INTERNATIONAL HEALTH TERMINOLOGY
STANDARDS DEVELOPMENT ORGANISATION

The Australian Pathology Units and Terminology Standardisation Project

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Mater Health Services
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Overview

- LOINC, UCUM and SNOMED CT 101
- History of Laboratory Communication Standards in Australia and the need for PUTS
- Terminology decisions
- Inputs / Sources
- Outputs / Deliverables
- Challenges / Issues
- The future / PITUS

LOINC 101

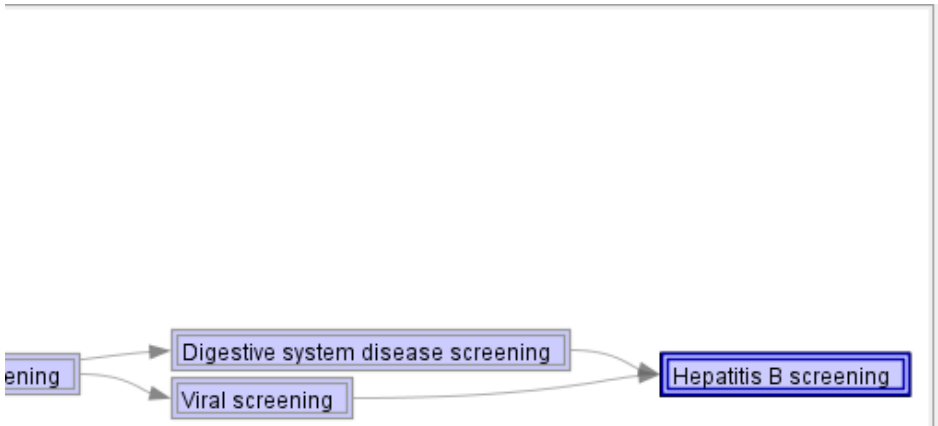
- LOINC is a coding system for laboratory observations
- has six so called axes or parts…
- Example Serum Sodium (code *2951-2*) :
  - Component (analyte) – *Sodium*
  - Property measured – *Substance concentration*
  - Timing – *A point in time*
  - System – *Serum (or plasma)*
  - Scale – *Quantitative*
  - Method used – only used where different methods give clinically significant different results
- Example units are provided but not part of the model (mmol/L)

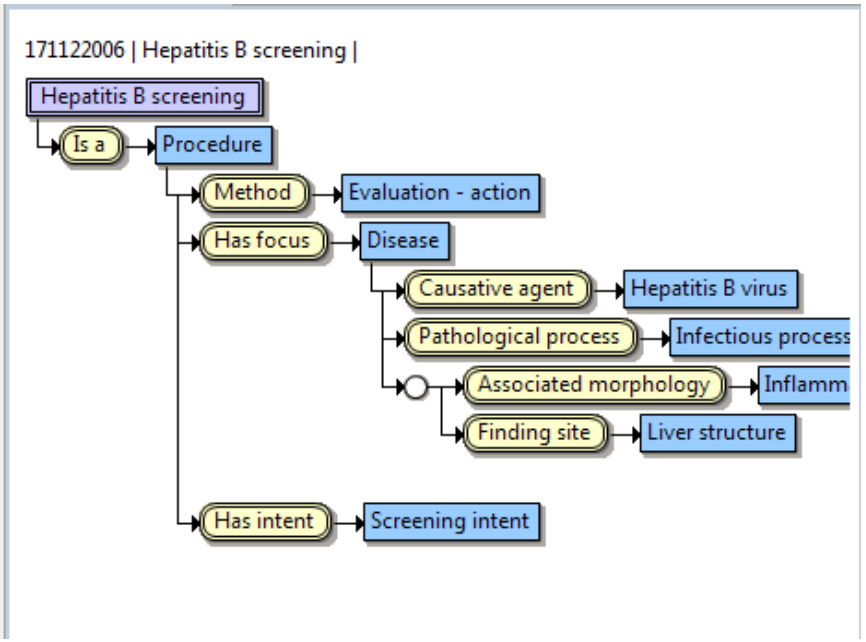
UCUM 101

- The Unified Code for Units of Measure (UCUM) is a code system intended to make units of measure unambiguous to a computer system.
- The focus is on electronic communication, as opposed to communication between humans
- Able to compute semantic equivalence between different forms of the same base unit e.g. ug/L === mg/mL
- Example: mmol/24 hours in UCUM is mmol/(24.h)
- More information http://unitsofmeasure.org/

SNOMED CT 101

- Developed & maintained internationally by IHTSDO
- Australian extension maintained by NeHTA , NCTIS
- A system of concepts in hierarchies
- Many concepts have logical definitions
- Concepts can have multiple parents





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History of Pathology Standards in Oz

1998

- AS2700.2 HL7 V2.3
- No terminology binding

2002

- AS4700.2 HL7 V2.3.1 & HB262 Implementation guide
- Binding to AUSTPATH and RCPA Broadsheet 29 SI Units

2012

- AS4700.2 HL7 V2.4 & HB262
- Binding to APUTS standard

National Pathology Terminology and Information Standardisation Plan (2011)

Stakeholders

Leaders

Pathology profession

Through RCPA and other PAC members; Provides primary link to the care team; Defines and endorses terminology content, esp. clinical terminology

Standards Australia

Primary link to ISO standards development and, pathology system developers and end users; Approves and publishes Australian Standards

NEHTA NCTIS

Primary link to clinical informatics community; Develops, maintains and distributes clinical information and terminology standards

Customers

By type

Healthcare consumers; Clinicians and others associated with healthcare providers (each with different models of care and represented by colleges, professional and industry associations); Researchers; Health software developers and knowledge resource developers; Statistical users

By activity

Local Terminology & Information Integrators - including organisations that develop local domain terminologies or classification code sets and, also, health systems developers and systems integrators including Jurisdictional e-Health programmes.

Clinical Terminology Users - who use systems supplied by a local terminology and information integrator or, alternatively, take and deploy Australian domain terminology or structured information in their own systems.

Collaborators

- Clinical Colleges, Associations and Scientific Societies (RCPA, AACB, AAPP, AIMS, ANZSBT, ASCIA, ASC, ASM, ESA, HSANZ, HGSA, HISA, IAP, NCOPP)
- Standards developers (IHTSDO, NEHTA, HL7 Australia, Standards Australia IT-14-6-5, NCCC)
- HI Professional and industry associations (HISA, HIMAA, MSIA, AIIA)
- Academia (Universities and Research Centres)
- Government agencies and authorities; ACSQHC, AIHW, Cancer Australia, Health Departments, Registries
- Jurisdictional E-Health Programs

Funders

- DoHA QUPP
- IT-14-6-5 (wrt Australian standards approval only)
- NEHTA (wrt Board approved workplan only)

Vision, Aims, and Principles

Vision

Australia has access to and uses standardised pathology information structures and terminologies to optimise systems for recording, decision support, communication and analysis so as to improve healthcare for the individual; the population; and the healthcare system for its practitioners and payers.

Aims

- To set up a system to develop, maintain and distribute Detailed Clinical Models (terminology and information structures) for Australian pathology domain content;
- To develop specific guidance for the binding of terminology to information structures to support system to system messaging;
- To develop terminology and information content by sub-disciplines in the pathology domain;
- To identify and/or develop a standard for the coded representation of units of measure in the pathology domain;
- To establish a 'one stop shop' for the development, maintenance and distribution of all terminology content necessary to support the pathology domain;
- To collectively drive the adoption of the Detailed Clinical Models for the pathology domain;
- To establish a workable compliance, conformance and accreditation environment relating to pathology domain information structures and terminologies.

Principles

- That the terminology used for pathology reporting and requesting should be standardised
- That a combination of terminology products will be required to deliver the necessary standardisation (which is likely to include elements from within SNOMED CT, LOINC, HL7 vocabulary tables and MeSH)
- That terminology development, maintenance and distribution is recognised as a specialist activity overseen by the NCTIS as a dedicated unit using a consistent set of tools and processes
- That the 'traditional knowledge owners' within the pathology domain be responsible for defining what the content of the standardised content shall be.

