So what do we know about Middle Earth
Demographics
Life Expectancy

![Life Expectancy Chart](chart.png)
Logistics

Frodo & Sam’s journey to Mount Doom in numbers

**MILES TRAVELLED PER BOOK**

- **FOTR**: 1319 MILES (73.2%)
- **TT**: 315 MILES (17.5%)
- **ROTK**: 166 MILES (9.2%)

**DAYS TRAVELLED PER BOOK**

- **FOTR**: 158 DAYS (84.3%)
- **TT**: 17 DAYS (9.2%)
- **ROTK**: 12 DAYS (6.3%)
Frodo & Sam’s journey to Mount Doom in numbers

<table>
<thead>
<tr>
<th></th>
<th>MILES TRAVELLED PER BOOK</th>
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<tbody>
<tr>
<td><strong>FOTR</strong></td>
<td>1319 MILES (73.2 %)</td>
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LOTROJECT.COM/TIMEDISTANCE
# Staff Interactions

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<thead>
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<th>Fellowship of the Ring</th>
<th>The Two Towers</th>
<th>Return of the King</th>
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<tr>
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<td>Samwise Gangrel</td>
<td>714 mentions</td>
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<tr>
<td>Merry Brandybuck</td>
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But do we feel we really know The Lord of the Rings from this data?
Yet we try to understand our health systems the same way

- Coded Healthcare Data
- Qualitative Human Data
- Quantitative Machine Data
In the beginning
About Us

Our Workforce

9,743 people are employed by the Canterbury District Health Board. We are the largest single employer in the South Island.

107 different ethnic groups across our workforce.

9% turnover rate, compared to 3.5% nationally.

3.2% sickness rate compared to 3.8% nationally.

52 is the average age of our oldest workforce group: Support Services.

46 is the average age of our workforce.

81% of our workforce are female.

48% of our workforce work part-time.

57% of DHB senior management roles (tier 2+) are filled by females.
Canterbury DHB

Key Population Stats

2019/20

578,830 people

Canterbury's population growth is exceeding expectations — already reaching levels predicted for 2022

Our population's growing

Our growth rate is 13.2% over the past 10 years — higher than predicted before the earthquakes.

Our population's ageing

Our population is older than the NZ average. By 2066, one in five people in Canterbury will be older than 65 (11.7% currently).

Our population's diverse

Our population is becoming more diverse. In Canterbury, one person out of every five was born overseas.

Based on the Stats NZ Dec 2016 Population Projections
Our Workforce

9,745 people are employed by the Canterbury District Health Board. We are the largest single employer in the South Island.

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52 is the average age of our oldest workforce group: Support Services.

107 different ethnic groups across our workforce.

9% turnover rate, compared to 9.5% nationally.

3.2% sick leave rate compared to 3.8% nationally.

48% of our workforce work part-time.

81% of our workforce are female.

48% of our workforce are nurses.

57% of DHB senior management roles (tier 1-3) are filled by females.
Where we started

Then

CANTERBURY PATIENTS ARE MORE LIKELY TO WAIT FOR TREATMENT (PRESS 2003)

And to be left dangling over when they will get help - than patients elsewhere in the country.

Canterbury cancer patients seemed to have suffered more than most from radiotherapy delays (Press 2003).

Over-crowded ED, Gridlocked hospital, Cancelled operations, Threatened industrial action.

General practice and hospital clinicians disconnected.

Locum medical costs sky-rocketing; nursing shortages.

2003 – Press reports that the CSHB has been unable to meet its elective performance targets for four financial years.

2006 - 500 patients removed from waiting lists to meet waiting time targets.
Then

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Where we were going ....

