• Established in 2009 by the Government of New South Wales
• Board governed, statutory body
• 40 staff

• Established in 2012 by the Government of Australia
• Board governed, statutory body
• 75 staff

• Established in 2016 by the Government of Victoria
• Chief executive governed
• 65 staff
Purpose

• Describe examples from down under where analyses of big data have driven improvements in health and care

• Offer views on the attributes of big data organisations that have a big impact

• Reflect on the attributes of big data projects that result in a big impact.
Purpose

- Describe examples from down under where analyses of big data have driven improvements in health and care
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Underuse: The case of child immunisation

MEASLES CASES
in the WHO European Region

5,273  23,927  41,000+
2016  2017  2018 (Jan to June)
Underuse: The case of child immunisation

All children coverage rates for 1, 2 and 5 year olds for the last 10 years

- 1 year olds
- 2 year olds
- 5 year olds
- 95% Aspirational Target

Period of the data 2011-12

Big data, public release April 2013

Bureau of Health Information

Trusted information. Informed decisions. Improved healthcare.
Underuse: The case of child immunisation

In 2013 Australia’s National Health Performance Authority named 30 local communities where:

- 85% or less of 1, 2 or 5 year children who were not been fully immunised and, accordingly, at risk of being exposed to contagious diseases such as measles and whooping cough.

- Among all 5 year olds, 23 of 61 catchments recorded less than 90% fully immunised. This was a much larger number of catchments than for all children aged 1 year (two out of 61 catchments) and 2 years (three out of 61 catchments).

- Percentages of Aboriginal and Torres Strait Islander children fully immunised were lower than for all children.
Underuse: The case of child immunisation

Children aged 5 years who were fully immunised, 2011–12

Percentages of children aged 6 years fully immunised, by Medicare Local catchment, 2011–12

Fully immunised at 6 years means that a child aged 20 to less than 36 months received their fourth or fifth vaccination (dependent on the type of vaccine used) for diphtheria, tetanus and whooping cough, their fourth vaccination for polio and their second vaccination for measles, mumps and rubella, all prior to the age of 6 years. It is assumed that all previous vaccinations were received.

Aboriginal and Torres Strait Islander children aged 5 years who were fully immunised, 2011–12

Percentages of Aboriginal and Torres Strait Islander children aged 6 years fully immunised, by Medicare Local catchment, 2011–12

Fully immunised at 6 years means that a child aged 20 to less than 36 months received their fourth or fifth vaccination (dependent on the type of vaccine used) for diphtheria, tetanus and whooping cough, their fourth vaccination for polio and their second vaccination for measles, mumps and rubella, all prior to the age of 6 years. It is assumed that all previous vaccinations were received.
Reducing variation in right care: Child immunisation

11 APRIL 2013
1st REPORT
11 APRIL 2013

85% children NOT fully immunised in some local areas

700+ media stories over 30 days with an audience of 29 million

5 MAY 2013
Sydney’s Sunday Telegraph launches the ‘No Jab, No Play’ vaccination campaign

1 JAN 2014
NSW legislation changed, making it mandatory for parents to provide evidence that their child is fully vaccinated before being able to enrol them in childcare

Interactive tool attracted 30,000 users

27 OCT 2015
Vic Parliament passed a law making it mandatory for kids attending childcare and kindergarten to be fully immunised from 1 Jan 2016

29 OCT 2015
Qld Parliament backed new law allowing childcare centres to exclude children who are not fully immunised effective 1 Jan 2016

23 NOV 2015
Senate passed legislation for the Australian Government’s ‘No Jab, No Pay’ law to become law

27 MARCH 2014
2nd REPORT
27 MARCH 2014

Almost 300 media stories over 30 days with an audience of more than 15 million

Interactive tool attracted 2,000 users

Number NOT fully immunised DOWN BY about 2,000 Compared to previous year

30 APRIL 2014
Courier Mail launches the ‘Keep Our Kids Safe’ vaccination campaign

1 JAN 2016
‘No Jab, No Pay’ laws came into force restricting childcare payments and Family Tax Benefit Part A to parents of children who have been fully immunised

Almost 200 media stories on launch, almost 300 at ten days with an audience reach of 7.9 million

1 JANUARY 2016

Interactive tool viewed by 22,000+ people in first 48 hours,
29,000+ in 20 days. Facebook key referral tool.