Key Result Areas

Content Development

- Fit for purpose terminologies have been developed and approved by the Pathology Profession, Standards Australia IT-14-6-5 and NEHTA's NCTIS.
- *KPIs –Quality (rework); Completeness (rate of change); Timeliness(%milestones reached)*

Content Distribution

- A system that facilitates consistent, simple distribution and updates of pathology terminologies is in use
- *KPIs – Consistency (incident monitoring); Simplicity (implementer feedback); Update (compliance statements).*

Adoption

- Adoption of standardised information structures and terminology is widespread across the pathology domain;
- There is direct realisation of benefits from standardised terminology use
- *KPIs- Adoption (% vendor adoption; % transaction volume); Benefit realisation (Decrease in rate of receiving system rejection of received messages due to code non-recognition)*

Compliance, Conformance and Accreditation

- An implementable compliance, conformance and accreditation environment is in place to assure the correct use of pathology information and terminology components;
- *KPIs – Implementable (proof of concept implementation with >1 pathology system vendor and >1 clinical end user system vendor); Correct use (% of conformant messages)*

Projects

1 Governance, Planning and Resourcing

- Establish the principles of governance for the development, maintenance and distribution of pathology terminology in Australia. Develop this plan, a governance structure to implement it and put in place project plans and resources

2 International approaches to path terminology use

- Review international approaches to pathology terminology use across key e-Health implementing nations

3 Terminology Binding for AS4700.2

- Develop specific guidance for binding terminology to the HL7 2.4 message required by AS4700.2 and update HB 262 to harmonize with the NEHTA NCTIS terminology and information specifications, the IHE profile and AS4700.2

4 Standard for Units of Measure

- Develop and approve a revised set of coded standard units of measure to update and future proof RCPA / AS4700.2

5 Australian Pathology Terminology Sets

- Develop, approve and distribute standard terminology sets (SNOMED CT, LOINC etc.) to populate AS4700.2 coded data

6 Standardisation of common biochemistry items

- Develop a fully specified terminology for the reporting of 'common' biochemistry items used in clinical decision support;

7 Terminology for structured cancer reports

- Review the protocols for cancer reporting and ensure terminology is available, consistent and able to be used in electronic decision support;

8 Terminology for QA programs

- Develop standardised terminologies to be used with standardised messages for the reporting of routine pathology quality assurance testing

9 NPAAC data standard review for terminology

- Revise existing NPAAC Requirements for Information Communication to address terminology;

PUTS - Objectives

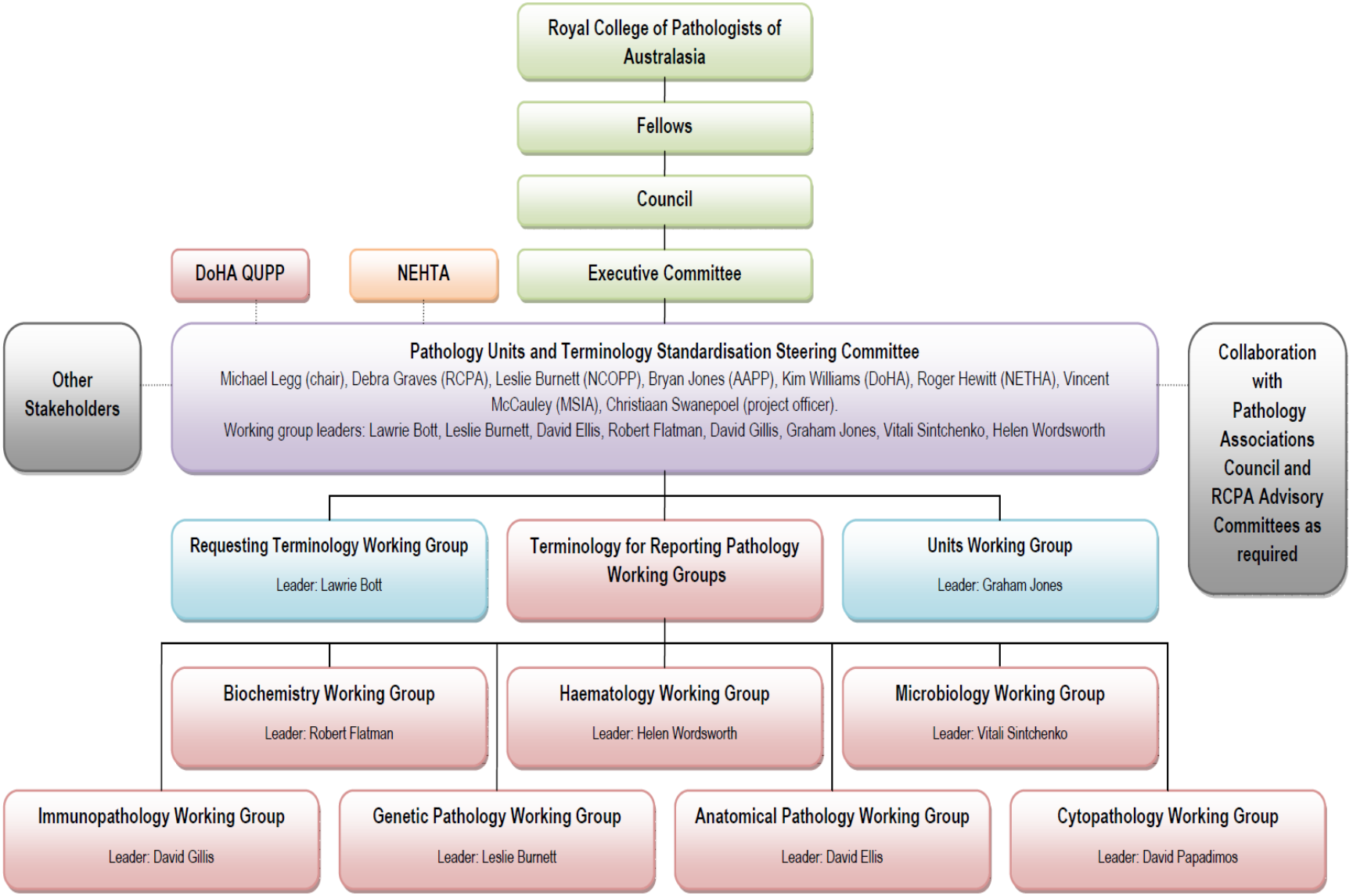
- A revised standard for the use of units in pathology indicating preferred units for display and a mechanism for their representation in electronic messaging
- Terminology sub-sets (or reference sets) of pathology terms for requesting and reporting pathology by discipline
- Standardisation of report terminology for common tests used in decision support – to improve safety in interpretation when results are combined
- Terminology for structured cancer reporting ensuring terminology is available, consistent and ultimately able to be used in electronic decision support

How does PUTS support eHealth?

- Harmonised reporting to Australian Personally Controlled Electronic Health Record (PCEHR)
- Enable decision support for things like diabetes test recall, drug monitoring in clinical software
- Enable electronic ordering of lab tests from primary care
- Enable HL7 reporting to RCPA external Quality Assurance Program
- Support Detailed Clinical Models (DCM), archetypes and templates e.g. Structured cancer reports
- Prevention of errors due to misinterpreting laboratory results

Why RCPA and why now?

- RCPA is a major player...can push for regulatory backing through revision of the NPAAC requirements.
- SNOMED CT now licenced in Australia and maintained by NeHTA National Clinical Terminology Information Service (NCTIS)
- AUSTPATH code-set no longer maintained by Standards Australia – out of date
- Awareness is high – Large electronic health records and HIE projects in USA, Canada, UK , Australia and elsewhere.


