NSW Data Assets and Their Uses
Overview of Current State and Future Directions

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Health System Information & Performance Reporting
System Purchasing and Performance Division
NSW Ministry of Health

27 February 2014
Overview

- Data in NSW Health
- Uses of health data
- Examples
- Notes on data linkage
- Future directions
Healthcare Data

- Clinical data
  - Patient level transactions
  - Clinical observations

- Administrative data
  - Financial data
  - Workforce data
  - Capacity data (facilities)

- Population data
  - Demographic and socio-economic data
  - Population health surveys
Data Collections

- Routine data collections (collected as by-product of routine operational activities of health services providers)

- Special data collections (collected in addition to or in parallel with routine operational processes)

- Most analysis and reporting (cca 80%) is based on routine data collections, i.e. data is obtained ‘automatically’ but
  - relies on thousands of clinicians and support staff entering the data
  - has a stringent legal framework around it and requires careful management of privacy and other risks
  - may suffer from various data quality issues
Key State-wide Data Collections

- Admitted Patient Data Collection
- Emergency Department Data Collection
- Waiting Times Data Collection
- Non-Admitted Patient Data Collection
- Sub and Non-Acute Patients (SNAP) Data Collection
- Perinatal Data Collection
- Home and Community Care (HACC) Data Collection
- Aged Care Assessment Program (ACAP) Data Collection
- Health Establishment Registration (HERO)
- Human Resource Data Collection
NSW Health’s Information Management Architecture (Current)

State Health Information Exchange (HIE)

Area Health Information Exchange 1

Area Health Information Exchange 9

Reporting Server(s)

Ministry LHDs

Statewide Reports

LHD Reports

Local Operational Reports

Administrative data submissions, including manual data submissions (e.g. bed numbers; hospital acquired infections; health programs etc.)

Hospitals’ operational/clinical systems

Largely automatic

Largely manual
NSW Health’s Information Management Architecture (New)

Enterprise Data Warehouse (EDWARD)

Reporting Server(s)

Statewide and LHD Reports

Ministry; LHDs

Largely manual

Automatic data extracts

Administrative data submissions, including manual data submissions (e.g. bed numbers; hospital acquired infections; health programs etc.)

Local Operational Reports

Alignment

Hospitals’ operational/clinical systems

Hospitals’ operational/clinical systems
Uses of Health Data

- **Primary use**
  - Provision of clinical care to patients and families

- **Secondary uses**
  - Research
  - Public health surveillance
  - Service management / improvement
  - Service planning / policy development
  - Allocation of funds
  - Performance monitoring
  - Public accountability
Performance Indicators

- Operate at different levels – National, State, Local Health Districts/Networks, individual facility, clinical unit
  - Ideally, should be aligned (but that is often not the case)

- Types of indicators:
  - **Input** indicators (e.g. Beds, FTEs, dollars)
  - **Process** indicators (e.g. Transfer of Care, NEAT, NEST)
  - **Output** indicators (e.g. Volumes of activity, $ per NWAU)
  - **Quality** indicators (e.g. Adverse events, Hospital Acquired Infections, Preventable admissions)
  - **Outcome** indicators (e.g. Mortality, Cancer survival rates, MH functional improvement measures)
Uses of Performance Data

- MOH and LHD level service planning (where to direct resources)

- MOH and LHD level performance monitoring and management (identify and address performance issues)

- Public performance reporting
  - National agencies (AIHW, NHPA, COAG Reform Council, Productivity Commission)
  - State agencies (BHI, CEC, MOH)

- Statistical reporting
  - Health Statistics NSW
  - Australian Bureau of Statistics
Examples – useful web sites

- Health Statistics NSW

- Australian Institute of Health and Welfare

- National Health Performance Authority
  - http://www.nhpa.gov.au

- Cancer Institute NSW

- Bureau of Health Information

- Clinical Excellence Commission
Examples – Ministry perspective

- Performance monitoring (internal to the system)
  - Mainly focussed on KPIs and service measures contained in LHD/SHN Service Agreements
## 2 Service Access and Patient Flow

### 9B1 Transfer of Care (< 30 minutes) (%)

<table>
<thead>
<tr>
<th>YTD Result Jan 2014</th>
<th>Target/Benchmark</th>
<th>Variance</th>
<th>% Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt;= 90%</td>
<td>-7.2</td>
<td>-8.0</td>
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<tr>
<td>Same Period LY</td>
<td>Variance</td>
<td>5.5</td>
<td>7.1</td>
</tr>
</tbody>
</table>

Note: There was a scheduled Ambulance CAD Outage between 22:00 19/12/2013 and 05:00 20/12/2013. During this time there was no data captured on Ambulance presentations to Hospital ED’s.

