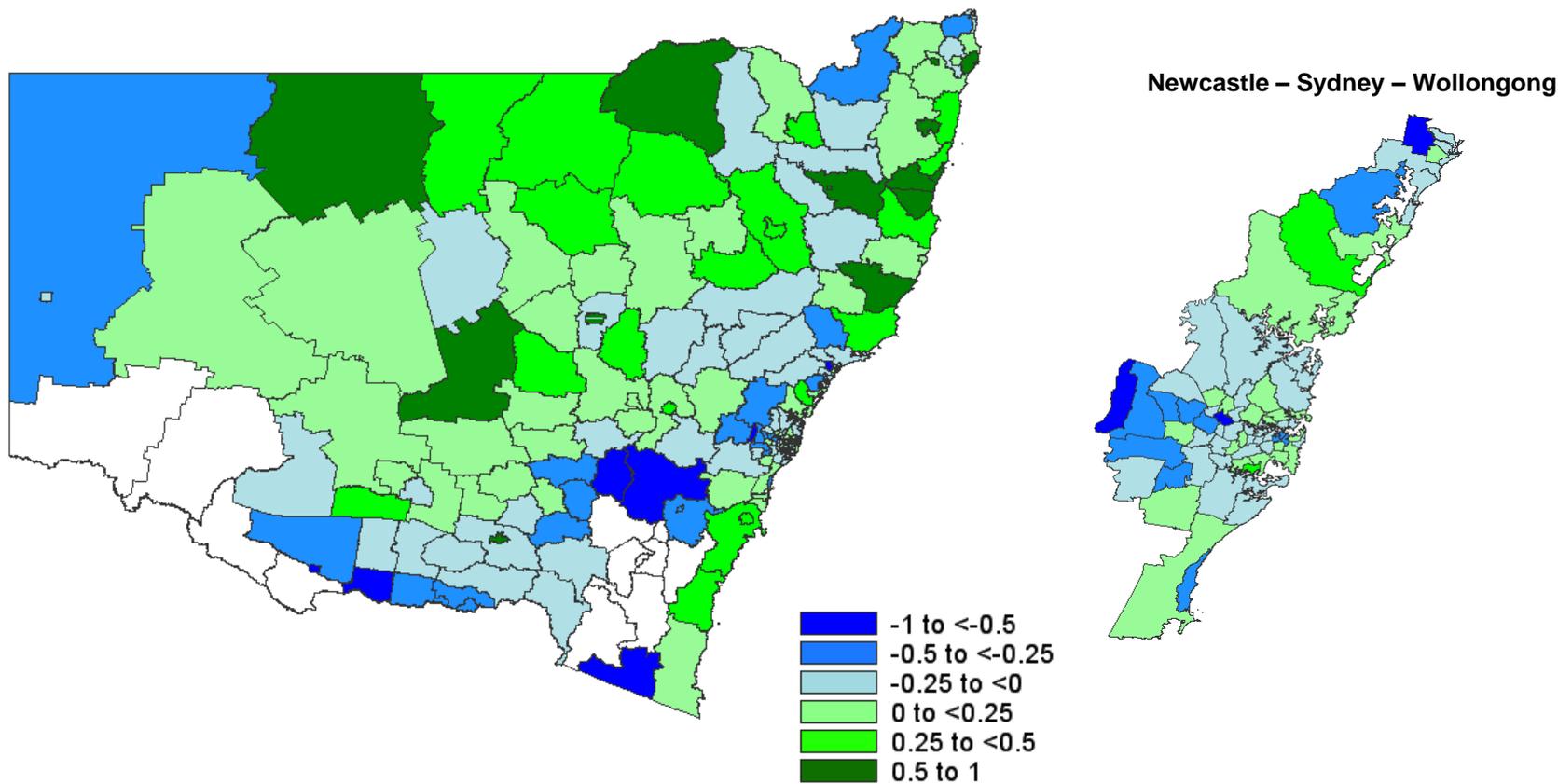
Disparity is greatest in less disadvantaged and more urban areas