Royal College of Pathologists of Australasia
Fellows
Council
Executive Committee
DoHA QUPP
NEHTA
Other Stakeholders
Pathology Units and Terminology Standardisation Steering Committee
Michael Legg (chair), Debra Graves (RCPA), Leslie Burnett (NCOPP), Bryan Jones (AAPP), Kim Williams (DoHA), Roger Hewitt (NETHA), Vincent McCauley (MSIA), Christiaan Swanepoel (project officer).
Working group leaders: Lawrie Bott, Leslie Burnett, David Ellis, Robert Flatman, David Gillis, Graham Jones, Vitali Sintchenko, Helen Wordsworth
Collaboration with Pathology Associations Council and RCPA Advisory Committees as required
Requesting Terminology Working Group
Leader: Lawrie Bott
Terminology for Reporting Pathology Working Groups
Units Working Group
Leader: Graham Jones
Biochemistry Working Group
Leader: Robert Flatman
Haematology Working Group
Leader: Helen Wordsworth
Microbiology Working Group
Leader: Vitali Sintchenko
Immunopathology Working Group
Leader: David Gillis
Genetic Pathology Working Group
Leader: Leslie Burnett
Anatomical Pathology Working Group
Leader: David Ellis
Cytopathology Working Group
Leader: David Papadimos

Face-to-face meetings at RCPA HQ in Sydney, Australia

Current usage - LOINC

- Use of LOINC in community and hospital pathology for reporting in HL7 ORU-R01 messages - but inconsistent

Examples:

- Hba1c

LOINC	LongName	Component	Property	Timing	System	Scale	Method	exUCUMunits
17856-6	Hemoglobin A1c/Hemoglobin.total in Blood by HPLC	Hemoglobin A1c/Hemoglobin.total	MFr	Pt	Bld	Qn	HPLC	%
4548-4	Hemoglobin A1c/Hemoglobin.total in Blood	Hemoglobin A1c/Hemoglobin.total	MFr	Pt	Bld	Qn		%

- Serum Glucose

LOINC	LongName	Component	Property	Timing	System	Scale
14771-0	Fasting glucose [Moles/volume] in Serum or Plasma	Glucose^post CFst	SCnc	Pt	Ser/Plas	Qn
14749-6	Glucose [Moles/volume] in Serum or Plasma	Glucose	SCnc	Pt	Ser/Plas	Qn

Current usage - Units

- Inconsistent use of units of measure in electronic messages:

Example:
24hr Urine Creatinine

mmol/24h
mmol/day
mmol/d
mmol/24 hrs
mmol/24 hours

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Terminology decisions

- Lab Request/Lab Order codes -> SNOMED CT

```
OBR|1|VP1000001-1||271234008^Alkaline phosphatase^SCT
   |||||||L|||||2397701B^MOUSE^MICKEY^K^^DR....
```

- Microorganism codes in culture results -> SNOMED CT

```
OBX|10|CE|11475-1^Culture^LN|1|78065002^Enterococcus faecalis^SCT||A||||F
```

- Lab observation codes (OBX-3) -> LOINC

```
OBX|3|SN|30405-5^Leucocyte Range^LN^ULeuc^Leucocyte Range^NATA2623||^10^-
   ^100|x10*6/L^x10E6/L^UCUM|<10|H|||F...
```

- Units of measure -> UCUM

```
OBX|8|NM|6690-2^White Cell Count^LN||11.0|x10*9/L^x10E9/L^UCUM|4.0-11.0
   ||||F|||201211280941+1000
```

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Inputs/Sources

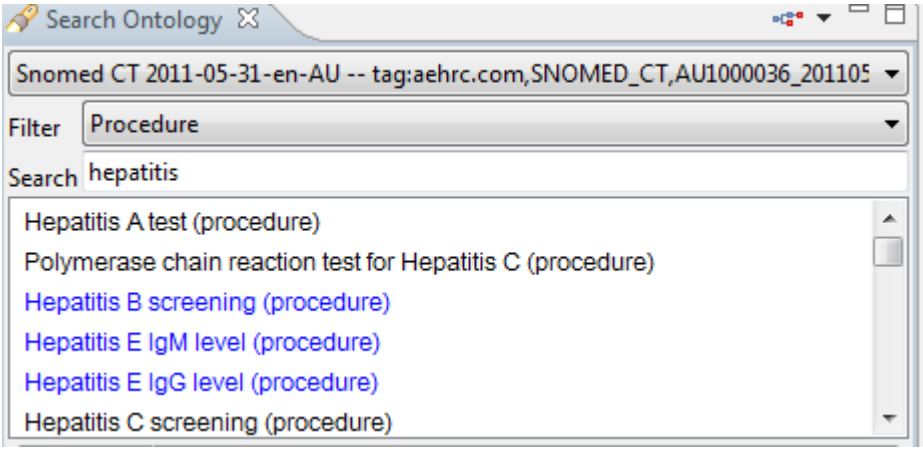
- RCPA Test Manual
- RCPA Broadsheet 29 (1988) – SI Units Revisited
- RCPA External Quality Assurance Program
- NeHTA reference sets
- Laboratory Information systems data sets (where possible ranked) from states and territories
- Practice Management Software order lists used in General Practice and Specialist settings.
- Deprecated Australian Standard order and results code sets (AUSTPATH)

Inputs / Sources cont...

- Public Health Laboratory Network (PHLN) case definitions
- CSIRO/Mater Pathology Microorganism mapping project
- The National Laboratory Medicine Catalogue (NLMC): Editorial Principles from the NHS.

Methods – Automated map tools

- Requesting Working Group and Micro-organism used CSIRO's Snapper automated mapping tool.



http://aehrc.com/research/health-data-management-and-semantics/clinical-terminology-tools

Methods – Pre-prepared lists

LOINC	Component	Property	Timin	System	Scale	Method
Erythrocyte Sedimentation Rate (ESR)						
30341-2	Erythrocyte sedimentation rate	Vel	Pt	Bld	Qn	
43402-7	Erythrocyte sedimentation rate	Vel	Pt	Bld	Qn	15M reading
4537-7	**Erythrocyte sedimentation rate**	**Vel**	**Pt**	**Bld**	**Qn**	**Westergren**
18184-2	Erythrocyte sedimentation rate	Vel	Pt	Bld	Qn	Westergren.2H rea
4538-5	Erythrocyte sedimentation rate	Vel	Pt	Bld	Qn	Wintrobe
4539-3	Erythrocyte sedimentation rate.Zeta	Vel	Pt	Bld	Qn	Zetafuge
Reticulocyte count abs						
14196-0	Reticulocytes	NCnc	Pt	Bld	Qn	
60474-4	Reticulocytes	NCnc	Pt	Bld	Qn	Automated count
42758-3	Reticulocytes	NCnc	Pt	Bld	Qn	Calculated
40665-2	Reticulocytes	NCnc	Pt	Bld	Qn	Manual
62249-8	Reticulocytes	NCnc	Pt	Bld^fetus	Qn	Automated count
Reticulocytes Immature						
51636-9	Reticulocytes.immature	NCnc	Pt	Bld	Qn	
33516-6	Reticulocytes.immature/Reticulocytes.total	NFr	Pt	Bld	Qn	
62250-6	Reticulocytes.immature/Reticulocytes.total	NFr	Pt	Bld^fetus	Qn	Automated count
Reticulocytes %						
31111-8	Reticulocytes/100 erythrocytes^^hematocrit adjusted	NFr	Pt	Bld	Qn	
4679-7	Reticulocytes/100 erythrocytes	NFr	Pt	Bld	Qn	
17849-1	Reticulocytes/100 erythrocytes	NFr	Pt	Bld	Qn	Automated count
31112-6	Reticulocytes/100 erythrocytes	NFr	Pt	Bld	Qn	Manual

chriss:
method no longer
westergren - automated

Pre-prepared lists – Clin Chem

LOINC	Component	Propert	Timi	System	Scal	Method	ExUCUMunits
Glucose Random							
14749-6	Glucose	SCnc	Pt	Ser/Plas	Qn		mmol/L
Glucose Fasting							
14771-0	Glucose^post CFst	SCnc	Pt	Ser/Plas	Qn		mmol/L
Estimated Glomerular Filtration Rate (eGFR)	**Creatinine-based formula (MDRD)**						
50384-7	Glomerular filtration rate/1.73 sq M.predicted	ArVRat	Pt	Ser/Plas	Qn	Creatinine-based formula (Schwartz)	
50210-4	Glomerular filtration rate/1.73 sq M.predicted	ArVRat	Pt	Ser/Plas	Qn	Cystatin-based formula	mL/min/{1.73m2}
48643-1	Glomerular filtration rate/1.73 sq M.predicted.black	ArVRat	Pt	Ser/Plas	Qn	Creatinine-based formula (MDRD)	mL/min/{1.73m2}
50044-7	Glomerular filtration rate/1.73 sq M.predicted.female	ArVRat	Pt	Ser/Plas	Qn	Creatinine-based formula (MDRD)	mL/min/{1.73m2}
62238-1	Glomerular filtration rate/1.73 sq M.predicted	ArVRat	Pt	Ser/Plas	Qn	Creatinine-based formula (CKD-EPI)	mL/min/{1.73m2}
33914-3	Glomerular filtration rate/1.73 sq M.predicted	ArVRat	Pt	Ser/Plas	Qn	Creatinine-based formula (MDRD)	mL/min/{1.73m2}
48642-3	Glomerular filtration rate/1.73 sq M.predicted.non black	ArVRat	Pt	Ser/Plas	Qn	Creatinine-based formula (MDRD)	mL/min/{1.73m2}
Estimated Glomerular Filtration Rate (eGFR)	**Creatinine-based formula (CKD-EPI)**						
50384-7	Glomerular filtration rate/1.73 sq M.predicted	ArVRat	Pt	Ser/Plas	Qn	Creatinine-based formula (Schwartz)	
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48643-1	Glomerular filtration rate/1.73 sq M.predicted.black	ArVRat	Pt	Ser/Plas	Qn	Creatinine-based formula (MDRD)	mL/min/{1.73m2}
50044-7	Glomerular filtration rate/1.73 sq M.predicted.female	ArVRat	Pt	Ser/Plas	Qn	Creatinine-based formula (MDRD)	mL/min/{1.73m2}
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48642-3	Glomerular filtration rate/1.73 sq M.predicted.non black	ArVRat	Pt	Ser/Plas	Qn	Creatinine-based formula (MDRD)	mL/min/{1.73m2}