### 9B3 NEAT – % of patients with total time in ED <= 4 hours (%)

<table>
<thead>
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<th>Target/Benchmark</th>
<th>Variance</th>
<th>% Variance</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>&gt;= 81%</td>
<td>-3.9</td>
<td>-4.8</td>
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<tr>
<td>Same Period LY</td>
<td>Variance</td>
<td>12.2</td>
<td>18.8</td>
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### 9B2 ED Triage 3 Cases Treated Within Benchmark Times (%)

<table>
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<th>Target/Benchmark</th>
<th>Variance</th>
<th>% Variance</th>
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<td>&gt;= 75%</td>
<td>0.5</td>
<td>0.7</td>
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<td>Same Period LY</td>
<td>Variance</td>
<td>4.3</td>
<td>6.1</td>
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</table>
### Service Access and Patient Flow

#### Elective surgery patients admitted within clinically appropriate time (%)

<table>
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<th>CAL YTD Result Jan 2014</th>
<th>Target/Benchmark</th>
<th>Variance</th>
<th>% Variance</th>
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<tbody>
<tr>
<td></td>
<td>98</td>
<td>-1.0</td>
<td>-1.1</td>
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</table>

**Same Period LY**

<table>
<thead>
<tr>
<th>Variance</th>
<th>% Variance</th>
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<tbody>
<tr>
<td>2.4</td>
<td>2.5</td>
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</table>

**Note:**

#### Category 1 elective surgery patients admitted within clinically appropriate time (%)

<table>
<thead>
<tr>
<th>CAL YTD Result Jan 2014</th>
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<th>Variance</th>
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<tr>
<td></td>
<td>100</td>
<td>-0.5</td>
<td>-0.5</td>
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</table>

**Same Period LY**

<table>
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<tr>
<th>Variance</th>
<th>% Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4</td>
<td>2.5</td>
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</table>

#### Category 2 elective surgery patients admitted within clinically appropriate time (%)

<table>
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<th>% Variance</th>
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<tr>
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<td>97</td>
<td>0.1</td>
<td>0.1</td>
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</table>

**Same Period LY**

<table>
<thead>
<tr>
<th>Variance</th>
<th>% Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>3.2</td>
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</table>
Examples – Ministry perspective

- **Performance monitoring (internal to the system)**
  - Mainly focussed on KPIs and service measures contained in LHD/SHN Service Agreements

- **Benchmarking**
  - Comparative analysis of performance by peer group

NSW Emergency Department Monitoring Data

Report Period: 01-December-2013 to 31-December-2013

Time spent in ED

Definitions:

Total time in ED - The total time from triage to departure from the ED

Admitted - Admitted to ward/inpatient unit, critical care ward (including HDU/CCU/NICU) or operating suite

Not Admitted - All other modes of separation

Cohort - Persons that departed from an Emergency Department having received treatment within the specified time period


Liverpool Hospital (D209)

<table>
<thead>
<tr>
<th>Time (Hrs)</th>
<th>Adm</th>
<th>% Adm</th>
<th>Not Adm</th>
<th>% Not Ad</th>
<th>D209 Tot</th>
<th>% D209</th>
<th>% A1 Peer</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 4 hrs</td>
<td>1,289</td>
<td>50.6%</td>
<td>3,078</td>
<td>77.4%</td>
<td>4,366</td>
<td>66.9%</td>
<td>66.6%</td>
</tr>
<tr>
<td>&lt;= 6 hrs</td>
<td>1,714</td>
<td>67.3%</td>
<td>3,656</td>
<td>92.0%</td>
<td>5,370</td>
<td>82.3%</td>
<td>82.9%</td>
</tr>
<tr>
<td>&lt;= 8 hrs</td>
<td>2,031</td>
<td>79.7%</td>
<td>3,852</td>
<td>96.9%</td>
<td>5,883</td>
<td>90.2%</td>
<td>91.0%</td>
</tr>
<tr>
<td>&lt;= 12 hrs</td>
<td>2,295</td>
<td>90.1%</td>
<td>3,940</td>
<td>99.1%</td>
<td>6,235</td>
<td>95.6%</td>
<td>96.4%</td>
</tr>
<tr>
<td>&lt;= 24 hrs</td>
<td>2,542</td>
<td>99.8%</td>
<td>3,974</td>
<td>100.0%</td>
<td>6,516</td>
<td>99.9%</td>
<td>99.7%</td>
</tr>
<tr>
<td>&lt;= 72 hrs</td>
<td>2,546</td>
<td>100.0%</td>
<td>3,975</td>
<td>100.0%</td>
<td>6,521</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>2,547</td>
<td></td>
<td>3,975</td>
<td></td>
<td>6,522</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of ED Adms</td>
<td>39.1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hrs within 4hrs | 3,891 | 7,195 | 11,086 |
Hrs over 4hrs   | 11,196 | 5,533 | 16,729 |