Remoteness of area of residence



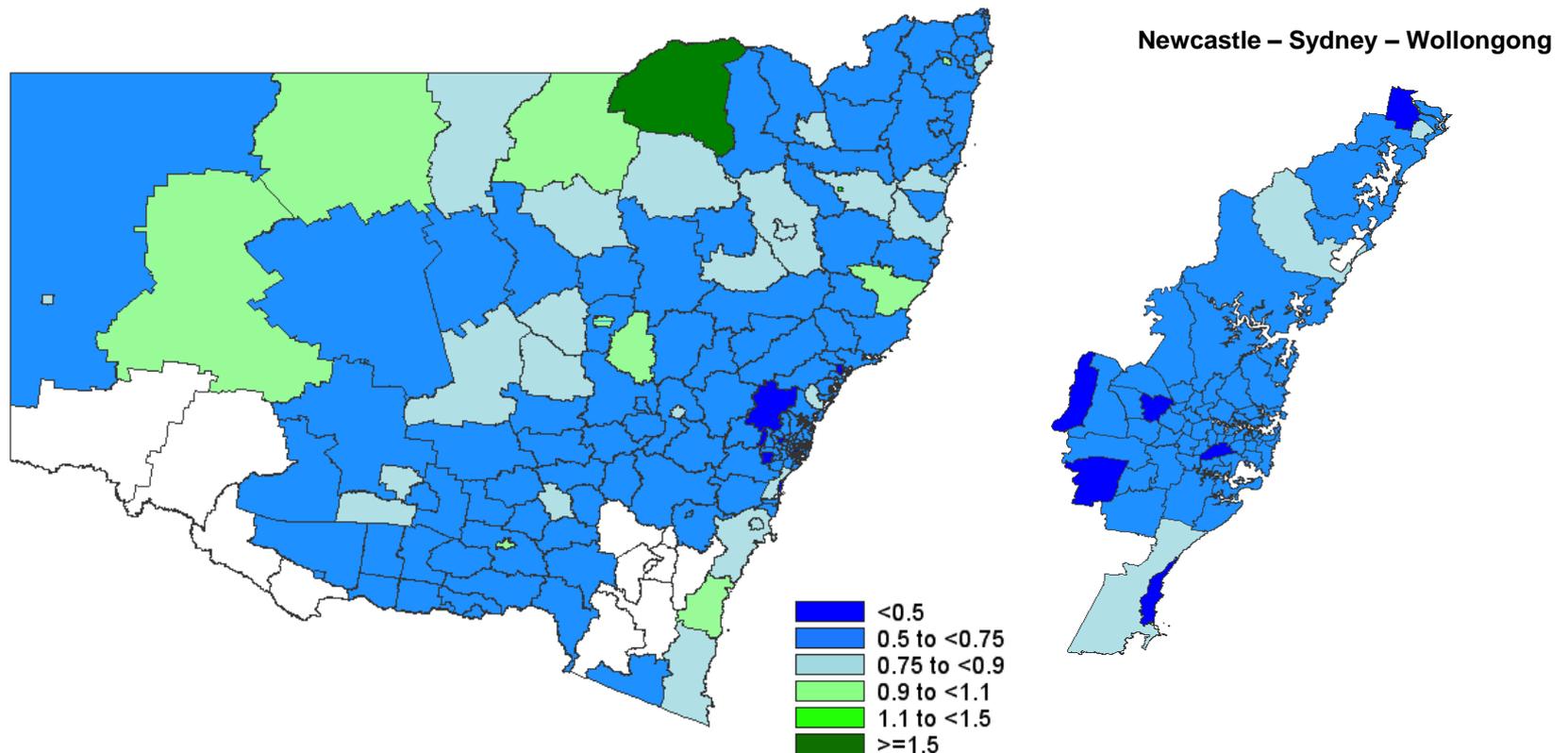
How do rates of cataract surgery for Aboriginal people vary by area?