Pre-prepared lists – UCUM Units

Description	Preferred Display	UCUM Unit	List
Bethesda unit	Bethesda U	[beth'U]	Reviewed
international unit per gram	IU/g	[IU]/g	Reviewed
international unit per liter	IU/L	[IU]/L	Reviewed
international unit per milliliter	IU/mL	[IU]/mL	Reviewed
pH	no unit	[pH]	Reviewed
part per billion	ppb	[ppb]	Reviewed
copies per milliliter	copies/mL	{copies}/mL	Reviewed
globules (drops) per high power field	Globules/HPF	{Globules}/[HPF]	Reviewed
international normalized ratio	no unit	{INR}	Reviewed
log (base 10) copies per milliliter	Log copies/mL	{Log_copies}/mL	Reviewed
log (base 10) international unit per milliliter	Log IU/mL	{Log_IU}/mL	Reviewed
multiple of the median	MoM	{M.o.M}	Reviewed
ratio	no unit	{ratio}	Reviewed
signal to cutoff ratio	s/co	{s_co_ratio}	Reviewed
titer	titre	{titre}	Reviewed
trillion per liter	10*12/L	10*12/L	Reviewed
million colony forming unit per liter	10*6 CFU/L	10*6.[CFU]/L	Reviewed
million per liter	10*9/L	10*9/L	Reviewed
million per milliliter	10*6/mL	10*6/mL	Reviewed
billion per liter	10*9/L	10*9/L	Reviewed
degree Celsius	Cel	Cel	Reviewed
centimeter	cm	cm	Reviewed

chriss:
Titre used by many laboratories. Only some have "titre" as a unit – should we titire as unit or

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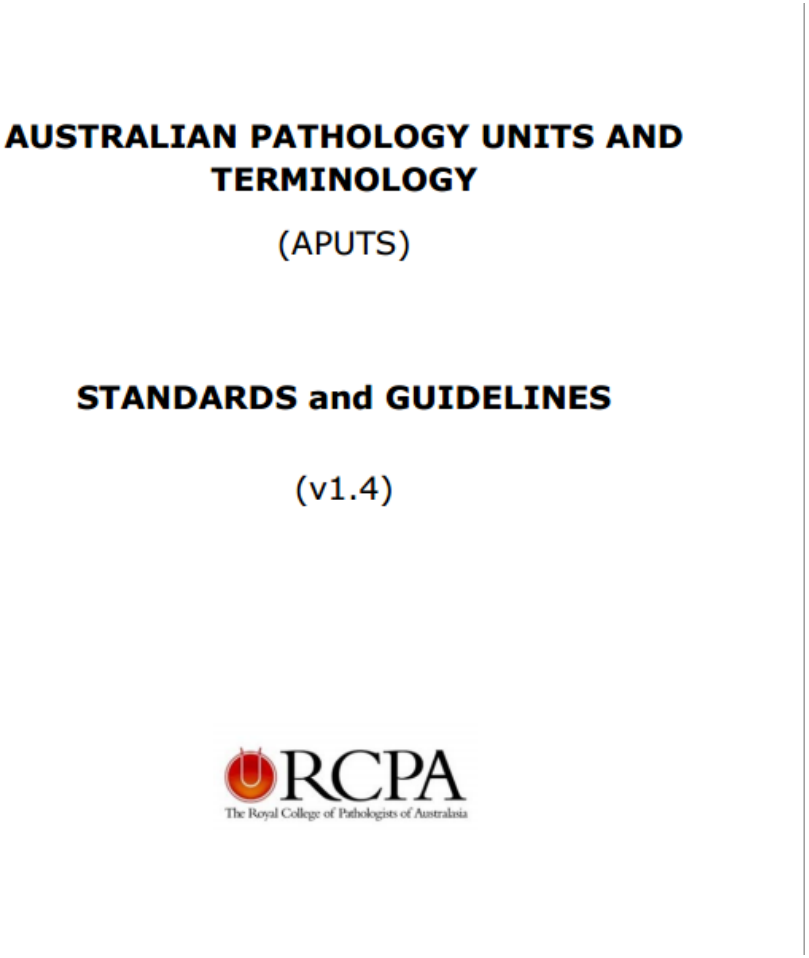
Outputs – The APUTS Standard



http://www.rcpa.edu.au/Publications/PUTS/PUTS_STDS.htm

Rules from APUTS 1.4....

Implementation

C5.01 Guideline G3.01 applies

G5.01 Where there is no preferred term available for a test here, free text descriptions should conform to the conventions used in developing preferred terms as described here.

Development

S5.01 The length of preferred terms must not exceed 40 characters.

CS5.01 There are report formats for which 40 characters is too large. For routine tests, names should use a maximum length of 20 characters. The label used in columnar cumulative reports should use a maximum length of 13 characters.

S5.02 The identifier of the substance being measured must come first *e.g. Hepatitis A Ab* not *Antibodies, Hepatitis*.

S5.03 Modifying words must follow the noun in the test name unless overridden by common usage *e.g. Calcium Urine*.

S5.04 Australian English spellings must be used for terms. The Macquarie Dictionary should be used as the reference to current practice in Australia where the term does not appear in the lists referenced here *e.g. faecal* not *fecal* and *haemoglobin* not *hemoglobin*.

S5.05 Abbreviations including acronyms used in developing preferred terms must come from the list in Appendix 3 – Approved abbreviations

Outputs – Lab orders subset

- SNOMED CT Subset/List for Lab Orders

Preferred term	Synonyms	Mapped Term
Active vitamin B12	Holotranscobalamin	439568007 | Measurement of holotranscobalamin concentration |
Adenovirus Ag Faeces		121960004 | Adenovirus antigen assay |
Alanine aminotransferase	ALT; Alanine transaminase; Glutamic pyruvic transaminase; SGPT	250637003 | ALT - blood measurement |
Albumin	Alb	104485008 | Albumin measurement, serum |
Alkaline phosphatase	ALP; Alk phos	271234008 | Serum alkaline phosphatase measurement |
Alpha-1-antitrypsin	A1AT, AAT	270976003 | Serum A1 antitrypsin measurement |
Alpha-fetoprotein	AFP	104404005 | Alpha-1-fetoprotein measurement, serum |
Alpha-fetoprotein tumour marker	AFP	441825001 | Measurement of alpha fetoprotein as marker for malignant neoplasm |
Amino acids	AA	313402005 | Plasma amino acid measurement |
Amiodarone level		166971003 | Serum amiodarone measurement |
Amylase		89659001 | Amylase measurement, serum |
Antibody screen	Ab screen; Abs	252315008 | Blood group antibody screening |
Antinuclear Ab	ANA; ANF; Nuclear Ab; Antinuclear factor	359788000 | ANA measurement |
APTT	Activated partial thromboplastin time	42525009 | Partial thromboplastin time, activated |
Aspartate aminotransaminase	AST; AST; Aspartate transaminase; Glutamic oxaloacetic transaminase; SGOT	250641004 | AST serum measurement |
Aspergillus serology	Aspergillus precipitins	87407009 | Serologic test for Aspergillus |
Barmah Forest virus Ab	BFV Ab, BF Ab, Barmah Forest virus serology	443388000 | Measurement of Barmah Forest virus antibody |
Bence Jones protein	Protein electrophoresis urine; Urine EPG	443363008 | Measurement of Bence Jones protein |