400 more hospital beds
2000 more aged care beds
8000 more health workers
400 more hospital beds
2000 more aged care beds
8000 more health workers
What are we doing
Integrated Healthcare and SNOMED

Creating Integration

Using SNOMED

HCAS

The Future

Bending the Curve

The Canterbury Journey

Middle Earth
Bending the Curve

Understanding the Population

Does Integrating a Health System Make...
Understanding the Population

Changes in population

From 2006/07 to 2017/18:
- 14.8% increase – total population
- 33.7% increase – over 65s
- 18.9% increase – over 75s
- 19.9% increase – Māori

From 2018/19 our population has grown 10% faster than the national rate.
Māori is growing at twice the national rate.
Changes in population

From 2006/07 to 2017/18:

- **14.8% increase** – total population
- **33.7% increase** – over 65s
- **18.9% increase** – over 75s
- **39.9% increase** – Maori

From 2012/13 our population has grown 30% faster than the national rate.
Maori is growing at twice the national rate.
Does Integrating a Health System Make a Difference?

Can we bend the curve?
Keeping People Well and Healthy and out of our Institutions.
Delayed/avoided burden of long term conditions, decreased acute care

Key measure: Relative growth in acute medical admissions
Increased planned care and decreased acute care

Key measure: Emergency Department attendance

ED attendance per 1,000 (age standardised, DHB of domicile)

ED Attendances Age 65+ (Age Standardised Rate per 1,000)
Delayed/avoided burden of long term conditions, decreased acute care

Key measure: Acute medical admissions
Increased planned care and decreased acute care

Key measure: Acute medical bed days
People living in their own homes

Proportion of 75+ people living in own homes

- Dementia
- Hospital Care
- Psychogeriatric
- Rest Home

Canterbury %
People living in their own homes
Integrated Respiratory Services – COPD

- Integrated response focusing on community management
- Around one third of 111 calls for respiratory issues are now diverted to community care
- Growth in admissions has been reduced
- Large reductions in bed days

COPD Ambulance Calls and outcome

- Blue: Ambulance Treated in Community
- Orange: ED
- Grey: Total Ambulance Calls
COPD INITIATIVE
In the five years, compared with expected:
466 fewer admissions
631 fewer ambulance arrival after hours
6299 fewer bed days * (2009 baseline)
139 fewer acute readmissions

Fewer COPD Admissions

Fewer occupied beds# COPD

Fewer COPD ED arrival by Ambulance
After Hours (Mon – Fri 6pm-8am, Sat–Sun any time)

Fewer readmissions for # COPD

17/05/2017
COMMUNITY FALLS PREVENTION

In five years, compared with expected (75+ years):
- 2253 fewer ED attendances
- 590 fewer fractured NOFs
- 37,683 fewer NOF bed days
- 222 fewer deaths at 180 days

Agreed price (IDF) $815 per rehab bed day
$8,212M costs foregone in last 12 months
Cost: 6 Physios ($650k pa)
National Service Coverage August 2017

Falls and Fracture system
- 80% of local health systems
- 86% of population

Community Group Strength and Balance Lead Agency
- 95% of local health systems
- 96% of population
ED attendance by ambulance
ED attendance – over 65s
Delayed/avoided burden of long term conditions, decreased acute care

Key measure: Ambulatory Sensitive Hospitalisations

ASH rate 0-4 years
(non-standardised, per 100,000)
Delayed/avoided burden of long term conditions, decreased acute care

Key measure: Ambulatory Sensitive Hospitalisations

ASH rate 45-64 years
(standardised, per 100,000)
Hospital Mortality Ratio
ARC – reducing the growth

Canterbury’s high historical ARC expenditure is coming back to national levels

Growth has been marginal for the last 7 years
In summary...System Outcome 9
Living within our means

- Better services to keep people in their own homes and communities
- Better access
- More choices throughout life

Quantifying the avoidable costs:
- Labs - $3.21M below the national benchmark
- Pharmacy - $1.39M below the national benchmark
- Radiology - $1.37M below the national benchmark
- $9.98M avoided costs for ED visits
- $14.49M avoided costs for medical surgical bed days
- $12.81M avoided costs for older persons rehab bed days
- $47.0M avoided costs in aged residential care
Overall efficiency (large buckets)

This results in a net $38.3M efficiency
Integrated Healthcare and SNOMED
A shared vision

In Canterbury we have a **shared vision**

A connected system, centred around people that aims not to waste their time
Three Strategic Goals

Three strategic goals

1. People take greater responsibility for their own health
   The development of services that support people/whānau to stay well and take increased responsibility for their own health and wellbeing.