Rates of cataract surgery by Statistical Local Area

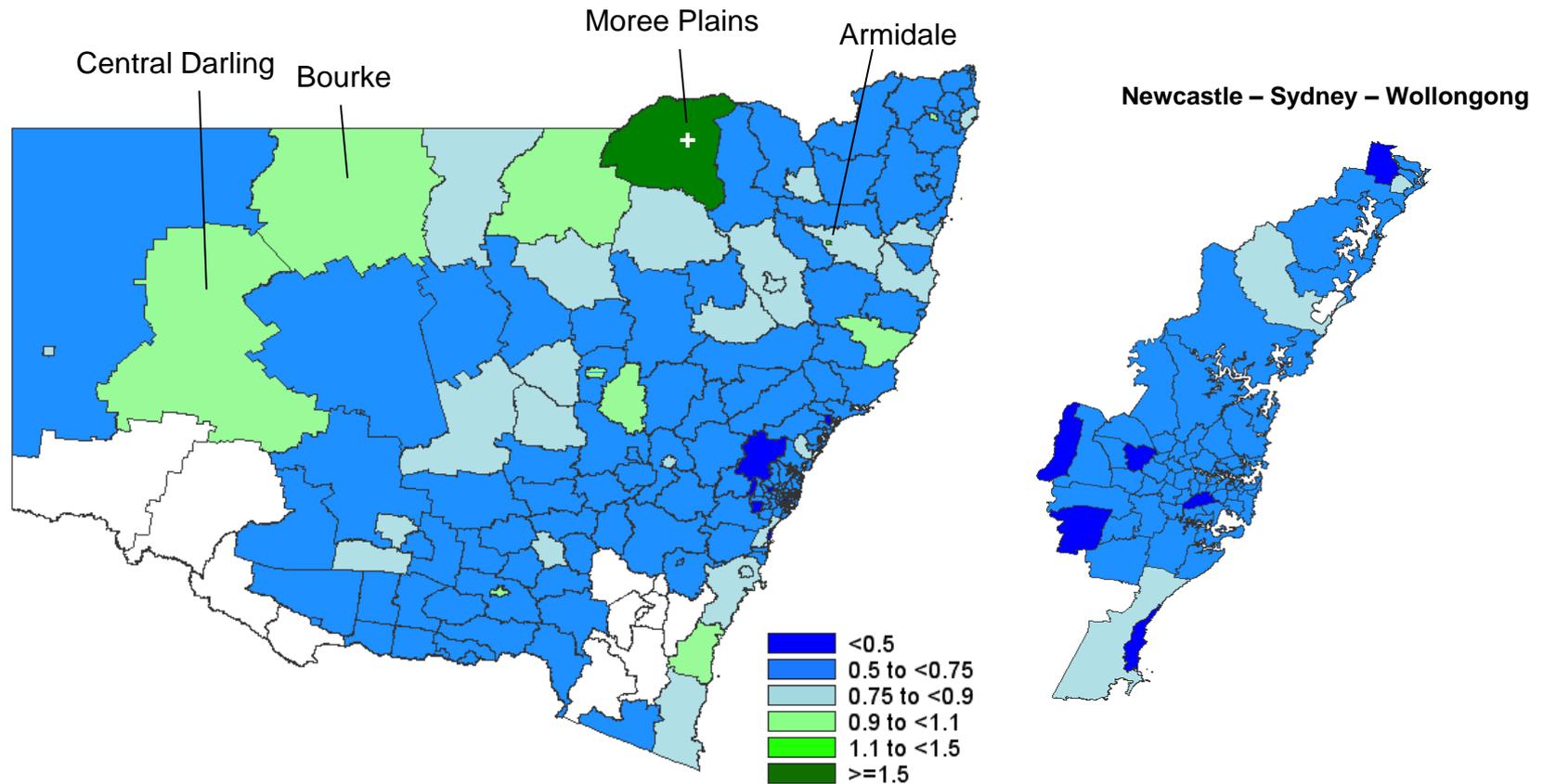


How does the disparity in rates of cataract surgery vary by area?

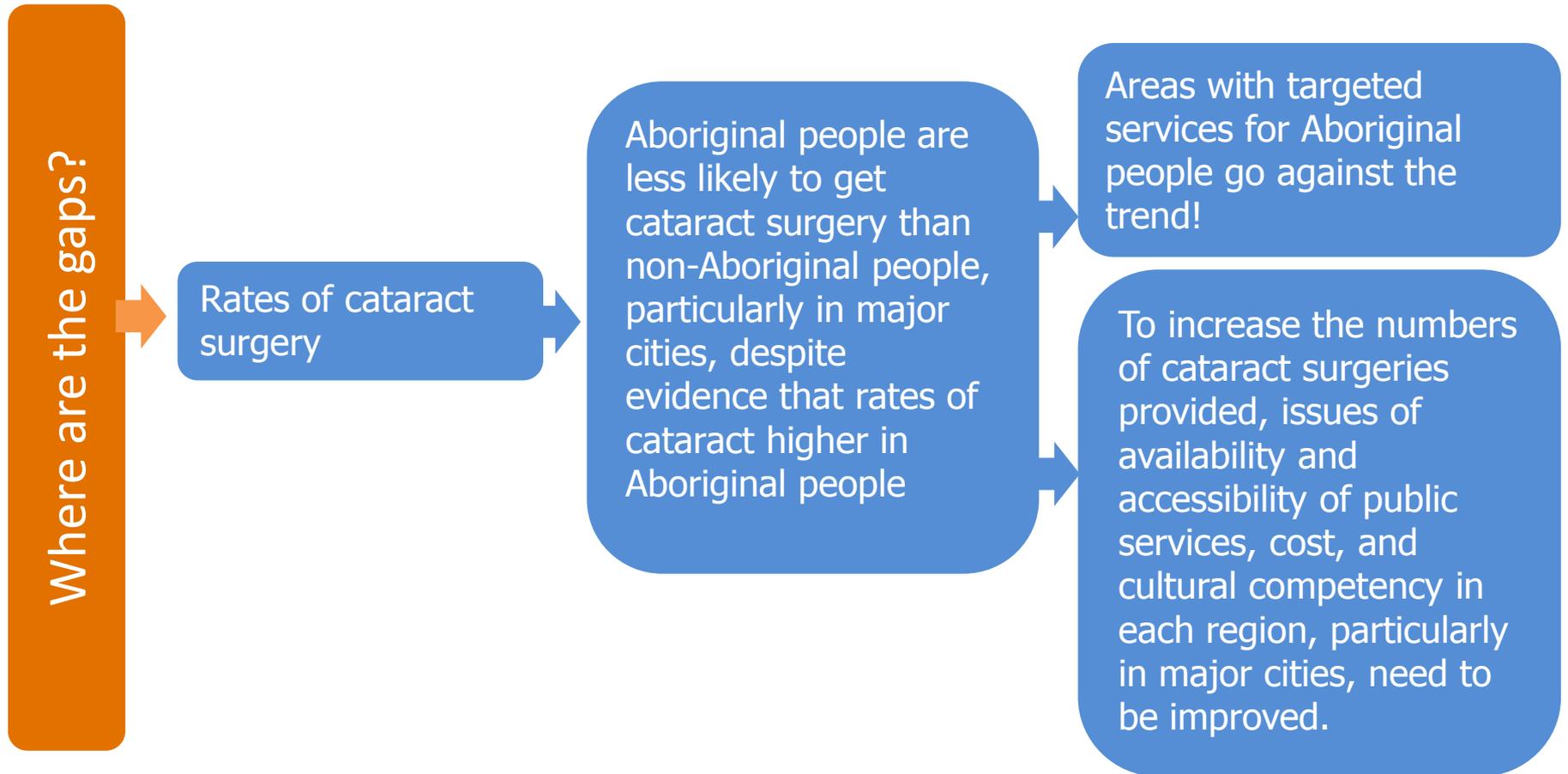
The rate of cataract surgery is lower for Aboriginal people in almost all areas in NSW, with notable exceptions



