



Innovation in health care

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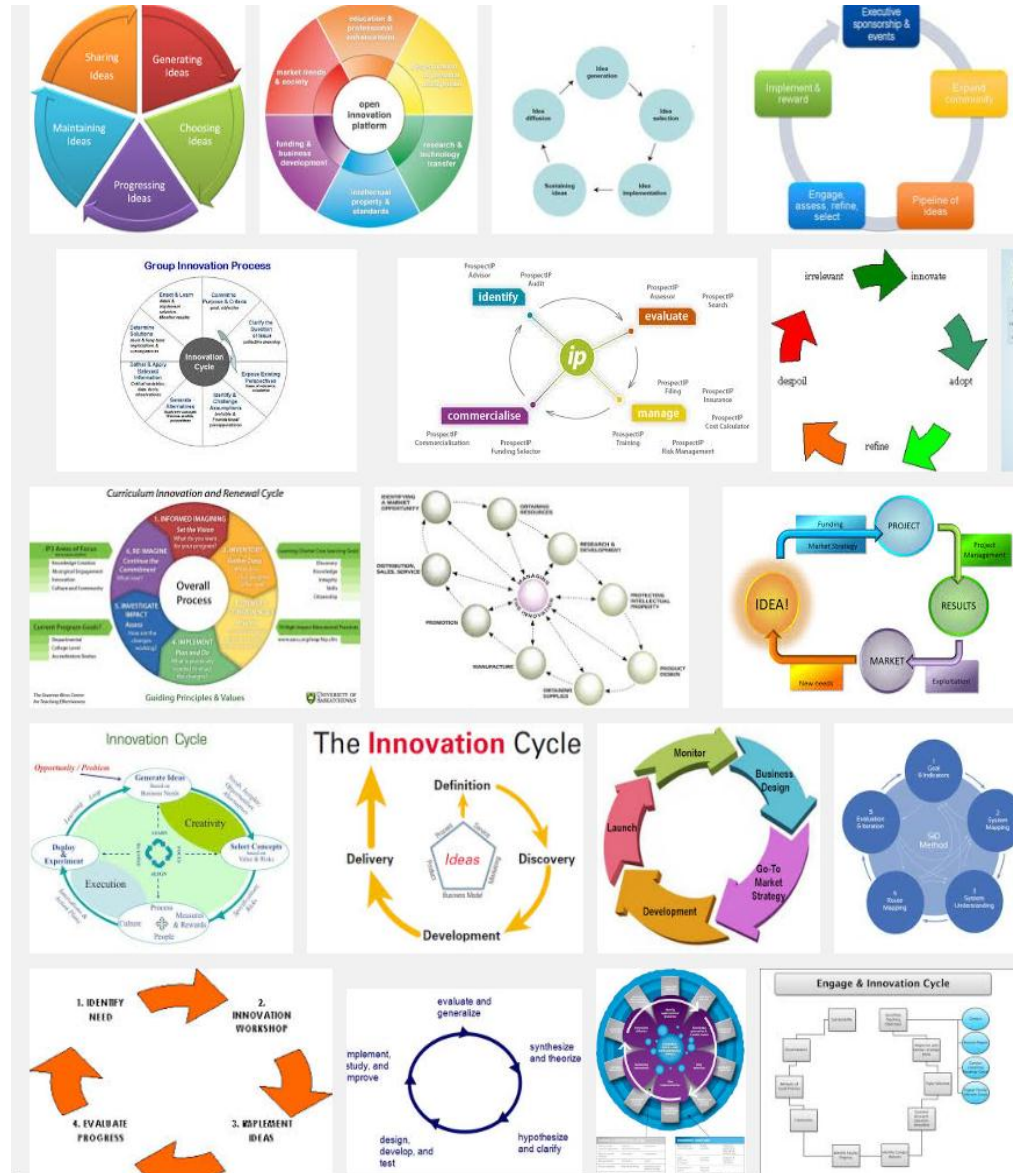
Today

- Definition
- Data as fundamental to innovation
- Examples
- Methods
- Future initiatives

What is innovation?