2. People stay well in their own homes and communities
   The development of primary care and community services to support people/whānau in a community-based setting and provide a point of ongoing continuity, which for most people will be general practice.

3. People receive timely and appropriate complex care
   The freeing-up of hospital-based specialist resources to be responsive to episodic events and the provision of complex care and support and specialist advice to primary care.
Three strategic goals

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3. People receive timely and appropriate complex care
   The freeing-up of hospital-based specialist resources to be responsive to episodic events and the provision of complex care and support and specialist advice to primary care.
One health system, one budget.

- Removing barriers and perverse incentives created by contracts and organisational boundaries by planning and working collaboratively across the public, private and NGO sectors.
- Getting the best outcomes possible within the resources we have.

It’s about people.

- The key measure of success at every point in the system is reducing the time people waste waiting.
- Right care, right place, right time, delivered by the right person.

Focus on leadership.

- The DHB’s role is to buy the right thing for the population.
- Clinicians are enabled to do the right thing the right way.

Take a ‘whole of system’ approach.

- Understand and respond to the needs of populations.
- Use information to plan and drive service improvement.
- Manage the short term in the context of the long term.
- Focus on improving productivity by doing the right thing the right way at the right time.
- Make decisions based on where services are best provided:
  - What is best for the patient?
  - What is best for the system?
Empowered Networks

Clinically led local and regional alliances established as vehicles for implementing system change and improving health outcomes

- High trust, low bureaucracy
- One health system, one budget
- Best for patient, best for system
- Everyone wins, or everyone loses
Adaptive Leadership

- clinicians are trusted
- care pathways are re-designed
- funding and resources are rearranged to support
- the person is in the middle of the process
- the system responds well to external shocks
- adaptive leadership in action
Working Differently

Supporting people to stay well
In their own homes and communities
Reducing acute demand
Freeing up hospital capacity
Co-owned Coordination

"The way we do it around here"
HealthPathways

- Designed and developed in Canterbury - clinically-led pathways developed by primary and specialist services for local health systems
- Provides a standardized model of care for patients
- Supports locally high-quality care
- Regularly reviewed by clinical teams

700+ Community pathways
485 Hospital pathways
99% of GPs use HealthPathways every week*
72% of GPs use HealthPathways every day*

Now used in 85 health regions from Antarctica, supporting care for 26 million people*

* Implementing the HealthPathways across South and Central Canterbury April 2018
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70% of GPs use HealthPathways every day*

Now used in 43 health regions in four countries, supporting care for 28 million people*

*Implementing HealthPathways across Queensland: a case study: April 2019
For our community

HealthInfo

Easy-to-use, patient-centred information website, contains high quality health information about a range of health conditions and diseases.

Content is checked, approved and regularly updated by the Healthinfo clinical advisors.

Bringing used to support Moqueerstock recovery.

1,879 website pages

50,000+ app views per month

553,674 page views in one year (2018)

326 page view per support after the Mosque attack.
HealthInfo

Easy-to-use, patient-centred information website, contains high quality health information about a range of health conditions and diseases

Content is checked, approved and regularly updated by the HealthInfo clinical advisers

Being used to support Mosque attack recovery

1,899 website pages
50,000+ page views per month
563,671 page views in one year (2018)
326 page views for support after the Mosque attack

Healthinfo usage: Jan-Mar 2019
A Shared Orientation
Services that Support People in a Community Based Setting
Acute Demand Management
We've invested in Community Services, to provide wrap-around care to support older people living in their own homes... with positive, measurable results.
Activity shifting into Primary Care allows for fewer hospital admissions, which means better patient outcomes.
Activity shifting into Primary Care allows for fewer hospital admissions, which means better patient outcomes.
ICT to Support
Connecting a Whole System

