NATA Assessment year x for ADRM and SPIA

Derek Holzhauser

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INFORMATICS

How are laboratories accredited?

- In 1986, the Australian Government introduced compulsory accreditation for pathology laboratories.
- To claim benefits under Medicare as an accredited provider, pathology laboratories must be assessed to and meet the National Pathology Accreditation (NPA) standards.
- The NPA Scheme operates as part of the Medicare rebatable pathology services under the Health Insurance Act 1973.
- The pathology accreditation standards that underpin the accreditation requirements specified in the Act under *Health Insurance (Accredited Pathology Laboratories—Approval) Principles 2017*

https://www.safetyandquality.gov.au/

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NPAAC

- The National Pathology Accreditation Advisory Council (NPAAC) is responsible for developing and maintaining the NPA standards for Australian pathology labs.
- The standards are categorised into 4 main tiers
- Tier 1 – The Principles
  Tier 2 – Overarching standards for all pathology services
  Tier 3A – Supervisory requirements for pathology laboratories
  Tier 3B – Technical and specific detailed requirements for good medical practice in all pathology services
  Tier 4 – Technical publications for specific areas of pathology

https://www.safetyandquality.gov.au/

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Assessment

- We have a single approved pathology accrediting agency – NATA (National Association of Testing Authorities)
- NATA use volunteer technical assessors to assess against the NPAAC standards

https://www.safetyandquality.gov.au/

NATA

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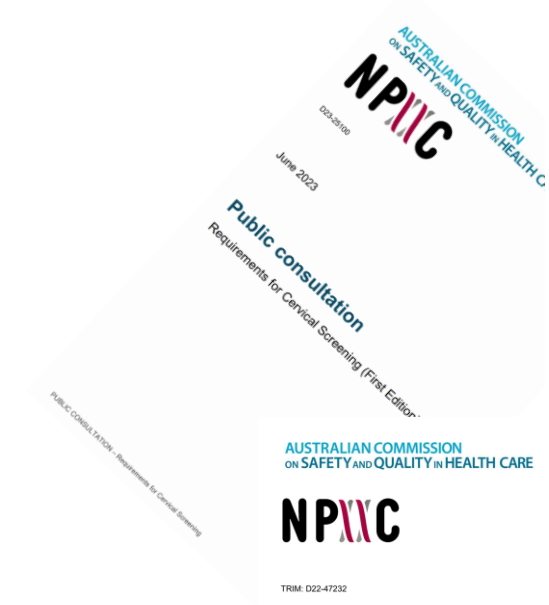


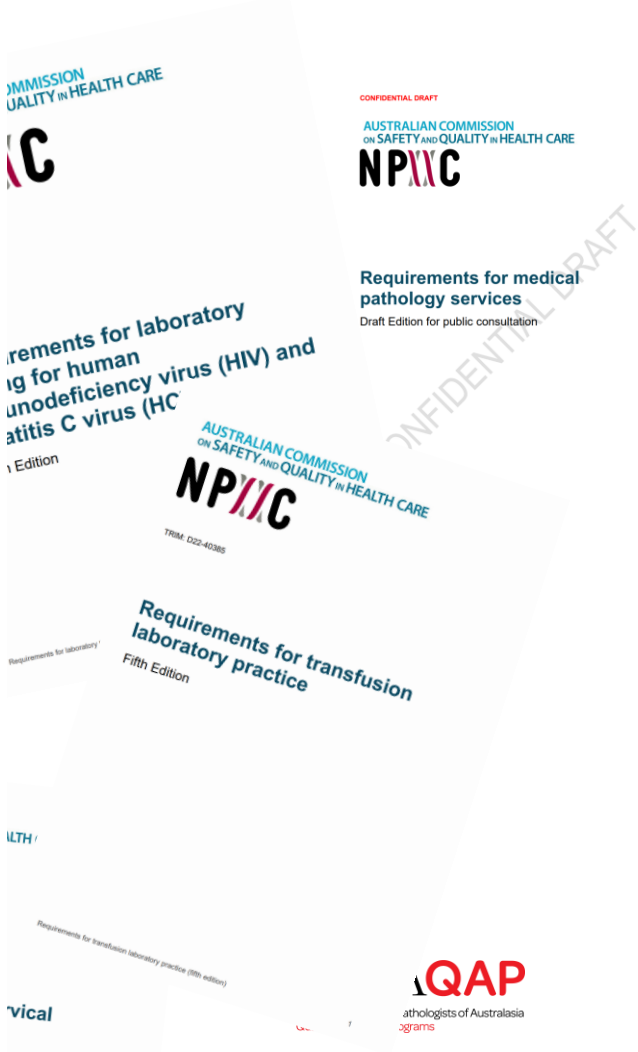
AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