Outputs – Discipline based LOINC sets

http://www.rcpa.edu.au/Publications/PUTS/PUTS_STDS.htm

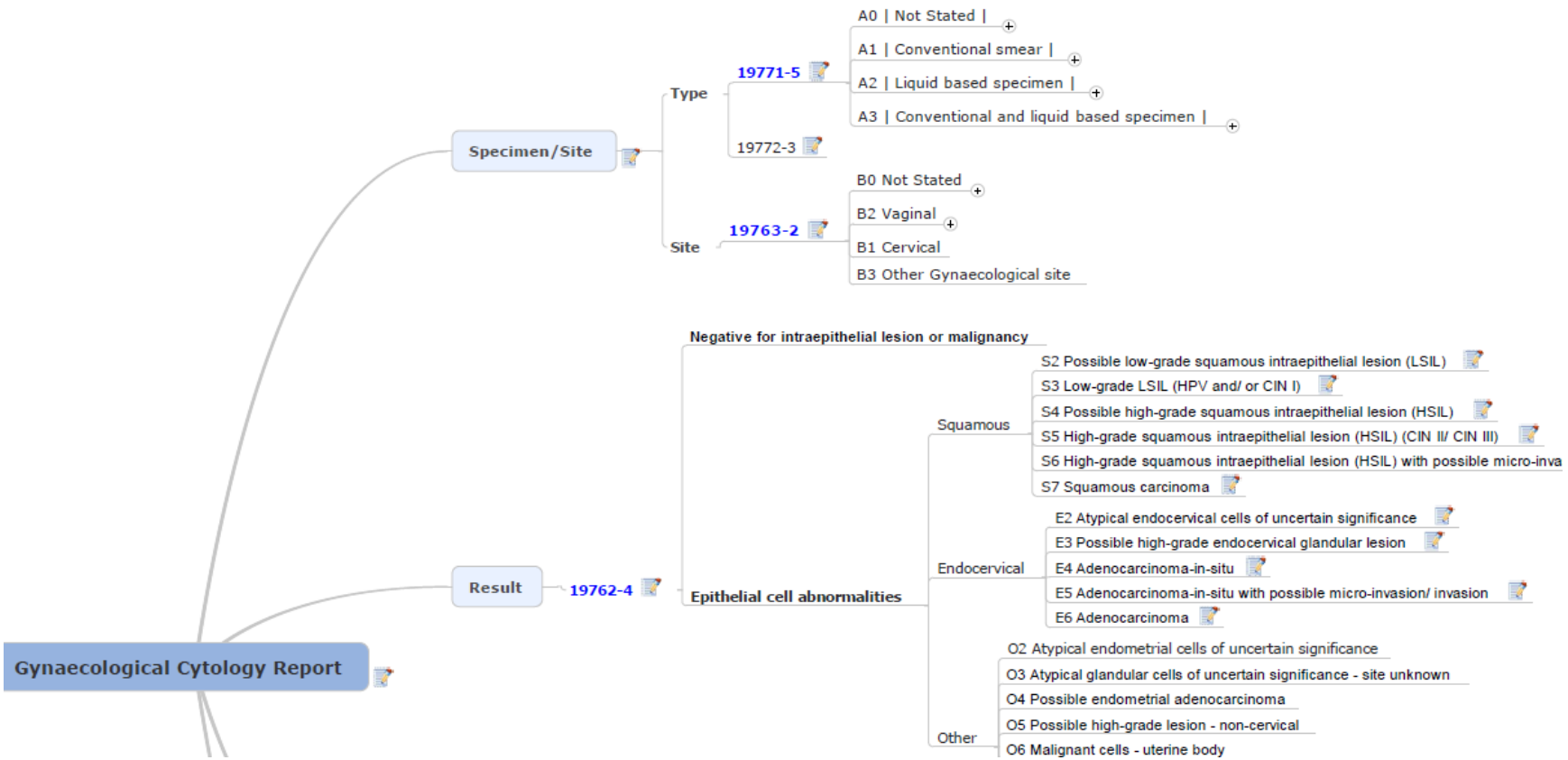
Preferred term	Synonym	Usage guidance	Specimen	PUTS Unit	LOINC term	LOINC Component
Acetylcholine receptor Ab	ACHR	For qualitative reporting	Serum	No Unit	43625-3	Acetylcholine receptor Ab
Acetylcholine receptor Ab	ACHR		Serum	nmol/L	20427-1	Acetylcholine receptor Ab
Adrenal Ab		For qualitative reporting	Serum	No Unit	14232-3	Adrenal Ab
Adrenal Ab			Serum	titre	32661-1	Adrenal Ab
Anti-Neutrophil Cytoplasmic Ab	ANCA	For qualitative reporting	Serum	No Unit	17351-8	Neutrophil cytoplasmic Ab
Anti-Neutrophil Cytoplasmic Ab	ANCA		Serum	titre	21023-7	Neutrophil cytoplasmic Ab
Anti-Neutrophil Cytoplasmic Ab	ANCA	For reporting pattern	Serum	No Unit	21419-7	Neutrophil cytoplasmic Ab pattern
Antinuclear Ab	ANA	For qualitative reporting	Serum	No Unit	8061-4	Nuclear Ab
Antinuclear Ab	ANA	For reporting in units	Serum	U	9423-5	Nuclear Ab
Antinuclear Ab	ANA	For reporting in titres which is the recommended unit	Serum	titre	29953-7	Nuclear Ab
Antinuclear Ab	ANA	Use for reporting pattern	Serum	No Unit	14611-8	Nuclear Ab pattern
Beta 2 glycoprotein 1 Ab IgA	B2GPI IgA		Serum	U	21108-6	Beta 2 glycoprotein 1 Ab.IgA
Beta 2 glycoprotein 1 Ab IgG	B2GPI IgG		Serum	U	16135-6	Beta 2 glycoprotein 1 Ab.IgG
Beta 2 glycoprotein 1 Ab IgM	B2GPI IgM		Serum	U	16136-4	Beta 2 glycoprotein 1 Ab.IgM
Cardiolipin IgA Ab	ACL IgA		Serum	U/mL	8063-0	Cardiolipin Ab.IgA
Cardiolipin IgG Ab	ACL IgG		Serum	U/mL	8065-5	Cardiolipin Ab.IgG
Cardiolipin IgM Ab	ACL IgM		Serum	U/mL	8067-1	Cardiolipin Ab.IgM