Shared records and shared planning for a million people

15,000+ unique users

Accessed more than 200,000 times every month
Its all about the Data

A single source of the truth
“quality data leads to better analysis; better analysis drives insight and greater insight changes behaviour”

Deloitte Report on Natural Disaster Resilience 2013
Using Data

<table>
<thead>
<tr>
<th>Clinical care of patient</th>
<th>Operational decisions</th>
<th>Planning services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactive</td>
<td>Real time</td>
<td>Proactive</td>
</tr>
<tr>
<td>Individual level</td>
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<td>Populations</td>
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<tr>
<td>Audit for quality</td>
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<td>Build quality in</td>
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<td>Forecasting and projections</td>
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Clinically-led
Disparate sources of data
Integrated Healthcare and SNOMED

Creating Integration

Using SNOMED

HCAS

Middle Earth

The Canterbury Journey

Bending the Curve

The Future
A pause on our journey to recap

- A flourishing integrated health system
- Belief in data to shape our destiny
- Collaborative ways of working
- Desire to do better, to do more
Bringing the pieces together

- Data Warehousing
- Health Pathways
- SNOMED enabled Tech
- Electronic Health Records
Standardising Workflows

Health pathways image (stones?)
Seeing the patient's journey

warehouse slide
The Clinician's knowledge captured

HCS screenshot
SNOMED CT in Middle Earth

- SNOMED CT is New Zealand's principle standard for quality data and interoperability (with HL7, FHIR & ICD-10)
- National strategy (Ministry of Health)
- Government Insurer (ACC) movement from READ codes
- Since 2015 new IS investments to include SNOMED CT
- SNOMED NZ Edition

The SNOMED NZ Edition includes all content from the SNOMED International Edition and New Zealand specific content in a separate package called the SNOMED NZ Extension.
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Moving beyond structured data

HCAS Data Size

<table>
<thead>
<tr>
<th>Scope</th>
<th>Record Unit</th>
<th>Total Records</th>
<th>distinct patient</th>
<th>Concept tags</th>
<th>Unique concepts</th>
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<tbody>
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<td>457,832</td>
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<td>557,557</td>
<td>306,014,692</td>
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<td>referrals</td>
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<td>696,628</td>
<td>58,590,805</td>
<td>40,733</td>
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Using our medical record to the full extent

Seamless integration of structured and unstructured data

Comprehensive use of available clinical data

- Traditional Healthcare BI data source
- Coded Healthcare Data
- Qualitative Human Data
- Quantitative Machine Data
Healthcare Analytics System (HCAS)

HCAS analyses and understands unstructured data in context. It allows us to search and analyse text within the medical record. It uses healthcare taxonomies (ontologies) like Snomed and ICD-10, and our coding systems to address healthcare related queries and provide visually driven analytical reporting.

Ontology tagging along with semantic and concept searching allows us to get more accurate and detailed results than a simple word search.
Our Issue (2016)

- Radiology Diagnostics
- Printer set up error
- 13,000+ reports over 5 years
- Not able to see if they had needed clinical follow up
- Review of all reports needed
Machine enabled
Chart abstraction
with SNOMED

- Data
- 1 year of selected radiology reports (19600 words)
- System features
  - SNOMED CT ontology
  - Seamless structured/semi-structured creation
  - Cohort generation of reports with actionable findings
  - Collaborative workflow
    - Cohort assignment
    - Computer-assisted chart abstraction
    - Cohort export for interoperability with other IT systems

Saved over a year of clinician time
- **Data**
  - 5 years of selected radiology reports (13601 records)

- **System features**
  - SNOMED CT ontology
  - Seamless structured/free-text filter creation
  - Cohort generation of reports with actionable findings
  - Collaborative workflow
    - Cohort assignment
    - Computer assisted chart abstraction
  - Cohort export for interoperability with other IT systems
Saved over a year of clinician time
A "first in the world solution" (2016)
HCAS Architecture