NPAAC

TRIM: D22-32436

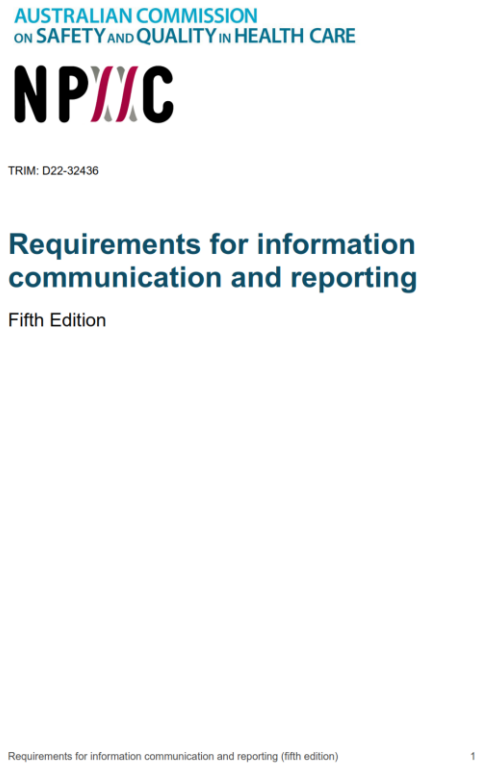
Requirements for information communication and reporting

Fifth Edition



Purpose

This document outlines how pathology information should be communicated between labs, requesters, consumers, and others.


AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE

NPAAC

TRIM: D22-32436

Requirements for information communication and reporting

Fifth Edition

Requirements for information communication and reporting (fifth edition) 1

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Why is it important

to use standardised terminology and messaging?

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The following story is based on true events

Only the names have been changed to protect the innocent

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The Royal College of Pathologists of Australasia
Quality Assurance Programs