Outputs – Genetics Report Model

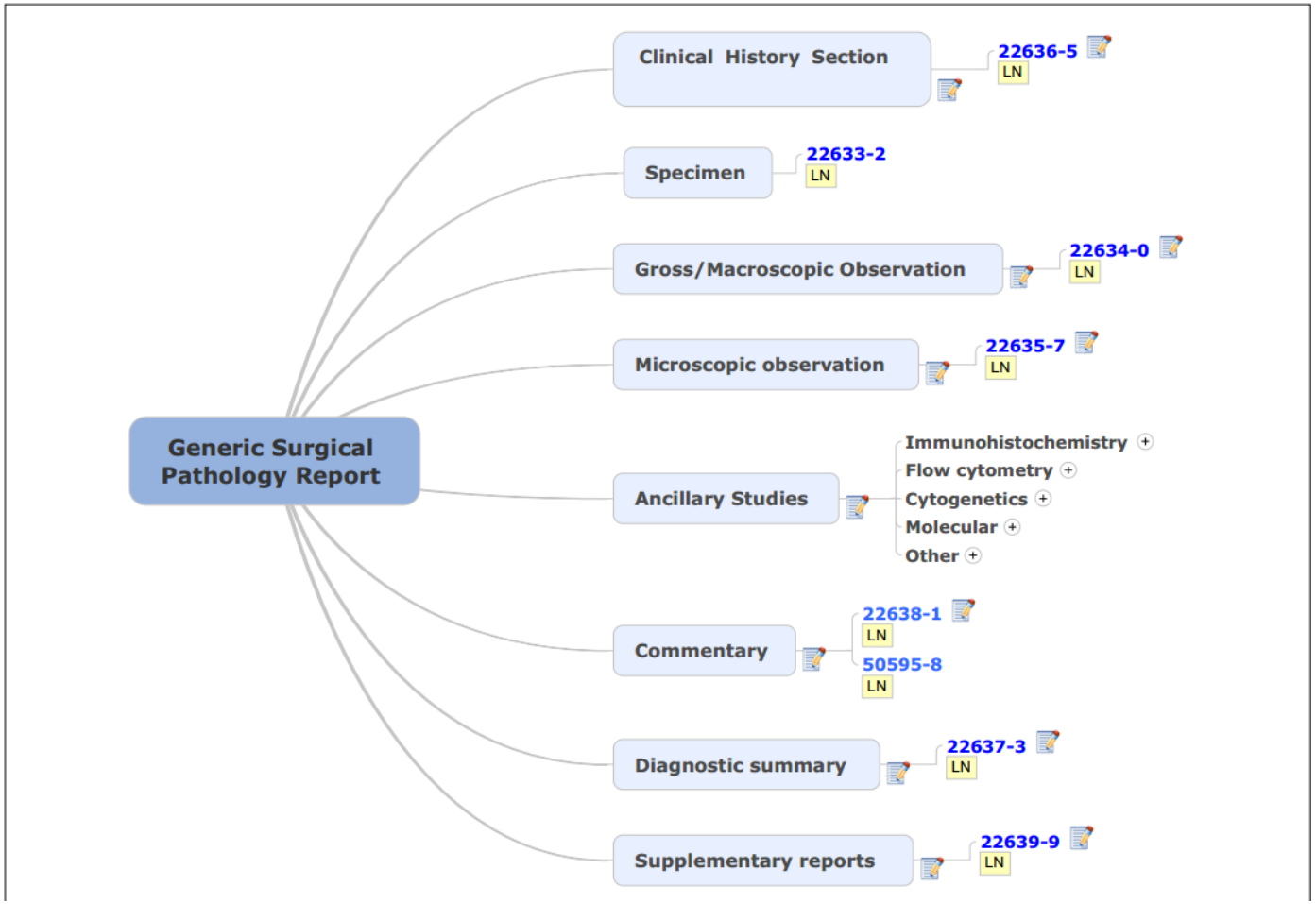
Example answers / response / Commnets	LOINC
Specimen	31208-2
Specimen Type must be stated: This could be any of blood, cells, fluids [state type], and could include tissue, frozen sample, formalin fixed paraffin Embedded sample. etc *Note the complication that a sample from a fetus may contain DNA from both the fetus AND the mother*	
Request	
Genetic disease/condition assessed	51967-8
A coded disease (recommend SNOMED) which is known to be caused by or identified by genomic DNA Markers. *ex: SCTID: 190905008 | Cystic fibrosis |*	
alterntive coding: HGNC:1881 | cystic fibrosis modifier 1	
Clinical question	53577-3
The freeform text that entered by orderer to further annotate the coded Reason for Study associated with an ordered test.	
Note: Although "Clinical Question" is shown as freeform text in this version, it is anticipated that a future "structured request framework" will be developed	
Test	
Genetic Test	
Genomic Source class	48004-6
The genomic class of the specimen being analyzed:	
Genetic Level	XXXXX-X
Whole Genome	
Chromosome	
Intergenic	
Gene	
Gene Name or Locus	
Coding System	XXXXX-X
HGNC Gene ID	48018-6
e.g. BRCA1 => HGNC:1100	
NCBI DNA Sequence Variation Number (dbSNP ids - rs#)	48003-8

Genetic Test Method	XXXXX-X
Category	XXXXX-X
Mutational analysis	XXXXX-X
The intention is to expand each of the following by one sublevel analogous to Chromosomal conditions so as to hold more detailed information relevant to each Type of Mutational Analysis (Next level of detail for these Mutational Analysis tests has not yet been shown)	
Tests for multiple mutations ...	XXXXX-X
Test for selected mutations only ...	XXXXX-X
Assay for size of triplet repeat only ...	XXXXX-X
Chromosome microarray (CMA)	
Microarray platform	62375-1
Microarray platform version number	62376-9
Base pair start coordinate	62381-9
Base pair end coordinate	62381-9
Flanking normal region before start	62382-7
Analysis by Chromosomal Banding	
ISCN band level [#]	62358-7
Chromosome band involved start	62379-3
Chromosome band involved end	62380-1
Chromosome banding method	62359-5
Cells analyzed [#]	62360-3
Cells counted [#]	62361-1
Cells karyotyped.total [#]	55199-4
Colonies counted [#]	62362-9
Mosaicism detected	62363-7
Analysis by in situ hybridisation	
Cell phase	62368-6
Probe gene name	62370-2
Probe locus	62371-0