- Identifying a problem
- Working out a likely solution
- [Testing it]
- Implementing it
- Evaluating it

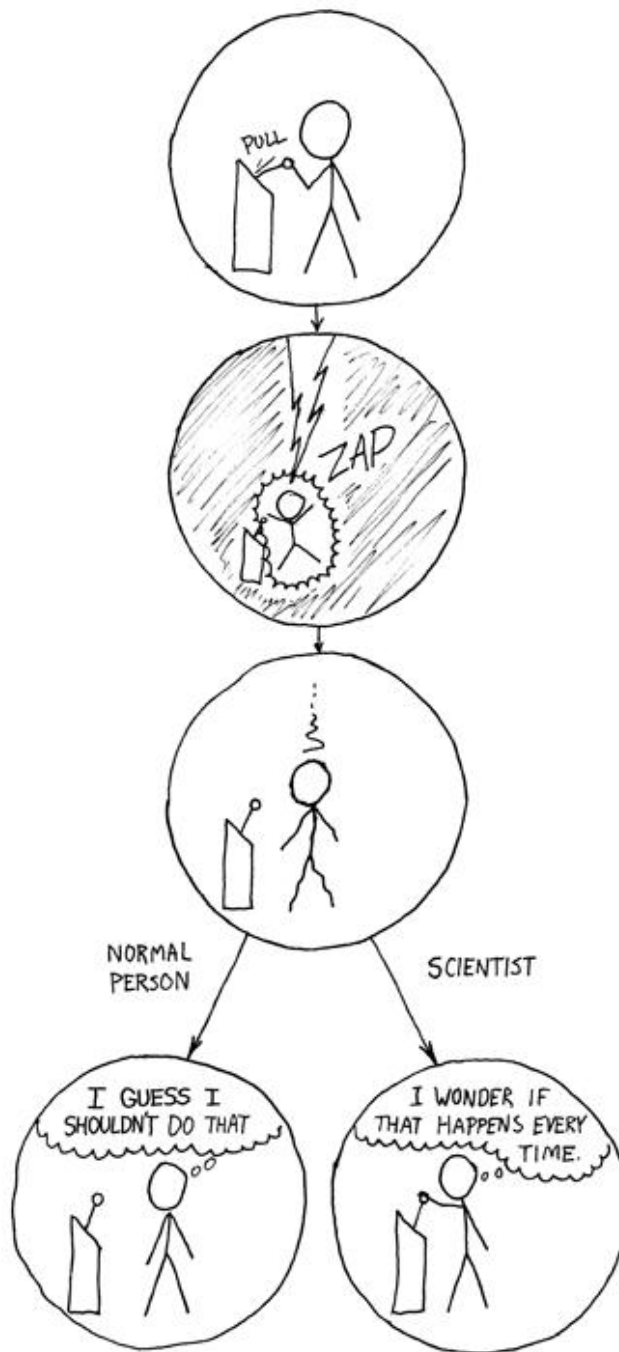
DATA



Data for health care innovation

- Horses for courses
- Large scale data
- Linkage
- Expertise/workforce
- Partnership



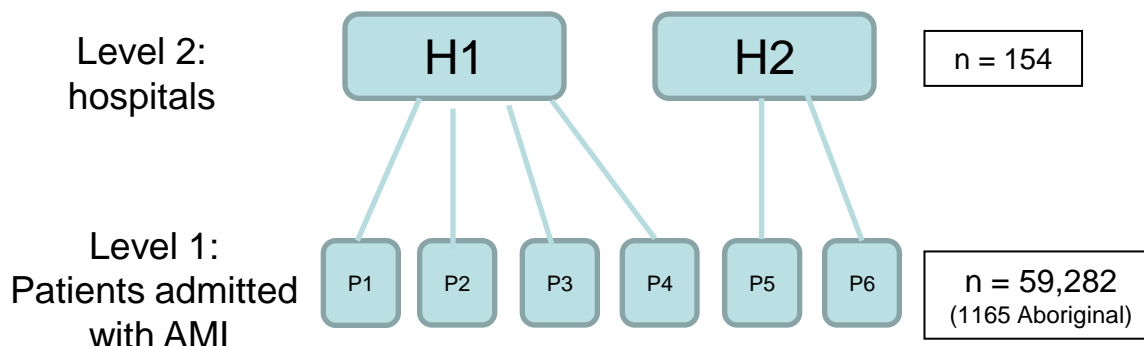


Data for health care innovation

- Room for improvement
- Quality
- Variation
- Outcomes
- Underpin monitoring
- etc

An example of multi-level analysis: examining variation in revascularisation¹

Outcome: revascularization within 30 days of AMI
Main exposure of interest: Aboriginal/non-Aboriginal



Level 1 variables: Aboriginal status, age, sex, AMI type, etc

Level 2 variables: hospital remoteness, size and catheterization facilities

¹Randall et al, Disparities in Revascularization Rates After Acute Myocardial Infarction Between Aboriginal and Non-Aboriginal People in Australia. *Circulation*. 2013;127:811-819.

