A Journey Towards Enhanced Data Quality in Healthcare

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Overview

- Introducing NSW Health
- Importance of data quality in healthcare
- Common data quality issues and their causes
- NSW Health data quality framework
- Examples of strategies being pursued
- Learnings so far
- The road ahead
NSW Health

- Australia’s largest state-based health system
- Serving the population of 7.3 million
- 2.5 million emergency department attendances per year
- 1.6 million hospital admissions per year
- 26 million non-admitted service occasions per year
- One of Australia’s largest employers: more than 100,000 full-time equivalent employees
- Recurrent expenditure budget of $16.4 billion in 2011-12
- Capital expenditure budget of $1.1 billion in 2011-12
- 220 public hospitals, 500 community health centres, 220 ambulance stations....

Structure of NSW Health

- NSW Ministry of Health
- 15 geographically-based Local Health Districts
  - each responsible for a number of public hospitals
- Three specialist health networks
- Ambulance service
- Four specialised agencies (clinical quality, clinical innovation, workforce development, public reporting)
Metropolitan NSW Local Health Districts

Rural and Regional Local Health Districts
Healthcare Data

- Clinical data
  - Patient level transactions
  - Clinical observations
- Corporate data
  - Financial data
  - Workforce data

Uses of Clinical Data

- Primary use
  - Provision of clinical care to patients and families
- Secondary uses
  - Research
  - Public health surveillance
  - Service management
  - Service planning / policy development
  - Allocation of funds
  - Performance monitoring
  - Public accountability
Importance of Data Quality

- Clinical decision making
- Managerial decision making
- Accuracy of long term projections and plans
- Activity based funding
- Accuracy of performance assessments
- Public reporting of health data
Performance Indicators

- **Activity** (e.g. number of emergency department attendances, number of cost-weighted admissions)
- **Safety and quality** (e.g. hospital acquired infections, unplanned readmissions, in-hospital mortality)
- **Service access and patient flow** (e.g. time spent in EDs, length of stay in hospital, waiting times for elective surgery)
- **Population health** (e.g. immunisation rates, low birth weight babies, avoidable hospital admissions etc.)

Activity Based Funding

New South Wales - Activity Based Funding - Monitoring of Activity against Targets

<table>
<thead>
<tr>
<th></th>
<th>August 2011 (12.1% uncoded)</th>
<th>YTD August 2011 (7.9% uncoded)</th>
<th>Jul-11 to Jan-12</th>
<th>YTD Aug-11 Avg. Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual</td>
<td>Target</td>
<td>Variance</td>
<td>% Variance</td>
</tr>
<tr>
<td>Acute Admitted Activity* (Weights)</td>
<td>113,234</td>
<td>107,078</td>
<td>6,155</td>
<td>5.7%</td>
</tr>
<tr>
<td>Planned Surgery</td>
<td>25,289</td>
<td>24,018</td>
<td>1,271</td>
<td>5.0%</td>
</tr>
<tr>
<td>Other surgery (incl. Unplanned)</td>
<td>25,965</td>
<td>24,453</td>
<td>1,513</td>
<td>6.2%</td>
</tr>
<tr>
<td>Medical</td>
<td>46,021</td>
<td>45,147</td>
<td>874</td>
<td>1.9%</td>
</tr>
<tr>
<td>Procedures</td>
<td>16,514</td>
<td>16,120</td>
<td>394</td>
<td>2.4%</td>
</tr>
<tr>
<td>Obstetrics</td>
<td>8,604</td>
<td>8,323</td>
<td>272</td>
<td>3.3%</td>
</tr>
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</table>

*Weights*
Targets, Targets, Targets...

<table>
<thead>
<tr>
<th>KPIs</th>
<th>Safety and Quality</th>
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<tbody>
<tr>
<td></td>
<td>Target</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Tier 1</td>
<td>Staphylococcus aureus bloodstream infections (SA-BSI) (per 10,000 occupied bed days)</td>
</tr>
<tr>
<td>Tier 1</td>
<td>Unplanned hospital readmissions: all admissions within 28 days of separation (%):</td>
</tr>
<tr>
<td>Tier 2</td>
<td>ICU Central Line Associated Bloodstream (CLAB) Infections (number)</td>
</tr>
<tr>
<td>Tier 2</td>
<td>Incorrect procedures: Operating Theatre-resulting in death or major loss of function (number)</td>
</tr>
<tr>
<td>Tier 2</td>
<td>Mental Health: Unplanned readmission within 28 days (%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>KPIs</th>
<th>Patient Flow</th>
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<tbody>
<tr>
<td></td>
<td>Tier 1</td>
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Media, Political and Public Interest

Superbugs at hospitals revealed

Number Crunching: Levels of Staph Infections in Hospitals made Public

Data reveals long emergency ward wait

New NSW hospital bed figures questioned

Gov 2.0: health data becoming more accessible
Public Reporting

MyHospitals

Median waiting times for elective surgery

The median waiting time is the number of days within which half of all patients at this hospital received their surgery.