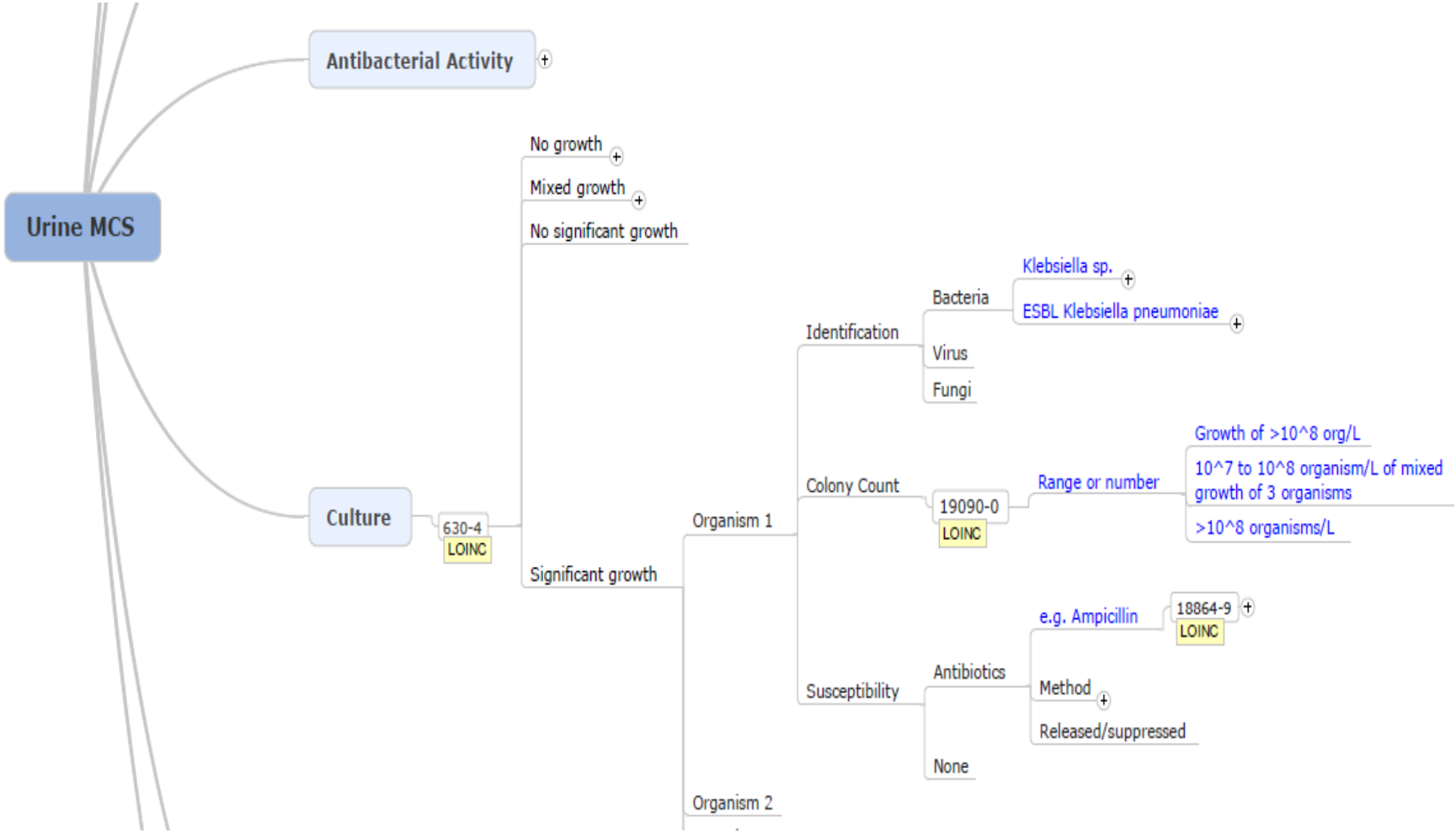
Outputs – Gynae report model



Outputs – Generic AP report



Outputs – Urine M/C/S model



LOINC Submission

Test Name	Format	Specimen	Unit Typ	PUTS Un	Base new	LOIN(	LOINC	Component	Prope	Time	System	Sca	Method
Immunopathology													
F-Actin Quantittive titres	Quantitative	Serum	Titre	Titre	54021-1		XXXXX-X	Actin.filamentous Ab	Titr	Pt	Ser	Qn	
Complement C1 esterase inhibitor (functional assay)	Quantitative	Serum	Units/Vol	U/L	4476-8		XXXXX-X	Complement C1 esterase inhibitor.functiona	ACnc	Pt	Ser/Plas	Qn	
Paraprotein 3 (mg/24h) 24h U	Q	ine			66481-3		XXXXX-X	Protein.monoclonal band 3	MRat	XXX	Urine	Qn	
Paraprotein 1/ Creatinine Ratio	Q	ine		mg/mmol	34366-5		XXXXX-X	Protein.monoclonal band 1/Creatinine	Ratio	Pt	Urine	Qn	
Paraprotein 2 / Creatinine Ratio	Q	ine		mg/mmol	34366-5		XXXXX-X	Protein.monoclonal band 2/Creatinine	Ratio	Pt	Urine	Qn	
Paraprotein 3 / Creatinine Ratio	Quantitative	Urine		mg/mmol	34366-5		XXXXX-X	Protein.monoclonal band 3/Creatinine	Ratio	Pt	Urine	Qn	
Alpha+paraprotein if paraprotein in Alpha area	Quantitative	Serum/Plasm	Units/Vol	g/L	53588-0		XXXXX-X	Alpha globulin+Gamma globulin.abnormal b	MCnc	Pt	Ser/Plas	Qn	Electrophoresis
Monoclonal free light chains kappa	Quantitative	Serum	Units/Vol	g/L	36916-5		XXXXX-X	Immunoglobulin light chains.kappa.free	MCnc	Pt	Ser	Qn	Electrophoresis
Monoclonal free light chains lamda	Quantitative	Serum	Units/Vol	g/L	33944-0		XXXXX-X	Immunoglobulin light chains.lambda.free	MCnc	Pt	Ser/Plas	Qn	Electrophoresis
Microbiology													
Barmah Forest virus RNA	Qualitative	Any	No Unit	n/a	34892-0		XXXXX-X	Barmah forest virus RNA	ACnc	Pt	XXX	Ord	Probe.amp.tar
Barmah Forest virus total Ab	Quantitative	Blood/Serum	Titre	Titre	22497-2		XXXXX-X	Barmah forest virus Ab	Titr	Pt	Ser	Qn	
Epstein Barr virus Ab virus capsid AbIgG avidity	Quantitative	Blood/Serum	%	%	69949-6		XXXXX-X	Epstein Barr virus capsid Ab.IgG avidity	Ratio	Pt	Ser	Qn	EIA
Hendra virus RNA	Qualitative	Any	No Unit	n/a	34892-0		XXXXX-X	Hendra virus RNA	ACnc	Pt	XXX	Ord	Probe.amp.tar
Hepatitis C Ag + Ab	Qualitative	Blood/Serum	No Unit	No Unit	51866-2		XXXXX-X	Hepatitis C virus 1 Ab+Ag	ACnc	Pt	Ser	Ord	
Herpes Simplex 1IgG Ab	Quantitative	Blood/Serum	Titre	Titre	24014-3		XXXXX-X	Herpes simplex virus 1 Ab.IgG	Titr	Pt	Ser	Qn	
Kunjin virus RNA	Qualitative	Any	No Unit	n/a	34892-0		XXXXX-X	Kunjin virus RNA	ACnc	Pt	XXX	Ord	Probe.amp.tar
Legionella spp IgM Ab	Qualitative	Blood/Serum	No Unit	No Unit	49915-2		XXXXX-X	Legionella sp Ab.IgM	ACnc	Pt	Ser	Ord	
Measles virus Ab IgM CSF	Qualitative	CSF	No Unit	No Unit	41132-2		XXXXX-X	Measles virus Ab.IgM	ACnc	Pt	CSF	Ord	
Measles virus total Ab CSF	Qualitative	CSF	No Unit	No Unit	46197-0		XXXXX-X	Measles virus Ab	ACnc	Pt	CSF	Ord	
Murray Valley encephalitis virus Ab IgG	Qualitative	Blood/Serum	No Unit	No Unit	22259-6		XXXXX-X	Murray Valley encephalitis virus Ab.IgG	ACnc	Pt	Ser	Ord	
Murray Valley encephalitis virus Ab IgG	Quantitative	Blood/Serum	Titre	Titre	33329-4		XXXXX-X	Murray Valley encephalitis virus Ab.IgG	Titr	Pt	Ser	Qn	
Murray Valley encephalitis virus Ab IgM	Qualitative	Blood/Serum	No Unit	No Unit	31248-8		XXXXX-X	Murray Valley encephalitis virus Ab.IgM	ACnc	Pt	Ser	Ord	
Murray Valley encephalitis virus Ab IgM	Quantitative	Blood/Serum	Titre	Titre	33331-0		XXXXX-X	Murray Valley encephalitis virus Ab.IgM	Titr	Pt	Ser	Qn	
Murray Valley Encephalitis virus RNA	Qualitative	Any	No Unit	n/a	34892-0		XXXXX-X	Murray Valley Encephalitis virus RNA	ACnc	Pt	XXX	Ord	Probe.amp.tar
Murray Valley encephalitis virus total Ab	Qualitative	Blood/Serum	No Unit	No Unit	22370-1		XXXXX-X	Murray Valley encephalitis virus Ab	ACnc	Pt	Ser	Ord	
Murray Valley encephalitis virus total Ab	Quantitative	Blood/Serum	Titre	Titre	22497-2		XXXXX-X	Murray Valley encephalitis virus Ab	Titr	Pt	Ser	Qn	
Ross river virus RNA	Qualitative	Any	No Unit	n/a	34892-0		XXXXX-X	Ross river virus RNA	ACnc	Pt	XXX	Ord	Probe.amp.tar

chriss:
Requested by Jill Tate

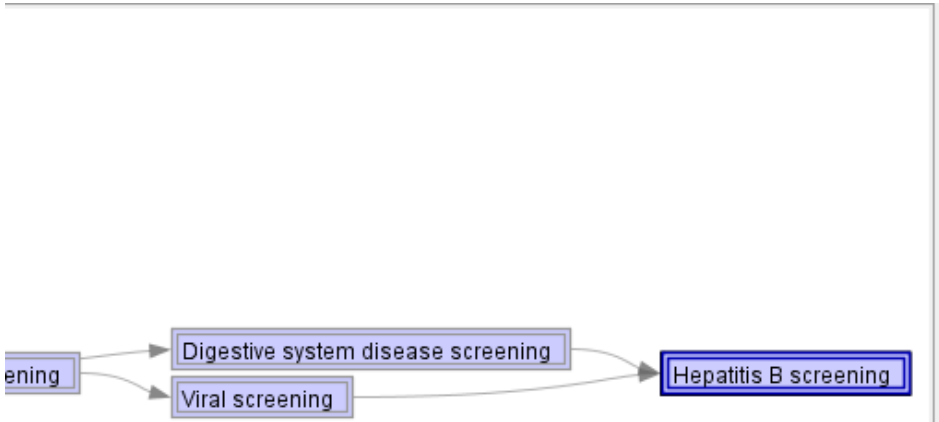
http://loinc.org/submissions-policy

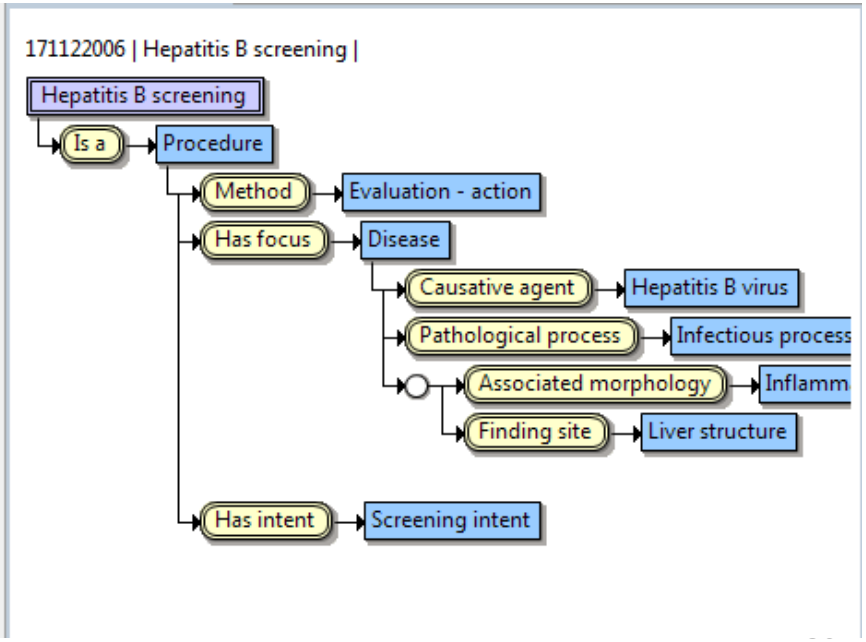
Overview

- LOINC, UCUM and SNOMED CT 101
- History of Laboratory standards in Australia and the need for PUTS
- Terminology decisions
- Inputs / Sources
- Outputs / Deliverables
- Challenges / Issues
- The future / PITUS