Patients admitted to a ward/ICU/theatre from ED

Patients not admitted to an Inpatient Unit from ED

As of: Wednesday, 29 January 2014
ED Benchmarking Data on the MOH Intranet:

NSW Emergency Department - Admissions from ED - Peer Groups A to C

Reporting period: 01-July-2013 to 30-September-2013

Definitions: Emergency Department Status - A patient who has during an episode been treated within an Emergency Department as well as within a ward within the same hospital (‘2’ ED role delineation 3 or above, ‘5’ ED role delineation 1 or 2)

Care Type - ‘1’ Acute Care or ‘5’ Newborn

Liverpool Hospital

Top 10 DRGs V6.0 by Days for patients Admitted from ED - Peer Comparison

Principal referral

<table>
<thead>
<tr>
<th>DRG Description</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schizophrenia Disorders (U61Z)</td>
<td>100</td>
</tr>
<tr>
<td>Major Affective Disorders (U63Z)</td>
<td>80</td>
</tr>
<tr>
<td>Trach W Vent &gt;95 hours W/O Cat CC or Trach/Vent &gt;95 hours W Cat CC (A06B)</td>
<td>60</td>
</tr>
<tr>
<td>Injuries W/O Catastrophic or Severe CC (X60B)</td>
<td>50</td>
</tr>
<tr>
<td>Septicaemia W Catastrophic CC (T60A)</td>
<td>40</td>
</tr>
<tr>
<td>Respiratory Infections/Inflammations W Catastrophic CC (E62A)</td>
<td>30</td>
</tr>
<tr>
<td>Other Digestive System Diagnoses W/O Catastrophic or Severe CC (G70B)</td>
<td>20</td>
</tr>
<tr>
<td>Chronic Obstructive Airways Disease W/O Catastrophic CC (E65B)</td>
<td>10</td>
</tr>
<tr>
<td>Dementia and Other Chronic Disturbances of Cerebral Function (B63Z)</td>
<td>5</td>
</tr>
<tr>
<td>Heart Failure and Shock W/O Catastrophic CC (F62B)</td>
<td>2</td>
</tr>
</tbody>
</table>

Key:
- Facility ALOS
- Peer ALOS
- Upper confidence level

Report generated: 29th January, 2014
ABF Benchmarking – 2011-2012 Average Cost per NWAU (13) By Facility
For Acute, ED encounters and Principal Referral Hospital
Top 10 DRG Report
Order by Average Cost per NWAU (13)
Top 10 URG Report
Order by Average Cost per NWAU (13)
Examples – Ministry perspective

- **Performance monitoring (internal to the system)**
  - Mainly focussed on KPIs and service measures contained in LHD/SHN Service Agreements

- **Benchmarking**
  - Comparative analysis of performance by peer group

- **Service planning**
  - Activity trend analysis (important in the Activity Based Funding environment)

- **Public health surveillance**
  - Emergency Department and Ambulance Surveillance System
Figure 4. Total weekly counts of Emergency Department presentations for any respiratory illness, for 2014 (black line), compared with each of the 5 previous years (coloured lines), persons of all ages, for 59 NSW hospitals.