Doctor receives results from lab electronically

Calls patient to discuss

Chol 2.5 mmol/L

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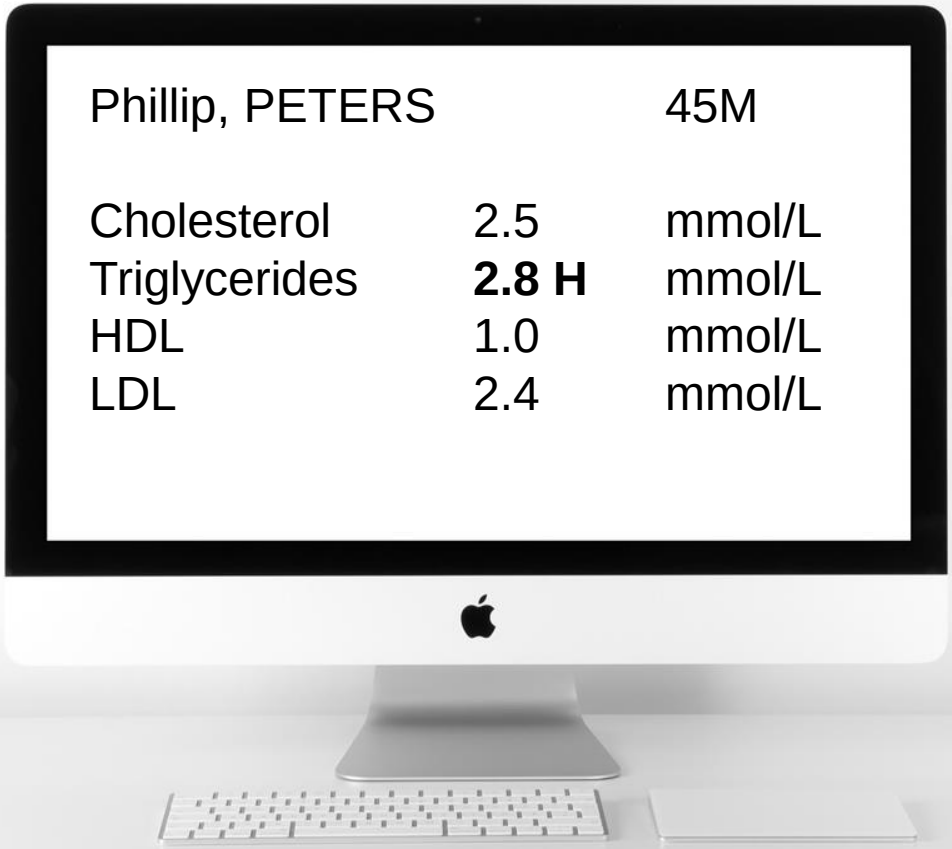
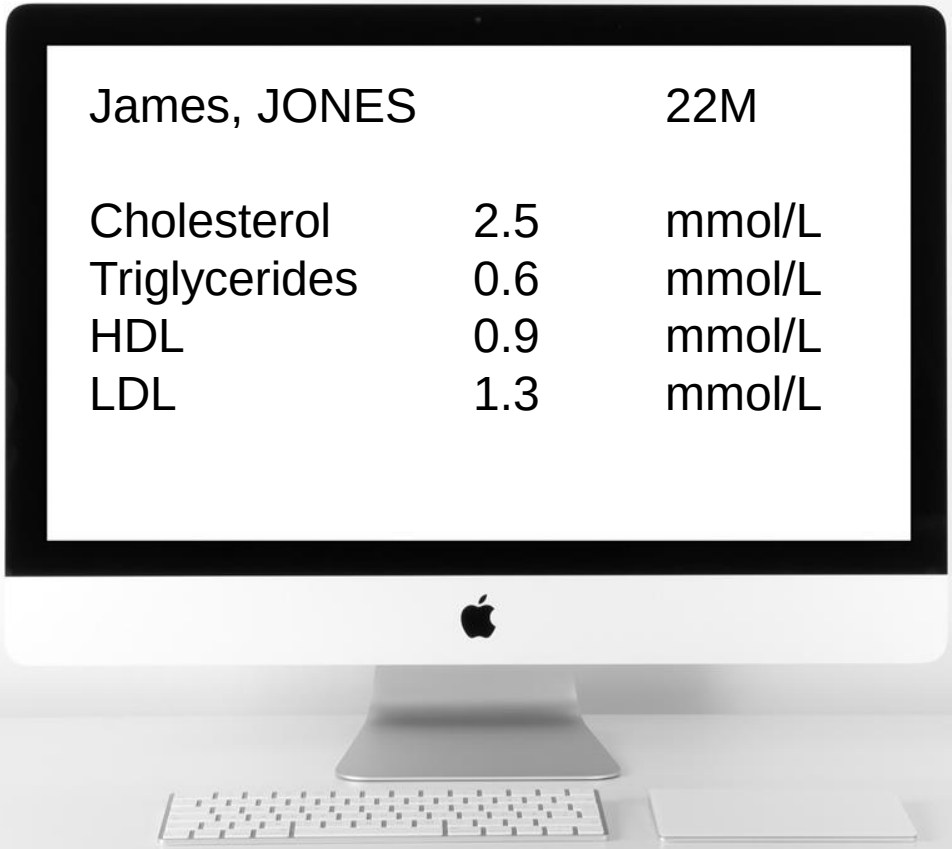
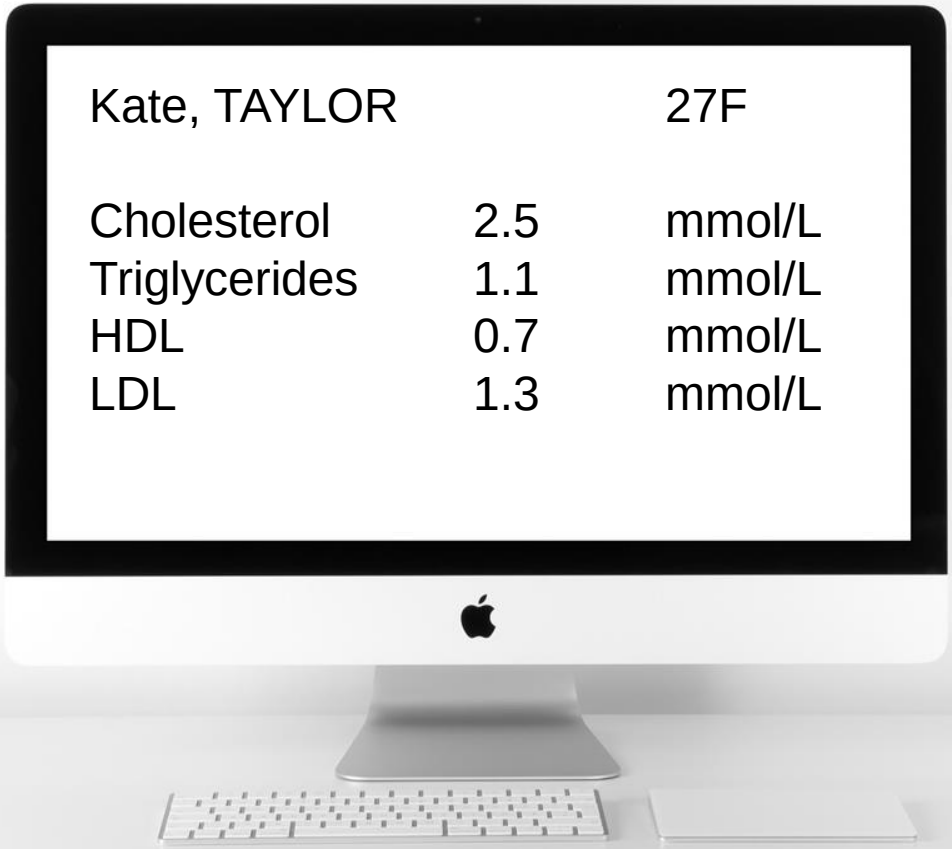
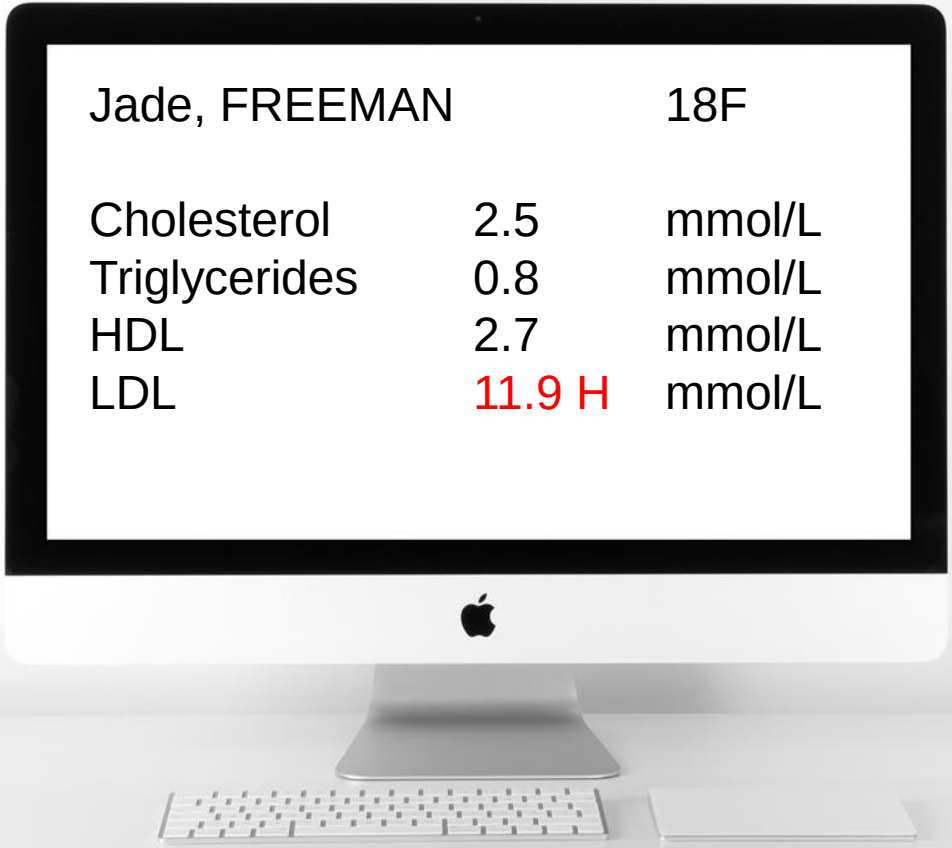