Areas with higher rates of cataract surgery in Aboriginal people



Summary - Cataract surgery rates



Mapping the outcomes of calls to healthdirect Australia



<http://www.datanetwork.org/about-us/>



UNSW
AUSTRALIA



CENTRE FOR
BIG DATA RESEARCH
IN HEALTH

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

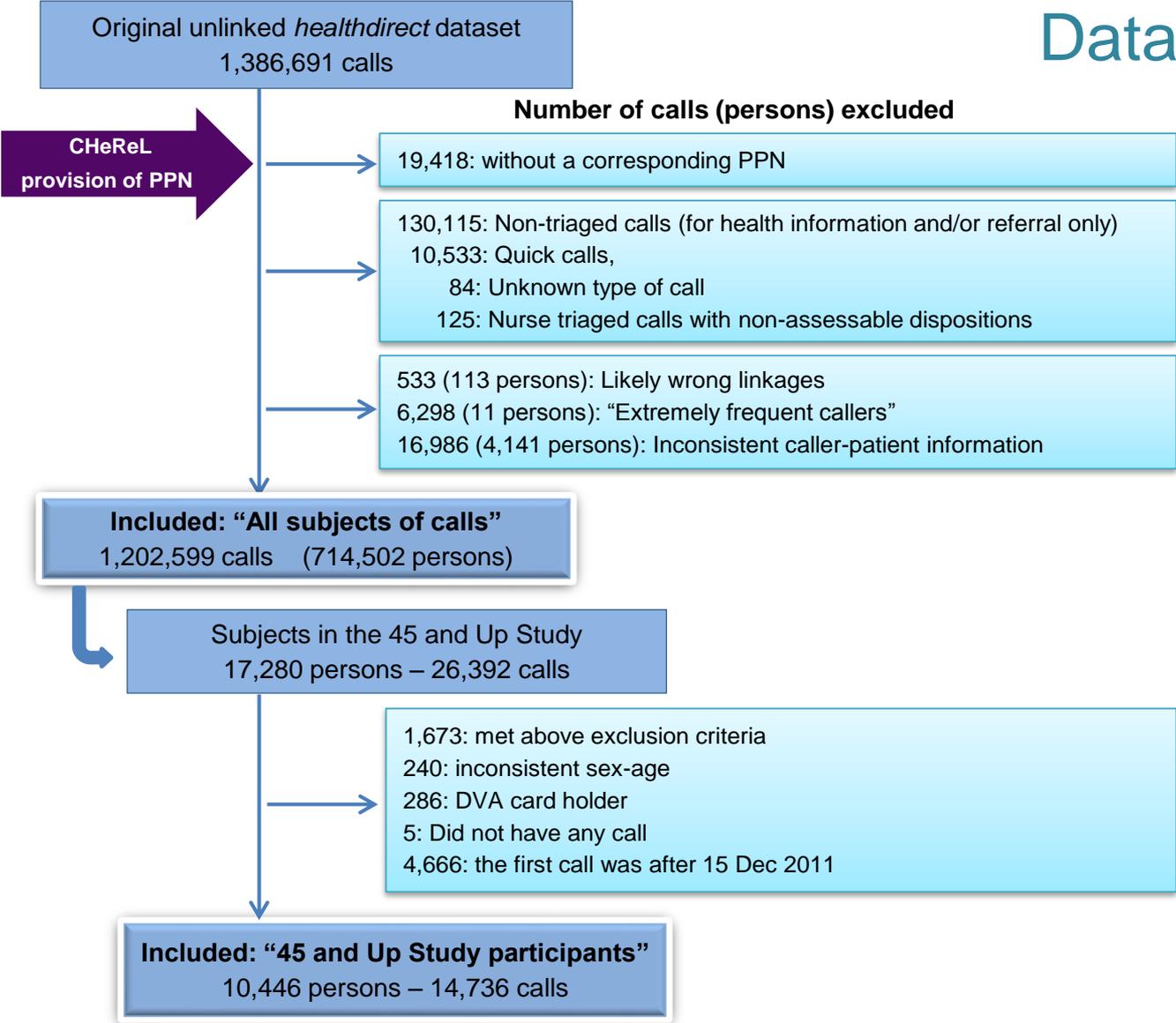
- Telephone triage service which caters for six of the eight Australian States and Territories
- Operates 24 hours a day, seven days a week
- Between 2009 and 2012, handled an average of 785,720 calls per
- Calls are mostly triaged by registered nurses, but since July 2011 some calls are transferred 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