Figure 5. Total weekly counts of Emergency Department presentations for influenza-like illness, for 2014 (black line), compared with each of the five previous years (coloured lines) excluding 2009, persons of all ages, for 59 NSW hospitals.
Examples – Ministry perspective

- Performance monitoring (internal to the system)
  - Mainly focussed on KPIs and service measures contained in LHD/SHN Service Agreements

- Benchmarking
  - Comparative analysis of performance by peer group

- Service planning
  - Trend analysis (important in the Activity Based Funding environment)

- Public health surveillance
  - Emergency Department and Ambulance Surveillance System

- (Near) Real time analytics
  - Patient Flow Portal
  - EDWARD reporting
Patient Flow Portal* Predictive Tool

Demand and Capacity: Prediction Mode (Sutherland Hospital)

<table>
<thead>
<tr>
<th></th>
<th>Wed</th>
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<th>Sat</th>
<th>Sun</th>
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<tr>
<td>07/11/12</td>
<td>50</td>
<td>40</td>
<td>47</td>
<td>16</td>
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<td>08/11/12</td>
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*Prediction data only applies to ED accessible wards*

**Bed Demand Status**

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<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
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Total ED accessible beds

<table>
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<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
<th>Mon</th>
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<tr>
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* Request access to the PFP via: pfp.healthtech.nswhealth.net

NSW Government
Health
## OT KPI Scorecard

### Service Agreement Measures

#### Source System Extract Date 25/04/13 | Provisioning refresh date 26/04/13

### ABC Local Health District

#### Scorecard

<table>
<thead>
<tr>
<th>Date</th>
<th>This Week</th>
<th>Month to Date</th>
<th>Year to Date</th>
<th>YTD Trend</th>
</tr>
</thead>
</table>

#### EMERGENCY DEPARTMENT

<table>
<thead>
<tr>
<th>KPI</th>
<th>Actual</th>
<th>Target</th>
<th>Actual</th>
<th>Target</th>
<th>Actual</th>
<th>Target</th>
<th>YTD Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Admission Performance within 6 hours</td>
<td>56%</td>
<td>80%</td>
<td>79%</td>
<td>90%</td>
<td>79%</td>
<td>90%</td>
<td>82%</td>
</tr>
<tr>
<td>Mental Health Presentations Staying in ED &gt; 24 hours</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Presentations Admitted to Ward/ICU/Operating Theatre</td>
<td>70%</td>
<td>0%</td>
<td>85%</td>
<td>0%</td>
<td>85%</td>
<td>0%</td>
<td>91%</td>
</tr>
<tr>
<td>Presentations Admitted, Referred or Discharged within 4 hours</td>
<td>77%</td>
<td>76%</td>
<td>50%</td>
<td>76%</td>
<td>76%</td>
<td>76%</td>
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<tr>
<td>Presentations Staying in ED &gt; 24 hours</td>
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<tr>
<td>Presentations Triage 1 treated within benchmark</td>
<td>6%</td>
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<td>54%</td>
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<tr>
<td>Presentations Triage 2 treated within benchmark</td>
<td>35%</td>
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<tr>
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### OPERATING THEATRE

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<tr>
<th>KPI</th>
<th>Actual</th>
<th>Target</th>
<th>Actual</th>
<th>Target</th>
<th>Actual</th>
<th>Target</th>
<th>YTD Trend</th>
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<tbody>
<tr>
<td>Elective Surgery Cancellations on Day of Surgery</td>
<td>56%</td>
<td>80%</td>
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<td>90%</td>
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<tr>
<td>Elective Theatre Sessions Theatre Utilisation</td>
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<tr>
<td>First Case on Time Theatre Performance (Elective)</td>
<td>100%</td>
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<td>90%</td>
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<tr>
<td>Number of Theatre Attendances</td>
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</table>

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Sample – Operating Theatre Activity Summaries

**EBI Program**

**Target: <2%**

Elective Surgery Cancellations on Day of Surgery

- Total Cancellations on Day of Surgery for Elective Surgery
- Planned Theatre List Cancellations for Elective Surgery
- Theatre Case Cancellations for Elective Surgery
- Total Patients on Planned List for Elective Surgery

**KPI**

\[
\frac{180 \times 8\%}{141 \times 6\% + 37 \times 2\%} \div 2150 \times 100\%
\]

**Target: 80%**

Elective Session Utilisation

\[
\frac{\text{Actual Case Time}}{\text{Outside Session Case Time}} = \frac{n \text{ hours}}{100\%}
\]

