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Leveraging data-driven innovation in aging societies

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Introduction

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- Two examples of data-driven innovation
- Western Australian Data Linkage System
  - Discovery of causes of unplanned hospital stays in elderly
  - True rates of adverse drug reactions in the elderly
- Institute of Urban Indigenous Health
  - Chronic disease intervention outcomes through risk and economic modeling
  - Geographic modeling of administrative data for service planning

Western Australia Data Linkage

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- System established 1995
- Population-based: 2.1 million people in 2008
- > 30 risk factor, morbidity, health care and vital databases
- Links created using probabilistic name matching
- Data is geocoded
- Family trees calculated
- Managed by Health Department and

Core Data Sets

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- Hospital separations
- Cancer registrations
- Midwives notifications
- Mental health contacts
- Birth and death registrations
- Electoral roll
- Emergency presentations

What can it tell us?

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- Other data had shown doubling of rate of hospital stays due to adverse drug reactions during 80's
- By 2002 it had increased 5 times
- Drugs responsible: Oral anticoagulants, cytotoxics (cancer), antirheumatics for arthritis, corticosteroids, antihypertensives and opioids

Adverse Drug Reactions in Elderly

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- Analysis of 153 million records in Linked Data showed that rates of admission were double shown by medical coding
- Further analysis showed previously hidden reasons for unplanned hospital admission
- Elderly taking PIMs (potentially inappropriate medications) e.g. Temazepam, Diazepam had significantly higher risk of unplanned hospital stays
- Possibly as a result of increased accidents as a result of PIM usage

Chronic Disease Intervention Modeling

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- Queensland has a life expectancy gap of 8.9 years between Indigenous and Non-Indigenous people
- Due to
  - Cardiovascular Disease (29%)
  - Diabetes (19%)
  - Chronic respiratory disease (16%)
  - Mental disorders (10%)

Measuring outcomes of clinical intervention

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- Data from a uniform clinical platform
- Established baseline of clinical indicators
- Measured indicators after intervention
- Calculated risk of disease
  - CVD: Framingham
  - Diabetes: UKPDS Outcomes Model
  - Mental Health: PHQ4
  - Alcohol: Audit C Scores

Calculating economic and life outcomes

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- Data was used to calculate
  - Improvements in clinical risk
  - Economic savings by applying an economic model
  - Cost/Benefit analysis
  - Improvement in Health-Adjusted Life Expectancy
- Analysis showed improved outcomes and increase in HALE of 0.48 years

Geographic planning for chronic disease

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- IUIH has increased number of clinics to 16
- Calculating clinic services based on geocoded administrative data (Medicare claims)
- Can only do this because of a centralised collection of information that is coded

Data Analysis in Clinical Provisioning

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- Importance of centralised and linked data
- Applying models of risk, outcomes and economics.
- Feed into performance measures
- Pitfalls:
  - Understanding the underlying motivations of data
  - Linkage issues
  - Incomplete or false data
  - Inaccurate or unacceptable models