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

Data preparation



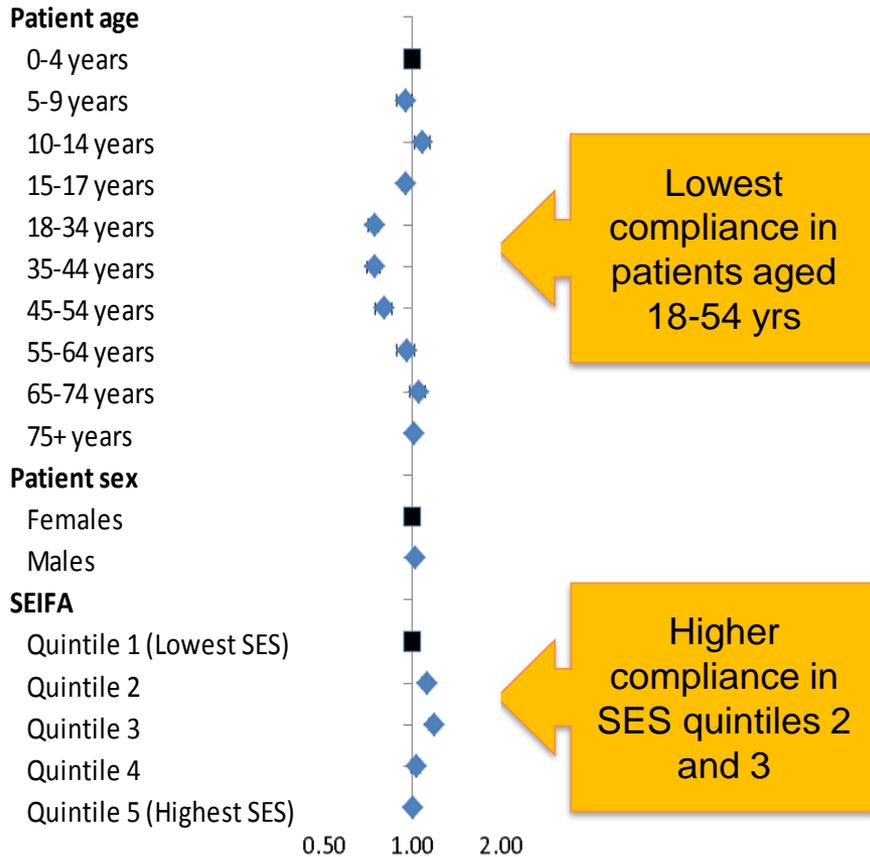
Definitions

- “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.