Issues – SNOMED CT just a code-set?

- Issue: The misconception that SNOMED CT is “just another code-set”, any code will do...
- Response: Use visual tools that display SNOMED CT concepts in a graph to prevent mapping to “grouper” concepts & favour “fully defined” concepts.





Issues – Apples aren't apples

- Issue: Combining data from what appears to be the same test in time series for a subject such as in cumulative reports or graphs carries with it significant clinical risk.

- Response: Assess the clinical risk and use traffic lights.

LOINC	Component	Proper	Timi	System	Sca	Method	Data combination indicat
14569-8	17-Hydroxyprogesterone	SCnc	Pt	Ser/Plas	Qn		Red
1743-4	Alanine aminotransferase	CCnc	Pt	Ser/Plas	Qn	With P-5'-P	Green
1744-2	Alanine aminotransferase	CCnc	Pt	Ser/Plas	Qn	Without P-5'-P	Green
61151-7	Albumin	MCnc	Pt	Ser/Plas	Qn	BCG	Green
61152-5	Albumin	MCnc	Pt	Ser/Plas	Qn	BCP	Green
2862-1	Albumin	MCnc	Pt	Ser/Plas	Qn	Electrophoresis	Red
1754-1	Albumin	MCnc	Pt	Urine	Qn		Orange
32294-1	Albumin/Creatinine	Ratio	Pt	Urine	Qn		Orange
1755-8	Albumin	MRat	24H	Urine	Qn		Orange

http://www.ychi.leeds.ac.uk/ychi/files/pub/PathReportingIssues_WhitePaper_vFinal.pdf

Issues – The ground is moving

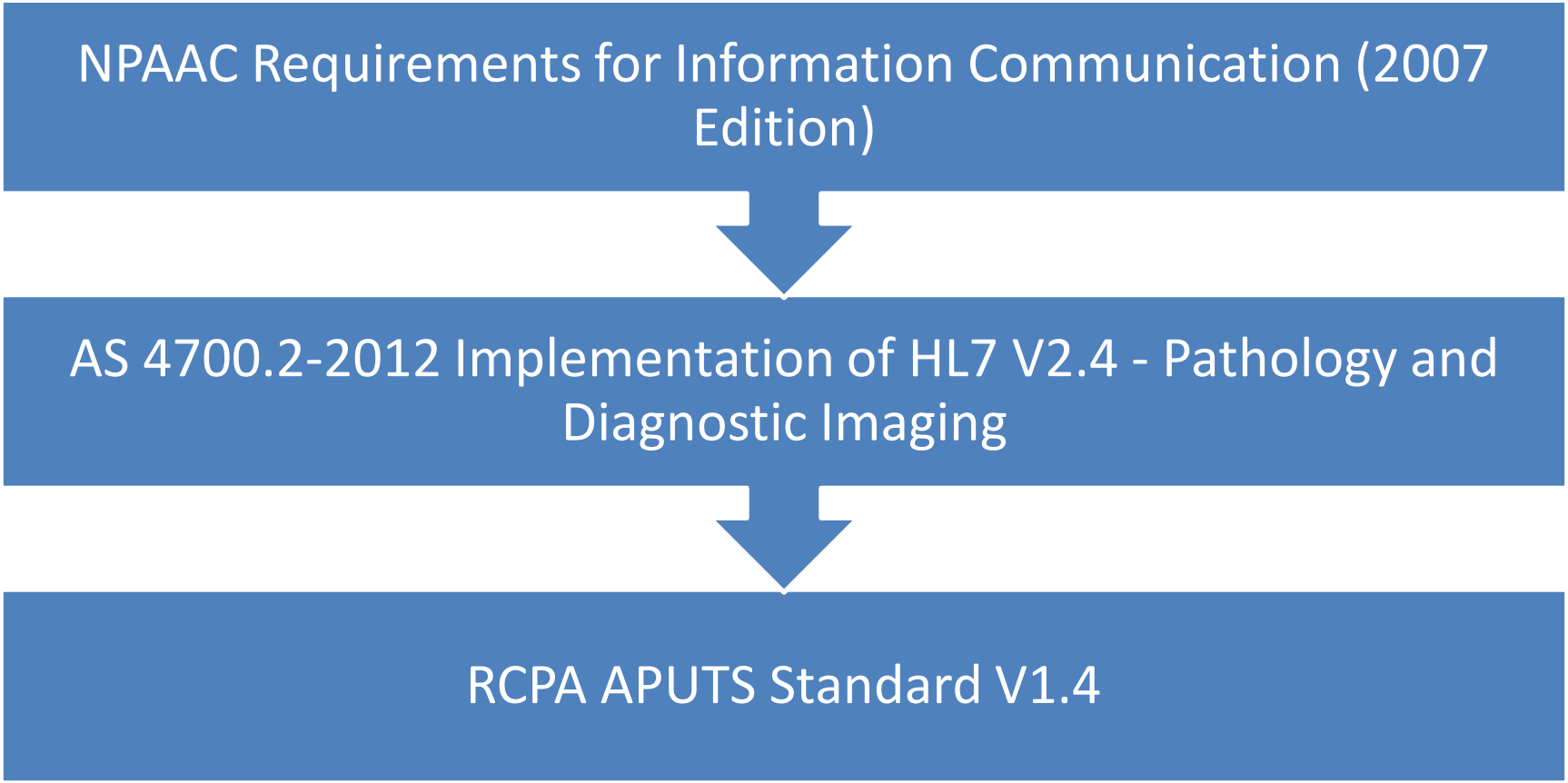
- Issue: Maintenance of LOINC subsets going forward
- Response: The new PITUS project will establish maintenance policy.

- RII and IHTSDO agreement what does it mean for our SNOMED CT Orders subset?
- Response: New SCT content will require a submission from Australia + one other NRC to be accepted into International SCT

- Issue: Changes to SNOMED CT Organisms in the near future
- Response: Update subset after each SNOMED CT AU release

Compliance, Conformance , Accreditation

Accreditation Document Stack



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The future - PITUS

- Dept of Health and Ageing funding for the RCPA to further improve requesting and reporting
  1. Implementation evaluation of requesting/reporting
  2. Decision support for pathology requesters
  3. Safety in Pathology reporting - standards for cumulative reports, abnormal indicators and demographics
  4. Reference range harmonisation across labs
  5. Report information modelling and structured reporting

Conclusions

- One terminology does not fit all circumstances
- Pathologists are very mindful of inappropriate pooling of results, we must build systems to prevent this from happening
- It is vital that we have a process to maintain these subsets going forward
- One major side-effect was the education of Pathologists about terminology and units issues.

References

1. Australian Request Codes (AUSTPATH) - http://www.ahml.com.au/austpath.php
2. Australia Pathology Units and Terminology Documents (APUTS) http://www.rcpa.edu.au/Publications/PUTS/PUTS_STDS.htm
3. The Australian Pathology Units and Terminology Standardisation Project – An Overview http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3428252/
4. LOINC – www.loinc.org
5. SNOMED CT – www.ihtsdo.org

Acknowledgements

- Prof Michael Legg
- Dr Christiaan Swanepoel
- Mater Health Services, Brisbane, Australia