95% aspirational national immunisation target agreed
Underuse: The case of child immunisation

Cognitive and competitive levers

- Public reporting of 1, 2 & 5 year olds (small area) with resultant media campaign in 2013
- Aspirational national immunisation target agreed (95%) in 2015

Normative, coercive and structural

- Change in legislation & regulations (*No jab, no play*) from 2014 to 2016 across states
- Change in family benefits policy (*No jab, No pay*) in 2016
- Performance Agreements with Primary Health Networks in 2015

Supportive levers

- Information for parents, educators and health professionals
- Decision support tools for parents
Reducing variation and increasing the national rate: Largest gain from commencement of public reporting and resultant media campaign in 2012-13. Subsequent gains related to changes to public health policy (No Jab, No Play) and social policy (No Jab, No Pay), establishment of an aspirational target (95%) and continued annual reporting of immunisation rates across small areas.
The result: Increased use of right care, reduction in variation

In 2012-13 2/31 Primary Health Networks areas had rates above the National target of 95% for fully immunised children (5 year olds).

In 2015-16 3/31 Primary Health Network areas had rates above the National Target of 95% for fully immunised children (5 year olds).

…. (see figure)

In 2016-17 10/31 Primary Health Network areas had rates above the National target of 95% for fully immunised children (5 year olds) (data available online).

By March 2018 17/31 Primary Health Network areas had rates above the National Target of 95% for fully immunised children (5 year olds) (data available online).
Underuse: The case of child immunisation

By March 2018, 17/31 Primary Health Network areas had rates above the National Target of 95% for fully immunised children for 5 year olds and 12/31 Primary Health Networks had rates above the National Target of 95% for fully immunised children for 1 year olds (data available online).
Purpose

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Improving outcomes: Healthcare-associated SAB infections

Published April 2015

This report presents rates of healthcare-associated bloodstream infections in Australia’s largest public hospitals caused by a bacteria called Staphylococcus aureus.

Although commonly found on the skin of healthy people, Staphylococcus aureus (S. aureus) can cause serious illness if it gets into the bloodstream. Evidence suggests 5% to 35% of people with this sort of infection come from 1% or fewer cases. S. aureus bloodstream infections contracted in hospital are considered potentially preventable and hospitals aim to have as few as possible.

In 2013-14, there were 1,621 cases of healthcare-associated S. aureus reported as being acquired while receiving care in a public hospital – around 1.6% of the total, with 61% of cases in major hospitals with fewer vulnerable patients and 17% cases in large hospitals with fewer vulnerable patients. The number of cases increased to 1.6% in large hospitals with more vulnerable patients.

The report highlights variation in infection rates across major and large hospitals. Among major hospitals with more vulnerable patients, the rate of infection was more than twice that of large hospitals with fewer vulnerable patients. The rates showed a similar level of variation.

150 less cases in 2 years

Peer groups based on risk of infection
Inefficient care: Comparable costs of inpatient care

The cost of providing care to similar acute patients can be almost **2X** as high depending on the hospital.

The costs incurred by public hospitals to deliver a notional ‘average’ service to acute admitted patients, ranged from: **$3,100 to $6,100**

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**Figure 1: Cost per National Weighted Activity Unit (NWAU) for acute admitted patients, major metropolitan public hospitals, 2011–12 to 2013–14**

<table>
<thead>
<tr>
<th>Year</th>
<th>2011–12</th>
<th>2012–13</th>
<th>2013–14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fee (A$)</td>
<td>14,775.15</td>
<td>15,000.15</td>
<td>15,444.36</td>
</tr>
<tr>
<td>Variance</td>
<td>80,987.15</td>
<td>91,897.15</td>
<td>93,886.15</td>
</tr>
<tr>
<td>Cost per NWAU</td>
<td>$6110</td>
<td>$6370</td>
<td>$6420</td>
</tr>
</tbody>
</table>
In 2011–12, there were 5,613 admissions for knee replacements without complications or comorbidities in major metropolitan and major regional public hospitals.

The average cost per admission in major metropolitan public hospitals ranged from $10,600 at one hospital to $29,300 at another.
**Improving efficiency: Reducing comparable costs by 5+%**

**Table 3:** Major metropolitan public hospitals that improved efficiency by decreasing the average cost of care by at least 5%, 2011–12 to 2013–14

<table>
<thead>
<tr>
<th>Major metropolitan public hospitals</th>
<th>Reduced spending</th>
<th>Increased number of activity units (NWAUs)</th>
<th>Reduced spending &amp; increased no. of activity units (NWAUs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caboolture Hospital (Qld)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campbelltown Hospital (NSW)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mater Adult Hospital (Qld)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Royal Brisbane &amp; Women’s Hospital (Qld)</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St George Hospital (NSW)</td>
<td></td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>The Alfred (Vic)</td>
<td></td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Western Hospital [Footscray] (Vic)</td>
<td></td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Westmead Hospital (NSW)</td>
<td></td>
<td>●</td>
<td></td>
</tr>
</tbody>
</table>