**Target: na**

Emergency Surgery Access Priority 1 - 6

- Emergency Case
- Elective Surgery Cases
- Elective Medical Cases
- Elective Other Cases
- Emergency Cases
- Total Non-Patient Session Time

**Number of Theatre Attendances**

- Elective Theatre Sessions
- Theatre Utilisation
- Total Theatre Attendances

- Elective Surgery Cancellations on Day of Surgery
- Planned Theatre List Cancellations for Elective Surgery
- Theatre Case Cancellations for Elective Surgery
- Total Patients on Planned List for Elective Surgery

**OT FR1 KDB**

**OT FR3 KDB**

**OT FR4 KDB**

**FR6 KDB**
Health Record Linkage

- The bringing together, from two or more different sources, of health-related data that relate to the same individual, family, place or event
- Designed to overcome the limitations of traditional data collection silos
- Offers opportunity to link with non-health data sets
- Provides an integrated view of ‘patient’s journey’
- Enables analysis of outcomes
Centre for Health Record Linkage

- Established in 2006
  - to create and sustain a record linkage infrastructure for the health and human services sector, and provide access to these resources to bona fide researchers and health planners and policy makers.

- Established by:
  - NSW Department of Health and the Cancer Institute NSW
  - ACT Health, NSW Clinical Excellence Commission, The Sax Institute, University of Newcastle, University of NSW, University of Sydney, and the University of Western Sydney.

- www.cherel.org.au
The CHeReL does:

with data custodian and ethical approval:

- create a *master linkage key*, consisting of ‘pointers’ to records for specific people in health-related data sets
  - does not contain health information about individuals
- provide a mechanism for accessing linked data for:
  - research
  - planning of health services
  - evaluation of health services

… for the public benefit
The CHeReL does not:

- hold health information other than that required for the record linkage
- have a “repository” of linked health data
- carry out data analysis or research on linked health data
  (... it does carry out research on methodological aspects of record linkage)
CHeReL Master Linkage Key

- 45.4 million records
- 9.3 million people
- 4.9 average links per person
- 6,211,698 people with multiple records

**NSW**

- **Admitted Patient Data Collection**
  - July 2000 – June 2011
  - 25,159,796 records
- **Perinatal Data Collection**
  - Jan 1994 – Dec 2010
  - 1,524,048 records
- **Central Cancer Registry**
  - 504,894 records
- **RDBM Birth Registrations**
  - Jan 1994 – Dec 2010
  - 1,522,948 records
- **Perinatal Death Reviews**
  - Jan 2000 – Dec 2009
  - 7,160 records
- **ABS Perinatal Deaths**
  - Jan 1994 – Dec 2005
  - 9,445 records

**Emergency Department Data Collection**
- Jan 2005 – June 2011
- 12,663,863 records

**ACT**

- **Admitted Patient Collection (Canberra Hospital)**
  - July 2004 – June 2009
  - 299,807 records
- **Cancer Registry**
  - 17,723 records
- **Emergency Department Information System (Canberra Hospital)**
  - July 2004 – June 2009
  - 258,771 records
- **ACT Perinatal Data Collection**
  - 24,246 records
Secure Unified Research Environment (SURE)

- Australia’s first high-performance “virtual computing environment”

- Designed specifically for health researchers to:
  - securely access, store and rapidly analyse anonymised health information brought together from sources such as hospitals, cancer registries, clinical trials, general practice, and research studies.

- Funded by the DIISRTE, NSW Health and the (then) NSW Office for Science and Medical Research.

- Hosted by The Sax Institute

- For more information see www.sure.org.au
Future Directions

- **Analytics and reporting from EMR systems**
  - Near real-time
  - Down to clinical unit, patient group, treatment type

- **Further developments and deployment of EDWARD**
  - Improved reporting consistency (Facility LHD – State) and availability
  - Greater range of data sets, with ability for ‘blended’ analysis (eg. activity vs. cost vs. workforce vs. capacity)
  - ‘Patient journey’ analysis

- **Greater (and routine) use of linked data sets**
  - Outcomes measurement; predictive algorithms
  - Applicability to bioinformatics and genomic research

- **Advanced analytics and modelling**
  - Demand models, predictive capacity planning, process optimisation
  - Machine learning

- **Focus on data quality**
  - Data profiling and proactive management of data quality