**Data ingestion/data enrichment**
- Mappers
- Pattern matchers
- Ontology tagger
- ETL/ELT

**Knowledge sources**
- CLINVAR
- ICD9/ICD10
- SNOMED

**Big Data engines**
- IDOL
  - Interprets human information for HCAS
- Vertica
  - HCAS Big Data analytics

**Healthcare analytics**
- Population trending
- Length of stay reporting

**Point of care apps**
- [Heart]
- [Phone]
- [Person]
- [Medication]

Canterbury District Health Board
Pulling concepts from the written record that is not SNOMED CT coded (i.e. not a problem list based analysis)
<table>
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<tr>
<th>HCAS Radiology ID</th>
<th>Event Date</th>
<th>Event Site</th>
<th>Event Exam Type</th>
<th>Event Description</th>
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<td>CT UROGRAM</td>
<td>DR THE 24 HOUR SURGERY</td>
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RADIOLOGY REPORT:
Report Dictation Date: 2016-01-06 14:42:00
Report Text:

CLINICAL DETAILS:
Right flank pain and haematuria. Known hyperparathyroidism.

TECHNIQUE:
Unenhanced CTU protocol.

FINDINGS:
No right renal tract calculi. Calcification in right side of pelvis adjacent uterus represents a phlebolith, unchanged as compared with CT from 19/9/2009. Small calcui in dependently in the lower pole calyx of left kidney.

10 x 8 x 12 mm calculus at the left pelvireticular junction/proximal ureter, with moderate proximal pelvicalyceal system dilatation. No left perinephric stranding. This calculus is visible on the scout view.

Mild fullness of right pelvicalyceal system and ureter.

No parenchymal abnormality within the kidneys within the limits of an unenhanced scan.

Partially calcified gallstones within non-distended gallbladder. No extrarenal abnormality seen elsewhere.

CONCLUSION:
Left PUJ/proximal ureteric calculus with pelvicalyceal system dilatation, contralateral to the side of her pain.

Mild fullness of right renal tract, but no renal calculus? recent passage of a stone.

Gallstones without CT evidence of cholecystitis.

Radiologist FRANZCR

Recommendations made in this report do not necessarily indicate availability via published funded clinical pathways. Please...
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[Signature]
Radiologist FRANZCR

DocumentTags: 38

Report Distributed Date: 2016-01-06 14:47:00
Report Author: COMRAD SYSTEM
Healthcare data is rich with unstructured information, not leveraged by today's BI and big-data tools.

Clinicians and Business Analysts think in terms of concepts to do their roles, not rows, columns, schemas.

IDOL is able to leverage taxonomies and ontologies to make the analysis "clinically aware", allowing business users to interact and discover.

Automatic Classification and Entity Extraction turns unstructured data into structured information.
Pulling concepts from the written record that is not SNOMED CT coded (i.e. not a problem list based analysis)
A growth in data

- Expanding digital clinical records
- Regional data warehousing
- Enhanced integration tools
Data transparency – Because of the scale of both structured and unstructured data in HCAS, clinicians, administrators, and IT support have new visibility into issues which were difficult or impossible to identify with existing tools.
Data transparency – Because of the scale of both structured and unstructured data in HCAS, clinicians, administrators, and IT support have new visibility into issues which were difficult or impossible to identify with existing tools.
Hypothesis Testing

Rapid hypothesis testing – allowing clinicians and administrators to quickly assemble a cohort of patients to determine whether the data is likely to back-up their hypothesis.
Digital enabled chart abstraction

Audit and Research - speed and accuracy to allow for issue identification and actions. Built in work-flow tools to ensure clinical efficiency and validation.
Health Pathway review

Audit and changes to clinical pathways – significantly faster than manual processes because the system assists in chart abstraction. Using the same human resources, more auditing can occur, allowing more rapid determination of compliance and the impact of clinical pathway changes.
Non-acute Urology Assessment

Request
Offer all referral options, even if the patient is eligible for DHB treatment, as per the HDC Code.

Christchurch Hospital Urology Department

1. Check criteria:
   - Seen within 4 months.

   Within 2 weeks
   - Suspicious testis mass.
   - Haematuria and abnormality on imaging or positive cytology.
   - Abnormal imaging suggestive of malignancy.