Poor outcomes: Mortality within 30 days of admission
Poor outcomes: Mortality within 30 days of admission

NSW public hospitals 30-day mortality results, by condition, NSW, July 2012 – June 2015

Hospitals higher than expected: AMI (4), Ischaemic stroke (5), Haemorrhagic stroke (1), CHF (10), Pneumonia (9), COPD (11), Hip fracture surgery (5)

No different than expected: AMI (60), Ischaemic stroke (39), Haemorrhagic stroke (29), CHF (54), Pneumonia (60), COPD (62), Hip fracture surgery (29)

Hospitals lower than expected: AMI (3), Ischaemic stroke (1), Haemorrhagic stroke (0), CHF (5), Pneumonia (6), COPD (2), Hip fracture surgery (3)
Poor outcomes: Mortality within 30 days of admission

30-day mortality, concentration of outlier results across hospitals, NSW, July 2012 – June 2015

Among 75 referral, major and district hospitals, between July 2012 and June 2015:

47 hospitals had no ‘higher than expected’ results

15 hospitals had higher than expected mortality for 1 condition
9 hospitals had higher than expected mortality for 2 conditions
4 hospitals had higher than expected mortality for 3 conditions
Poor outcomes: Mortality within 30 days of admission

Example hospital profile

Risk-standardised mortality ratios (RSMRs) for seven conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of patients (index cases)</th>
<th>RSMR</th>
<th>July 2012 – June 2015</th>
<th>RSMRs for three-year periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute myocardial infarction</td>
<td>544</td>
<td>1.18</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Ischaemic stroke</td>
<td>193</td>
<td>1.10</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Haemorrhagic stroke</td>
<td>65</td>
<td>0.74</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>298</td>
<td>1.13</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>602</td>
<td>0.86</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>223</td>
<td>1.40</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Hip fracture surgery</td>
<td>336</td>
<td>1.75</td>
<td>0.0</td>
<td></td>
</tr>
</tbody>
</table>

Acute myocardial infarction risk-standardised mortality ratio by number of expected deaths, NSW public hospitals

Cumulative mortality following hospitalisation for acute myocardial infarction, this hospital and NSW

30-day mortality, age-sex standardised rate per 100 hospitalisations, NSW, July 2000 – June 2015

- Acute myocardial infarction
- Haemorrhagic stroke
- Ischaemic stroke
- Congestive heart failure
- Pneumonia
- Hip fracture surgery
- Chronic obstructive pulmonary disease

Deaths per 100 hospitalisations

July 2000 – June 2003


July 2006 – June 2009

July 2009 – June 2012

July 2012 – June 2015
Purpose

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- Offer views on the attributes of big data organisations that have a big impact
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Attributes of big data organisations that have a big impact

- **Organisation governance structures and processes** that support independence in editorial control of performance reports and information products on topics that align with health system priorities ~ right topics, impartial information
- **Project governance structures and decision-making processes** that ensure all performance reports and information products engage and respond to stakeholders priorities for information about selected topics ~ call to action, actionable insights
- **Multidisciplinary group of specialists that work in collaborative teams** to define and produce performance reports and information products ~ useful information
- **Large group of communications specialists** that ensure that the team continually focus on the priorities and learning styles of target audiences ~ accessible information
- **Quality assurance processes to ensure rigor and reproducibility** of information ~ trusted, credible information
- **Reward innovation** in aligning information products with stakeholder needs.
Purpose

• Describe examples from down under where analyses of big data have driven improvements in health and care

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• Reflect on the attributes of big data projects that result in a big impact.
Attributes of big data projects that have a big impact

- Organisation governance structures and processes that support independence in editorial control of performance reports and information products on topics that align with health system priorities ~ right topics, impartial information
- Project governance structures and processes that ensure all performance reports and information products engage and respond to stakeholders (e.g. report advisory committees, and seek out formative and final feedback from content expert reviewers, academic peer reviewers) ~ call to action, actionable insights
- Multidisciplinary group of specialists that work in collaborative teams to define and produce performance reports and information products ~ useful information
- Large group of communications specialists that ensure that the team continually focus on the priorities and learning styles of target audiences ~ accessible information
- Quality assurance processes to ensure rigor and reproducibility of information ~ trusted, credible information
- Reward innovation in information products that align with stakeholder needs.
Thank you

Diane.Watson@health.nsw.gov.au

Providing the community, healthcare professionals and policy makers with information that enhances visibility of the performance of the health system in NSW, in order to inform actions to improve healthcare and strengthen accountability.