Phillip, PETERS 45M
Cholesterol 2.5 mmol/L
Triglycerides 2.8 H mmol/L
HDL 1.0 mmol/L
LDL 2.4 mmol/L


Sue, SMITH 37F
Cholesterol 2.5 mmol/L
Triglycerides 0.8 mmol/L
HDL 1.8 mmol/L
LDL 0.3 mmol/L


James, JONES 22M
Cholesterol 2.5 mmol/L
Triglycerides 0.6 mmol/L
HDL 0.9 mmol/L
LDL 1.3 mmol/L


Kate, TAYLOR 27F
Cholesterol 2.5 mmol/L
Triglycerides 1.1 mmol/L
HDL 0.7 mmol/L
LDL 1.3 mmol/L


Jade, FREEMAN 18F
Cholesterol 2.5 mmol/L
Triglycerides 0.8 mmol/L
HDL 2.7 mmol/L
LDL 11.9 H mmol/L

Doctor calls pathology lab

"Why do all my patients have a cholesterol of 2.5 mmol/L when tested at your lab?"

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Ultimate Pathology

Local Road Medical Practice
Local Road

WEST NILE VIC 3095

PETERS, Phillip
001-02-03
DOB/Age/Sex: **10/06/74 45 years Male**
Location: **Local Road Medical Practice**
Doctor: SMITH, J
Copies to:
Your Ref: 12345
Accession No.: 19-001-00001

CLINICAL CHEMISTRY

Chemistry

Cholesterol	<5.5	mmol/L	**6.0 H**
Triglycerides	<2.0	mmol/L	**2.8 H**
HDL	1.8-3.2	mmol/L	1.0
LDL	0.0-4.0	mmol/L	2.4

01/08/19 14:12 LDL Cholesterol:
People who need to be treated for high cholesterol should aim for LDL ('bad') cholesterol 2.5 mmol/L or lower. However, people who are considered at high risk, such as those who have had a heart attack, should aim for LDL less than 1.8 mmol/L.

Triglycerides	<2.0	mmol/L	**2.8 H**
HDL	1.8-3.2	mmol/L	1.0
LDL	0.0-4.0	mmol/L	2.4

01/08/19 14:12 LDL Cholesterol:
People who need to be treated for high cholesterol should aim for LDL ('bad') cholesterol 2.5 mmol/L or lower. However, people who are considered at high risk, such as those who have had a heart attack, should aim for LDL less than 1.8 mmol/L.

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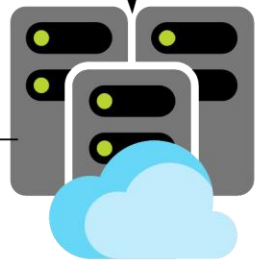
Instrument

Lab Information System

```
OBR|2||01-8614957-UEG-0^NATA^2184^N|LIP^LIPID PROFILE^2184|||...|F
OBX|1|ST|LIP^^L||LIPID PROFILE|||||F
OBX|2|NM|TCHL^Cholesterol^L||6.0|mmol/L^^UCUM|<5.5||---|||F
OBX|3|NM|TRG^Trigyclerides^L||2.8|mmol/L^^UCUM|<2.2||||F
OBX|4|NM|HDL^HDL Cholesterol^L|HDL Cholesterol|1.0|mmol/L^^UCUM|>2.0||||F
OBX|5|NM|LDL^LDL Cholesterol^L|LDL Cholesterol|2.4|mmol/L^^UCUM|||||F
OBX|6|FT|LCOM^Lipid Comment 21^L||\.nf\People who need to be treated for high cholesterol should aim for LDL ('bad') cholesterol 2.5 mmol/L or lower. However, people who are considered at high risk, such as those who have had a heart attack, should aim for LDL less than 1.8 mmol/L.|||||F|
```