   Within 4 weeks
   - PSA > 100 micrograms/L or possible neurological symptoms suggest cord compression.

   Within 8 weeks
   Significant risk of malignancy, major functional impairment, moderate risk of permanent damage to organ or system if consultation is delayed, or pain requiring narcotics of high analgesia dose to control:
   - Severe lower urinary tract symptoms (LUTS) IPSS > 15, QoL > 4, or complication of bladder outlet obstruction (BOO).
   - Gross haematuria or persistent macroscopic or microscopic haematuria.
   - Significantly elevated PSA on 2 measurements.
   - Resolved ureteric colic with treatable stone.

   Within 4 months
   Moderate functional impairment, pain (controlled), restriction of social or economic activity:
   - Moderate bladder outlet obstruction or prostatism
   - Groin or scrotal abnormality if symptoms of significant pain or benign mass > 5 cm with significant impairment in quality of life (impact on Life score greater than 10)
   - Asymptomatic diagnosed renal tract stone
Coding Quality

Assistance to clinical coding – identification of concepts in the electronic record to ensure accuracy and acuity. Access to broader range of documentation

Audit of coding to identify where concepts have not been captured and support positive change at clinical capture and coding identification
Results Range

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<tr>
<th>DRG</th>
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<tr>
<td>E62C - Respiratory Infections/Illnesses</td>
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<td>E62B - Respiratory Infections/Illnesses</td>
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Text Obs ID: 254711520
Document Heading: GPMailbox
Document Content: This document will be delivered electronically when you press Finalise.

Text Obs ID: 254711521
Document Heading: MedicalHistory
Document Content: Chronic Myelomonocytic Leukemia, BCR-ABL negative, JAK2 V617F negative, normal cytogenetics, June 2017. -> Loss of appetite, weigh lymphadenopathy and painful left shoulder, increasing anaemia October 2018 - likely progression of CML -> No response to treatment for one month with hydri Commenced treatment with azacytidine, December 2018 - Painful right lateral malleolus cellulitis, treated in Ashburton Hospital with flucloxacillin NSTEMI - Ju artery disease for medical management. COPD - right upper lobe nodule, with nil evidence of malignancy - for CT surveillance.

Text Obs ID: 254711522
Document Heading: MedChartAllergies
Document Content: No Known Allergies
Connecting the Patient Journey

Allows the connection of individual IT systems together (structured and unstructured data) to follow a cohort of patients through the health system based on reported findings.
The sum of three parts

HCAS (System)

SNOMED (ontology)

CDHB (Data)
CDHB Data

- Format of how we store unstructured data
- Petabyte volume of unstructured currently
- Data science capacity
- Regional warehouse gives data breadth
- Clinician Trusted
- Source System integration
HCAS

- Negation and Spelling mistakes
- Choosing the right data elements
- Ingestion process

- Speed of query
- Data democratisation
- Integrates different source systems
SNOMED CT

- Clinical notes vary
- Process of updating
- Early in adoption life-cycle

- Standardised
- Embedded into new systems
- Human and machine readable
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Dr Andrew Leung, Radiologist FRANZCR
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Report Status: Distributed
Report Distributed Date: 2016-01-06 14:47:00
Report Author: COMRAD SYSTEM
Current Concept:
Kidney stone (disorder)

Child(ren):
- Calcium renal calculus (disorder)
- Calculus pyelonephritis (disorder)
- Calculus in renal pelvis (disorder)
- Calculus of kidney and ureter (disorder)
- Calyceal renal calculus (disorder)
- Congenital calculus of kidney (disorder)
- Matrix stone of kidney (disorder)
- On examination - renal calculus (disorder)
- Uric acid renal calculus (disorder)
- X-linked recessive nephrolithiasis with renal failure (disorder)

Defining Relationships:
- Is a
  - Kidney disease (disorder)
  - Kidney lesion (finding)
  - Urolithiasis (disorder)

Group:
- Finding site (attribute)
  - Kidney structure (body structure)
- Associated morphology (attribute)
  - Calculus (morphologic abnormality)

This concept is sufficiently defined.