**All orthopaedics**
- 26 days compared to the national average of 62 days
  - [See previous year's data](#)

**Total hip replacement**
- 113 days compared to the national average of 115 days
  - [See previous year's data](#)

**Total knee replacement**
- 236 days compared to the national average of 180 days
  - There were fewer than 10 surgeries performed in previous years

Common Data Quality Issues

- Patient demographics (incl. Indigenous Status)
- Patient’s “financial class”
- Emergency department arrival, triage and treatment times
- Admission sources
- Care type changes
- Clinical coding of discharge diagnoses
**Error Rates**

<table>
<thead>
<tr>
<th>Collection</th>
<th>Number of records in 2009/10</th>
<th>Number of records with at least one critical error</th>
<th>Error rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Departments</td>
<td>2,002,582</td>
<td>61,087</td>
<td>3.1%</td>
</tr>
<tr>
<td>Admitted Patients</td>
<td>1,465,977</td>
<td>4,780</td>
<td>0.3%</td>
</tr>
<tr>
<td>Waiting Lists</td>
<td>1,128,454</td>
<td>246</td>
<td>0.0%</td>
</tr>
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</table>

- Current metrics are likely to seriously underestimate the problem!

**Consequences**

- Loss of revenue
- Lack of inter-hospital comparability
- Challenge to credibility of published performance data
- Reduced utility of data for planning and decision making
Common Causes of Data Quality Issues

- Complex processes
- Time critical nature of clinical processes
- Numerous data entry points and operators
- Workload pressures
- Lack of training
- Inadequacies of operational ICT systems
- Data extraction and transformation errors
- Data storage and use
- Definition/interpretation issues
Key Impacts on Data Quality Dimensions

Figure 7: The Validity Dimension Decomposed
Source: Developed by the authors for this project

Data Quality Critical Success Factors

Figure 3: TOP Data Quality CSFs
Source: Lin, Koronis & Gao (2007)
NSW Health’s Data Quality Framework

Prevention
- data collection policies and guidelines
- data validation and standardisation rules
- user training
- optimisation of operational systems (PAS, EMR, Oracle)
- alignment with state-wide and national data standards
- data stewardship
- source system specifications to minimise data entry errors

Identification & Feedback
- data validation rules application
- proactive data mining and surveillance of data collections
- regular data quality reports back to LHNs, source systems’ administrators / AAGs
- quality checking software (such as clinical coding audit software)
- data quality statements on all reports
- person identity resolution

Rectification
- data warehouse tools for data validation and cleansing
- manual data validation and cleansing via Data Collection Coordinators
- authorised procedures for data corrections from source to data warehouse

Assurance
- routine data quality audit program
- special audits of targeted areas of LHNs / source system builds of interest
- data quality profiling and reporting
- liaison with Area Data Coordinators
- regular risk assessment
- reporting to the Data Governance Council

Preventative Strategies
- New/updated data collection guidelines (e.g. bed counting, admission policy)
- Working with ED system vendor to enhance data entry controls
- Training of clinical coders (incl. audit training)
- Reviewing and enhancing ETL processes
Identification and Feedback Strategies

- Data coordinators (subject matter expertise)
- Implementation of a data profiling tool
- Dedicated data quality analyst
- Data quality scores reported back to Local Heath Districts
- Software tool for checking quality of clinical coding – reported back to Local Health Districts

Rectification Strategies

- Manual intervention by local and central data coordinators
- Data warehouse hygiene (data cleansing scripts run monthly)
- Data cleansing routines built into the new Enterprise Data Warehouse
Assurance Strategies

- Routine data quality audit program
  - External, third party provider
  - Three year cycle of audits
  - Continuous quality improvement approach
- Special (issue-based) audits and reviews
- Governance processes

Data Governance Model

Data Governance Council

- Data and KPI definitions
- Alignment with national definitions
- Development of new collections
- Rationalisation of existing collections
- Metadata and master data oversight
- Data asset register
- Data policy reviews

- Oversight of DQ audit program
- Maintenance of DQ framework
- Data coordinators’ input
- Definition of data validation rules
- Oversight of rectification of IT defects causing data quality issues

- Oversight of BI support function
- Access and security policies
- Prioritisation of improvements and future developments
- BI ‘design authority’
- BI metadata management

- Oversight of all forms of data publication (web, reports, tools, documents)
- Strategic approach to statistical documents
- Input into NSW State Statistical Plan
- Development and oversight of publication standards
Learnings So Far

- Importance of communication and executive level support
- Alignment of objectives
- Culture of openness
- Balance between audit and continuous quality improvement
- People and processes first, followed by technology
- Importance of vendor management

The Road Ahead....

- Governance Council
- Audit program
- Data profiling
- Communication strategy
- New data warehouse
- Vendor relations