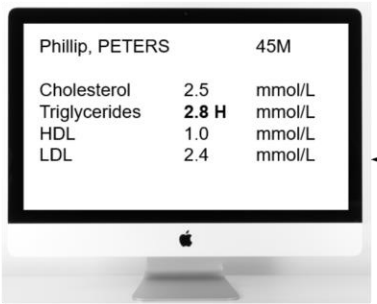
HL7 Message

encrypted



Messaging Service/Repository

encrypted



Doctor's Clinical System

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OBX|2|NM|TCHL^Cholesterol^L||6.0|mmol/L^^UCUM|<5.5||---|||F

Ultimate Pathology

Local Road Medical Practice
Local Road

WEST NILE VIC 3095

PETERS, Phillip
001-02-03
DOB/Age/Sex: **10/06/74 45 years Male**
Location: **Local Road Medical Practice**
Doctor: SMITH, J
Copies to:
Your Ref: 12345
Accession No.: 19-001-00001

CLINICAL CHEMISTRY

Chemistry

Cholesterol	<5.5	mmol/L	**6.0 H**
Triglycerides	<2.0	mmol/L	**2.8 H**
HDL	1.8-3.2	mmol/L	1.0
LDL	0.0-4.0	mmol/L	2.4

01/08/19 14:12 LDL Cholesterol:
People who need to be treated for high cholesterol should aim for LDL ('bad') cholesterol 2.5 mmol/L or lower. However, people who are considered at high risk, such as those who have had a heart attack, should aim for LDL less than 1.8 mmol/L.

Triglycerides	<2.0	mmol/L	**2.8 H**
HDL	1.8-3.2	mmol/L	1.0
LDL	0.0-4.0	mmol/L	2.4

01/08/19 14:12 LDL Cholesterol:
People who need to be treated for high cholesterol should aim for LDL ('bad') cholesterol 2.5 mmol/L or lower. However, people who are considered at high risk, such as those who have had a heart attack, should aim for LDL less than 1.8 mmol/L.

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How can we prevent this?

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We are speaking the same language (HL7)

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LOINC (Logical Observation Identifiers Names and Codes)

OBX|2|NM|14647-2^Cholesterol^LN^TCHL^Cholesterol^ULTP||6.0|mmol/L^^UCUM|<5.5||---|||F

1. LOINC Website https://loinc.org/faq/basics/

Easy, everybody just use LOINC codes?