Table 2. Sequentially Adjusted Aboriginal to Non-Aboriginal Hazard Ratio for Receiving a Revascularization Procedure Within 30 Days of AMI Admission

Model	Sequentially Adjusted For:	Variables and Random Effects Added to the Model:	AHR	95% CI	PValue
1	Demographics	+ Age, sex, year, AMI type*	0.63	0.57, 0.70	<0.01
2	Hospital of admission	+ random intercept†	0.82	0.74, 0.91	<0.01

Aboriginal patients 37% less likely to have a revascularisation procedure

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3	Comorbidities	+ Selected comorbidities‡	0.90	0.81, 1.00	0.05
4	Substance use	+ Current smoking, alcohol and drug abuse	0.92	0.83, 1.02	0.12
5	Private health insurance	+ Private health insurance	0.96	0.87, 1.07	0.50
6	Socioeconomic status	+ Socio-economic status§	0.97	0.87, 1.08	0.55
7	Remoteness	+ Remoteness of residence¶	0.97	0.87, 1.07	0.52
8	Border hospital	+ Hospital transfers patients interstate#	0.96	0.87, 1.07	0.50

After adjustment for more patient characteristics, no difference in rates between Aboriginal and non-Aboriginal

Notably, after adjustment for multiple patient characteristics, significant variation between hospitals remained

~50% of this variation could be explained by measured hospital factors

Table 4. Hazard Ratios for Hospital Covariates Added to the Adjusted* Multilevel Model One at a Time

	AHR	95% CI	P Value
Model 9 Remoteness of hospital†			
Major city (ref)	1.00		<0.01
Inner regional	0.56	0.44, 0.70	
Outer regional	0.51	0.42, 0.64	
Remote/very remote	0.70	0.50, 0.97	
Model 10 Average acute admissions per year			
<1200	0.43	0.33, 0.56	<0.01
1200–3899	0.43	0.34, 0.55	
3900–7084	0.52	0.38, 0.71	
7085–18 399	0.71	0.56, 0.90	
18 400 + (ref)	1.00		
Model 11 Catheterization laboratory			
No	0.46	0.35, 0.60	<0.01
Yes, not 24/7	0.60	0.44, 0.80	
Yes, 24/7 (ref)	1.00		



The heart failure variation project

Background

- General recognition of importance of heart failure, along with variation in care and outcomes
- Experimental elements/pilot

Methodological aim

To create an innovative collaboration between researchers, clinical networks and ACI staff, which allows a direct and responsive interface between high quality large-scale data and implementation.

Overarching research aim

Among people admitted to hospital in NSW with identified heart failure (HF), to examine hospital- and individual-level variation in readmission and mortality.