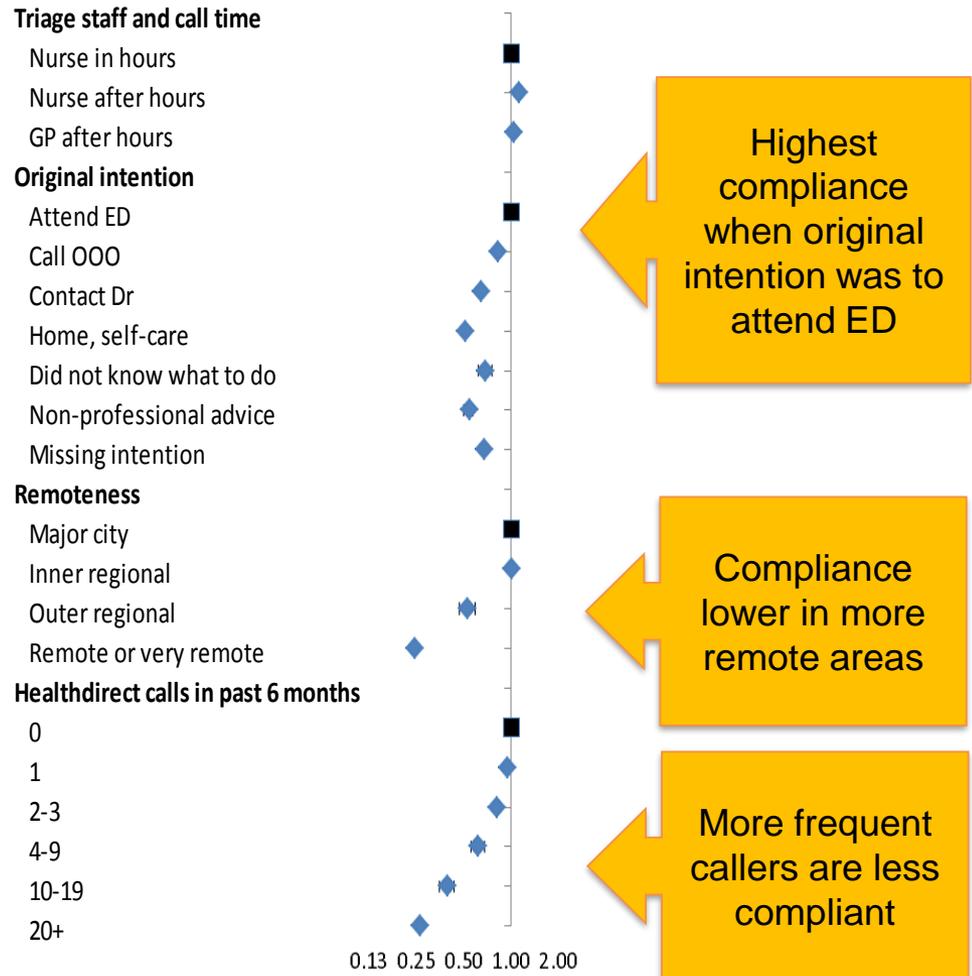


Factors associated with compliance

Patient characteristics



Call characteristics



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)