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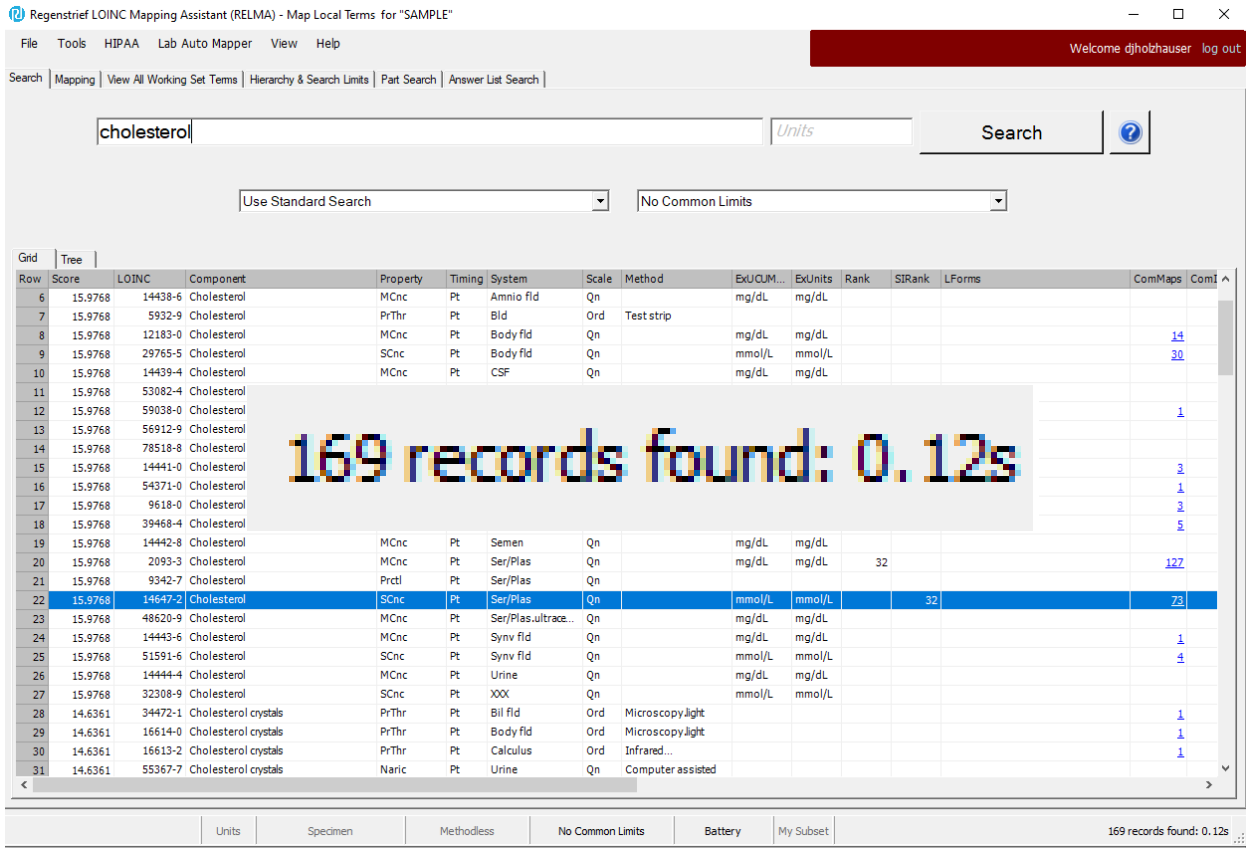
LOINC



https://loinc.org

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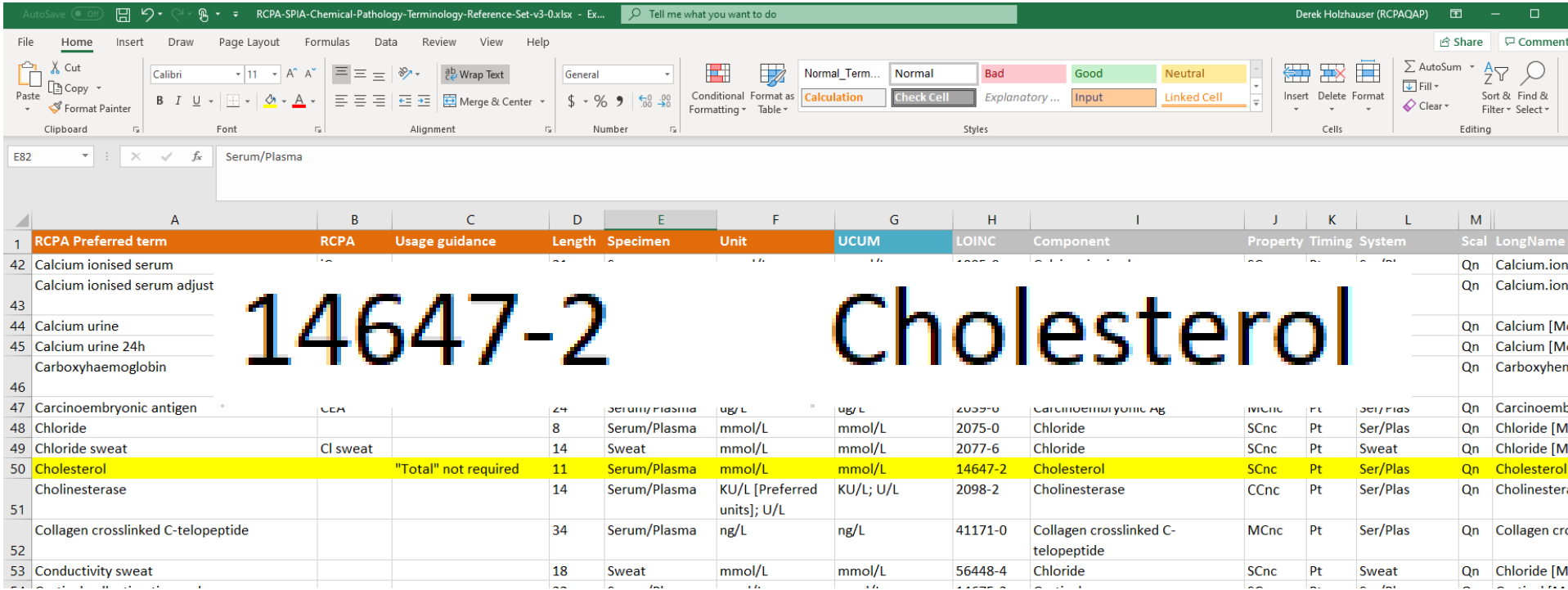
Terminology Reference Set