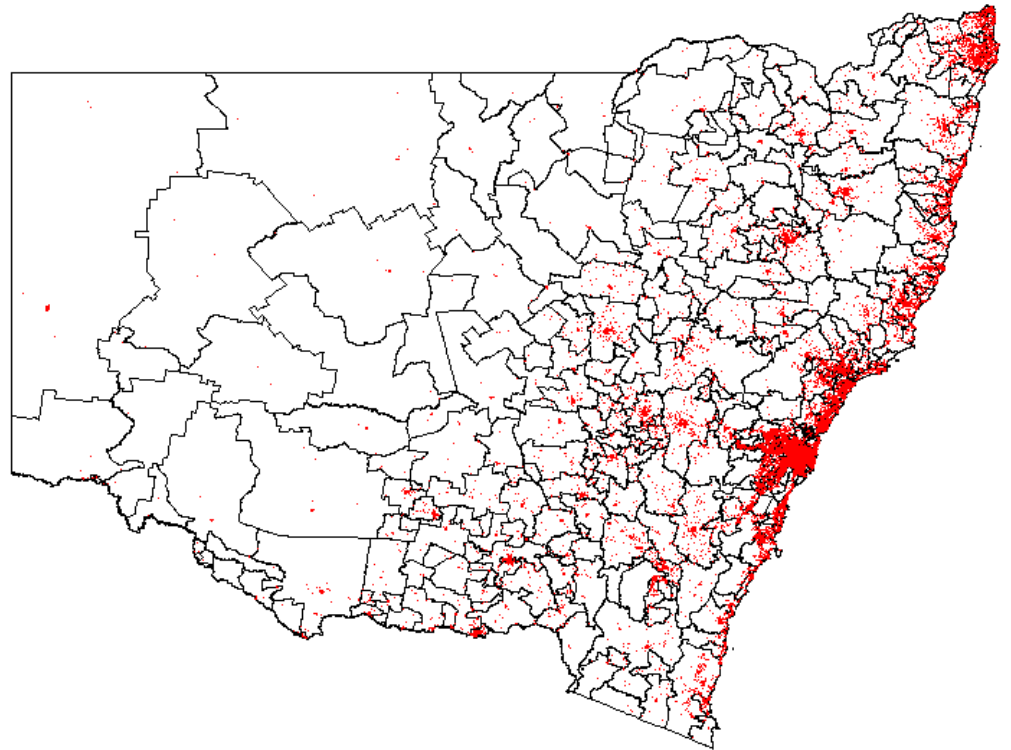
Working together

1. Focus developed in collaboration with clinical networks and ACI
2. Researchers develop initial approach
3. Meeting with network/ACI to consider approach and get input
4. Refinement of data analysis plans and approach
5. Data analysis
6. Feedback on results and their interpretation
7. Reports/dissemination



The 45 and Up Study

- recruitment of over 267,153 men and women aged 45 years and over from 2006 to 2009
- over 10% of people in this age group
- sampled through Medicare Australia
- baseline and follow-up questionnaires, data linkage



Data linkage

To end 2011:

- MBS, PBS since 2004; >36M records
- >12,000 deaths
- >1.3M hospital separations
 - e.g.10677 for primary diagnosis of IHD
- >400,000 emergency department records
- events will continue to accrue

Questionnaire

Recruitment: Jan 2006 – Dec 2008

n = 267,153

- self-completed
- risk factors –smoking, alcohol, BMI etc.
- physical and mental health status
- functional capacity
- work, financial and social factors
- priority factors to be investigated

Questionnaire

Recruitment: Jan 2006 – Dec 2008

n = 267,153

The 45 and Up Study relies on the willingness of people in New South Wales to share information about their lives and health. Participation is completely voluntary, and you will have to verify your name from the Study at any time. To be included, you must meet the eligibility requirements. Your completed questionnaire and consent form will return to the research centres. You will receive a letter with the results of the questionnaire.

THE 45 AND UP STUDY
45 and Up Study Questionnaire
for Women

Approved by:

Your answers and experiences are important to us. Please take a few minutes to complete this questionnaire. It will take about 15-20 minutes to complete. You can stop at any time and return to it later. You will receive a letter with the results of the questionnaire.

General questions about you

1. What is your date of birth?

2. What is your sex? Male Female

3. How tall are you?

4. What is your weight?

5. What is the highest qualification you have completed? None Year 10 Year 11 Year 12 Certificate Diploma Bachelor's degree Postgraduate degree

6. Are you currently married or living with a partner? Yes No

7. How many children do you have?

8. How many children are currently living with you?

9. How many children do you have who are aged 18 or over?

10. How many children do you have who are aged 15 or under?

11. How many children do you have who are aged 5 or under?

12. How many children do you have who are aged 2 or under?

13. How many children do you have who are aged 1 or under?

14. How many children do you have who are aged 0 or under?

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Hospital data (APDC)
to Dec 2011
Total admissions since baseline - >1.3 million
Participants admitted > 50%