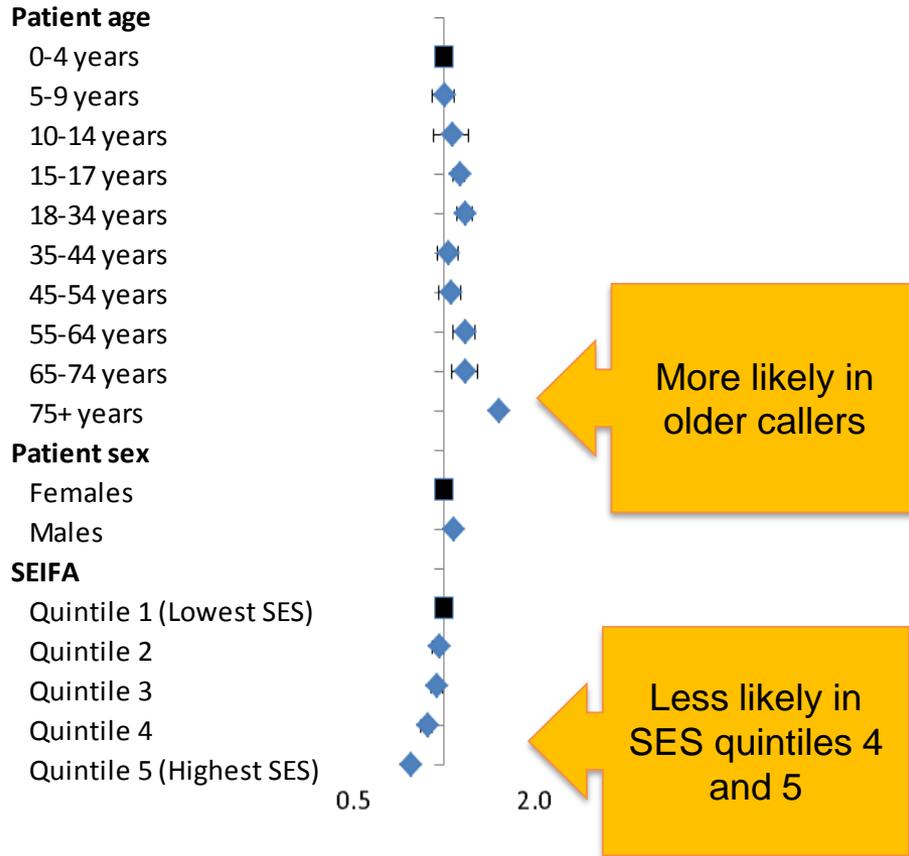


Self-referral to ED

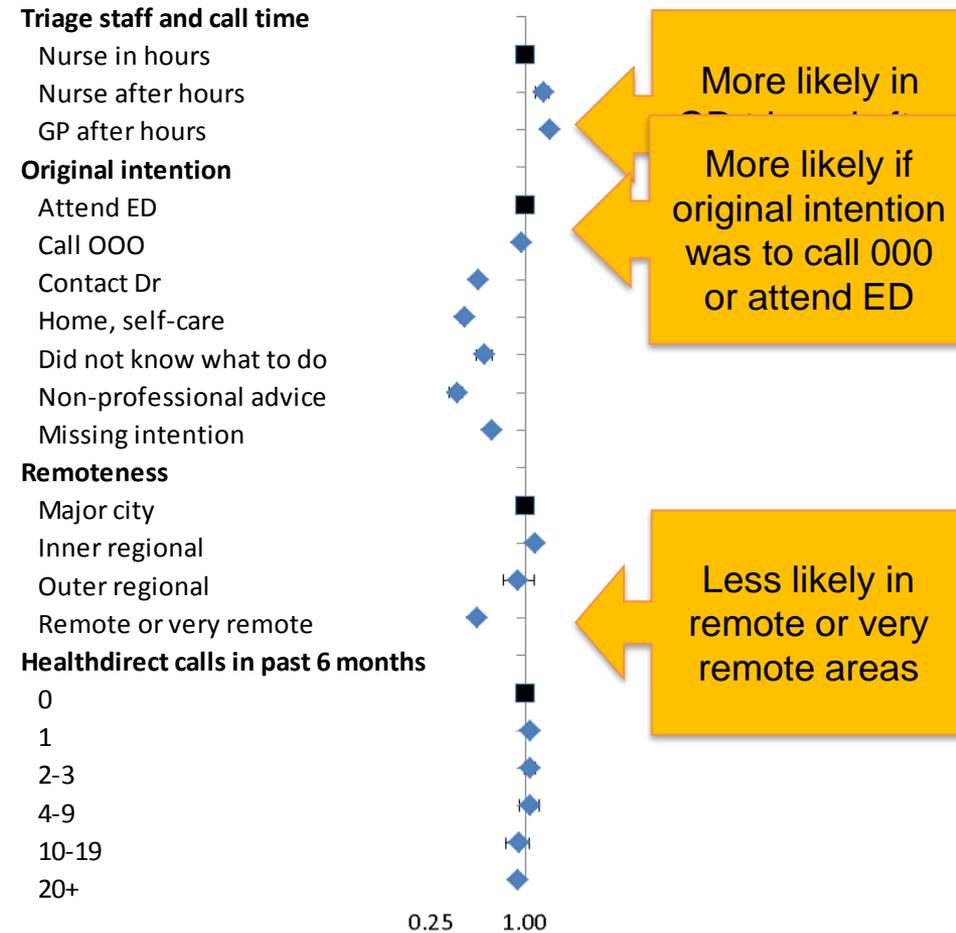
State/Territory	Number			Self-referral rate % (95%CI)
	Self-referral		Total	
	Yes	No		
NSW Overall	19,214	288,636	307,850	6.2% (6.2-6.3)