Descriptions (Synonyms):
- Fully Specified Name: Kidney stone (disorder)
- Synonym: Kidney stone [158296018]
- Synonym: Renal stone [158297010]
- Synonym: Nephrolith [158298017]
- Synonym: Renal calculus [158299013]
- Synonym: Calculus of kidney [512193015]
- Synonym: Nephrolithiasis [512194014]
- Synonym: Kidney calculus [512195010]
- Synonym: Renal calculi [71011000009116]
Integrated Healthcare and SNOMED

Creating Integration

Using SNOMED

HCAS

The Future

Middle Earth

Bending the Curve

The Canterbury Journey
SNOMED CT is integral in our future.
Enabling better transfer of care in integrated systems

Structured presenting complaints/problem/diagnosis/order lists
The New Data

Solve a myriad problems
"Why" vs "What"

New Solutions

Predictive Analysis
The new data in health

**Current and future healthcare data**

Turning data into insight:

- Electronic health records
- Laboratory results
- Imaging data
- Genomics data
- Clinical trials data
- Electronic medical records
- Wearable devices
- Health and wellness apps
- Social media
- Online communities
- Biochemical assays

We want to turn data into insight.

**Challenges in health and life sciences analytics**

- Data is in multiple systems and not normalized
- Structured data can be immense (e.g., genomics)
- Unstructured clinical data is not leveraged effectively
- Free-text is not standardized in nomenclature - users have individual styles and terminology preferences
- A large portion of clinical records are unstructured (free-text)

Business users need to take actions based on their data.
Current and future healthcare data

Turning data into insight

- Revenue management
- Claims
- EMRs
- ICD 9-10
- Genetic Sequences
- Lab values
- Medication records
- Clinician/caretaker notes
- Radiology reports
- Pathology readings
- Clinical quality measures
- Population health data

Future Sources

- Video
- Biometrics
- Geotracking
- SMS
- Web chat
- Physiologic monitoring
- Social networks
- Mobile apps
- Sensors
- Survey response
- Biochemical Assays

Current Sources

Traditional HLS data can be *structured* or *unstructured*, and *limited*, or *voluminous* in nature

Nontraditional healthcare data will challenge current methods of *data capture* and *analytics*

*We want to turn data into insight*
Challenges in health and life sciences analytics

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Business users need to take actions based on their data.
Creating the ability to predict outcomes

Machine learning over the structured lists and unstructured free text
Predictive Model Validation
## Pharmacist Prioritisation Report

### General Medicine Team

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**Notes:**
- This report is produced automatically each weekday morning.
- Patients previously unknown to CGHS will not have a name displayed, or demographic weights calculated, until the following weekend.
- The Ward the Patient was in on the previous report - Shown (in grey) under the Ward, if different to the current ward.
- Presenting Complaint shown in grey for new admissions.

**List of High Risk Medications:**
- buproprion + salazopyrin, diclofenac, dalipasen, levodopa + benserazide, levodopa + cabergoline, methadone, metoclopramide, mirtazapine, tacrolimus, warfarin

**Date Produced:** 06/06/2019
Streamline Health Pathways

The Pathway Link API interface to present best pathway options to clinicians with:

- quick access to relevant information in HealthPathways
- stable and reliable links to HealthPathways from clinical applications
- the ability to access HealthPathways from their clinical app, rather than having to log in separately.
Government Standards

- Adopted in Health and Social services
- National IT vendor strategies driving changes in incumbent vendor behaviour
- National Electronic Health record
- National Accident Insurer (ACC)

It is a continuing journey to a common vocabulary for clinical care
Some Thoughts

- A way of working
- A “whole of system approach”
- Drives change based on best care for the person in the context of their family/whanau and their community
- Works irrespective of and despite structures
- Continues to adapt and evolve
“Never doubt that a small group of thoughtful, committed, citizens can change the world. Indeed, it is the only thing that ever has.”

Margaret Mead
Integrated Healthcare and SNOMED