Death data (RBDM)
to Dec 2011
Total deaths > 12,000

Questionnaire

Recruitment: Jan 2006 – Dec 2008

n = 267,153

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- risk factors –smoking, alcohol, BMI etc.
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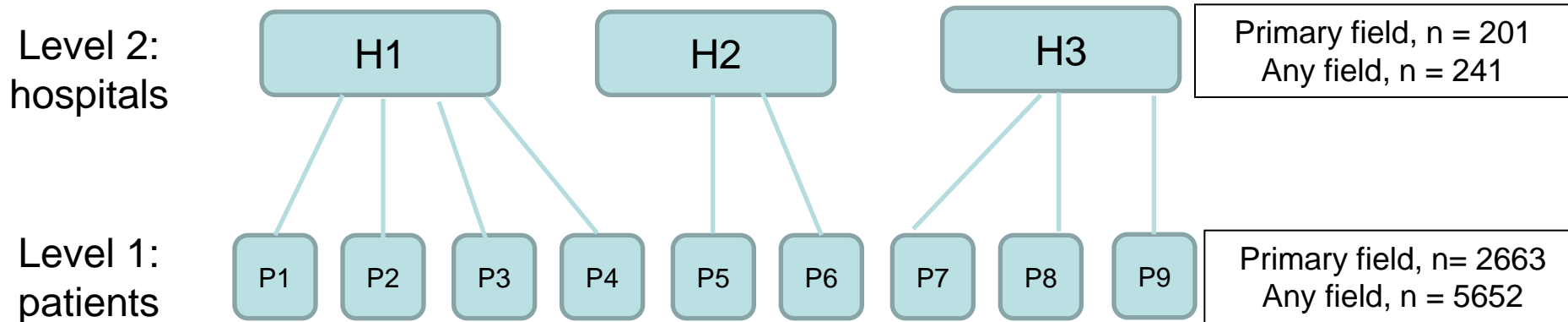
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Total deaths > 12,000



Select participants with HF admission since baseline:

- (a) Primary diagnosis field (n = 2663)
- (b) Any diagnosis field (n= 5652)

Methods: Multi-level data



Outcomes

Follow participants over time from first HF admission til Dec 2011 (or death)

Outcome variables:

1. Death following HF admission
2. Re-admission to hospital (standard=within 28 days of discharge) following HF admission

Exposures (predictors)

Individual-level variables:

- Sociodemographic
 - Age, sex, area of residence, household income, education, private health insurance, social support...
- Health
 - On baseline survey:
 - Behavioural risk factors: BMI, smoking, alcohol, physical activity
 - Health conditions: self-rated health, physical functioning (MOS-PF), chronic conditions, psychological distress (Kessler)...
 - From APDC:
 - previous admission for HF/ CVD, LOS (prior admission), con-current secondary diagnoses, Charlson Comorbidity Index (based on prior hospital admissions)...

Hospital-level variables:

- Location – health area; metro/non-metro
- Hospital type – public/private; principal referral

Sample characteristics

	HF admission primary field (n = 2663)	HF admission any field (n=5652)
Participants		
Median age (IQR)	82 years (75–87)	82 years (75–86)
Male: % (n)	61.6 % (1640)	60.6 % (3425)
Hospital type: as % of admissions		
Private	14.1%	15.6%
Principal referral	27.4%	29.8%
Major	30.5%	28.8%
District	17.5%	16.1%
Community	6.5%	5.4%

Outcomes: preliminary data

	Primary field (n=2663)	Any field (n=5652)
Deaths		
Died within 30 days: % (n)	9.7% (258)	13.1% (741)
Died within 90 days: % (n)	15.2% (404)	18.3% (1037)
Readmissions (within 28 days)		
Total	24.1% (642)	23.8% (1347)
- Emergency	58.2% (366)	52.6% (693)
- Non-emergency (planned)	41.8% (263)	47.3% (624)
Median length of stay (IQR)	5 days (3 -10)	7 days (4 -15)

NB: Readmission type missing in 13 (primary) & 30 (any field) admissions

Example questions (readmissions)

- What patient characteristics predict re-admission:
 - Socio-demographics – Age, income, social support
 - Health conditions – CVD and non-CVD
 - etc.
- What prior admission characteristics are associated with re-admission
 - Length of stay
 - Discharge type
 - etc.
- How much variation is there in readmission rates across hospitals?
- Can this hospital variation explained by:
 - Hospital location
 - Hospital type
 - etc.

Analysis for policy program (A4P)

- Sax Institute
- Helps agencies define the research question
- Explores the feasibility of using the 45 and Up Study to answer the question
- Conducts simple analyses
- Brokers approaches to more complex analyses requiring further funding



Thank you

- Rosemary Korda, Tim Dobbins
- Sally Redman, Mark Bartlett
- The 45 and Up Study management team: the Sax Institute, in collaboration with Cancer Council New South Wales; and partners the National Heart Foundation of Australia (New South Wales Division); New South Wales Department of Health; Beyondblue: the National Depression Initiative; Ageing, Disability and Home Care, Department of Human Services New South Wales; and Uniting Care Ageing