Factors associated with self-referral

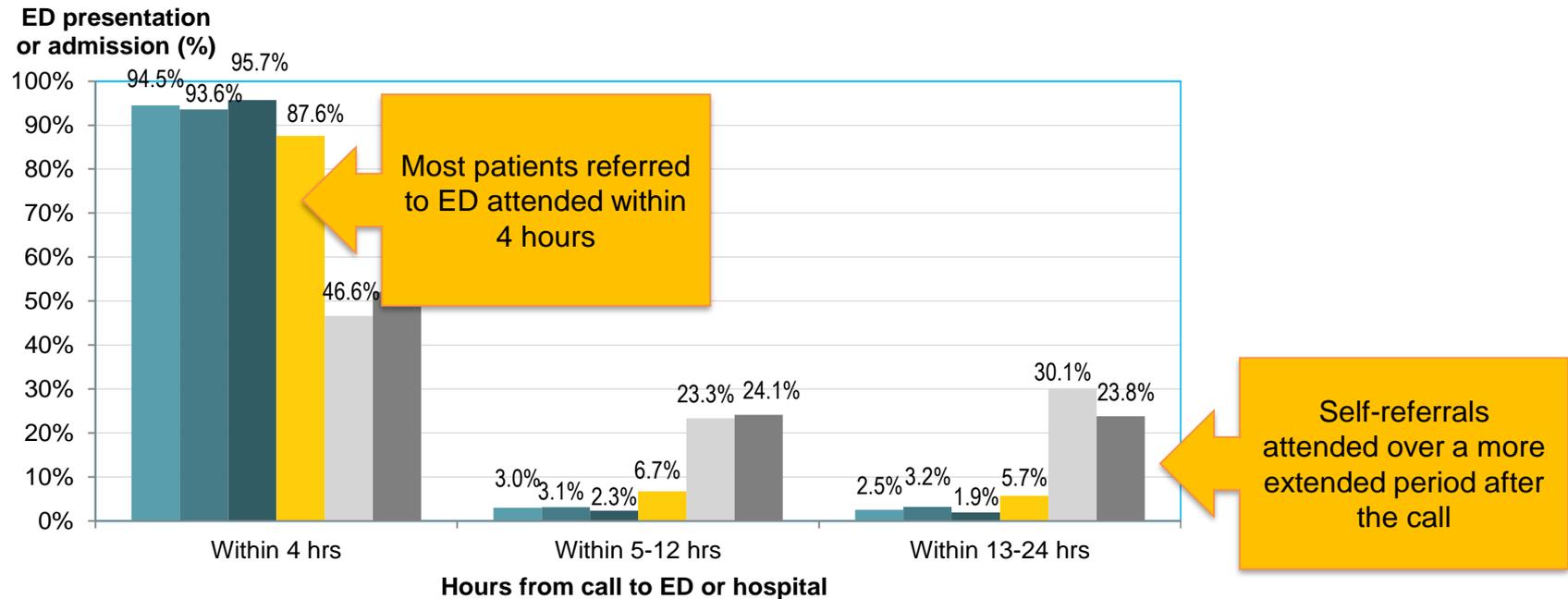
Patient characteristics



Call characteristics



Time to presentation

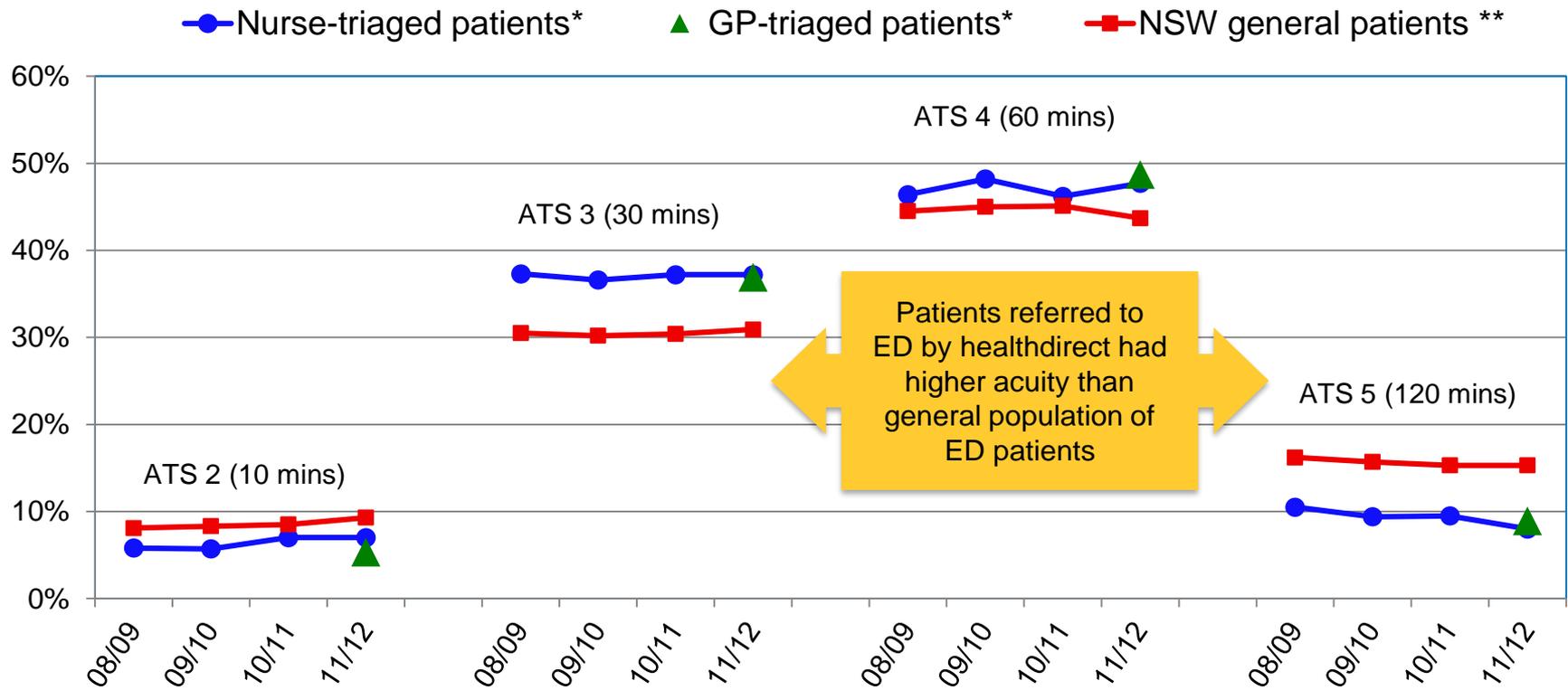


- Referred to ED by Nurse: All subjects of call in NSW 7/2008-12/2012
- Referred to ED by GP helpline: All subjects of call in NSW 7/2008-12/2012
- Referred to ED by Nurse or GP helpline: Subjects in 45 Up Study 7/2008-12/2011
- Told to see Doctor or GP: Subjects in 45 Up Study 7/2008-12/2011
- Self-referral to ED: All subjects of call 7/2008-12/2012
- Self-referral to ED: Subjects in 45 Up Study 7/2008-12/2011

ED triage categories



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
- Garratt E, Barnes H, Dibben C. Health administrative data: Exploring the potential for academic research. St Andrews: Administrative Data Liaison Service, 2010. Available at: http://www.adls.ac.uk/wp-content/files_flutter/1295883198ADLSHealthResearchpaper.swf
- Medical Research Council 2008. Developing and evaluating complex interventions: new guidance. Available at: <http://www.mrc.ac.uk/Utilities/Documentrecord/index.htm?d=MRC004871>
- Austin PC. An Introduction to Propensity Score Methods for Reducing the Effects of Confounding in Observational Studies. *Multivariate Behav Res* 2011; 46(3): 399–424.