	A	B	C	D	E	F	G	H	I	J	K	L	M	
1	RCPA Preferred term	RCPA	Usage guidance	Length	Specimen	Unit	UCUM	LOINC	Component	Property	Timing	System	Scal	LongName
42	Calcium ionised serum												Qn	Calcium.ion
43	Calcium ionised serum adjust												Qn	Calcium.ion
44	Calcium urine												Qn	Calcium [M
45	Calcium urine 24h												Qn	Calcium [M
46	Carboxyhaemoglobin												Qn	Carboxyhem
47	Carcinoembryonic antigen	CEA		24	Serum/Plasma	ug/L	ug/L	2039-6	Carcinoembryonic Ag	MCnc	Pt	Ser/Plas	Qn	Carcinoemb
48	Chloride			8	Serum/Plasma	mmol/L	mmol/L	2075-0	Chloride	SCnc	Pt	Ser/Plas	Qn	Chloride [M
49	Chloride sweat	Cl sweat		14	Sweat	mmol/L	mmol/L	2077-6	Chloride	SCnc	Pt	Sweat	Qn	Chloride [M
50	Cholesterol		"Total" not required	11	Serum/Plasma	mmol/L	mmol/L	14647-2	Cholesterol	SCnc	Pt	Ser/Plas	Qn	Cholesterol
51	Cholinesterase			14	Serum/Plasma	KU/L [Preferred units]; U/L	KU/L; U/L	2098-2	Cholinesterase	CCnc	Pt	Ser/Plas	Qn	Cholinestera
52	Collagen crosslinked C-telopeptide			34	Serum/Plasma	ng/L	ng/L	41171-0	Collagen crosslinked C-telopeptide	MCnc	Pt	Ser/Plas	Qn	Collagen cr
53	Conductivity sweat			18	Sweat	mmol/L	mmol/L	56448-4	Chloride	SCnc	Pt	Sweat	Qn	Chloride [M

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4. Conformance with electronic messaging standards

Laboratories should have in place processes to adopt updated versions of these standards as they are published by HL7 Australia.

S4.1 Laboratories **must** use the HL7 Standard as defined by the HL7 V 2.4 as set out in HL7AUSD-STD-OO-ADRM-2017.1 the Australian Pathology Messaging – Localisation of HL7 Version 2.4 2017.

C4.1(i) Use of the HL7 standard **must** include testing that demonstrates appropriate use of codes for orderables and results as well as use of patient, provider and organisation identifiers in the messages in accordance with Standard 3 of this document as well as management of message acknowledgments in accordance with Standard 2.

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4. Conformance with electronic messaging standards

C4.1(ii) When this HL7 Standard is updated in Australian Standards laboratories are required to move towards adopting the new version.

HL7 Australia

Australian Diagnostics and Referral Messaging - Localisation of HL7 Version 2.4

HL7AUSD-STD-OO-ADRM-2021.1

ADRM 2021.1

https://hl7.com.au/

HL7 Australia Limited
Lvl 24,Tower 3, 300 Barangaroo Ave
Barangaroo NSW 2000 Australia
www.hl7.org.au

6. Request and report format requirements

S6.2 A laboratory **must** ensure that at least one of the observational identifiers used in an electronic report should use the SPIA LOINC coding system, where available, and the associated UCUM units that is in accordance with the SPIA standards[5] when sending to external organisations.

C6.2(i) The source of LOINC codes should be those specified in SPIA.[6]

C6.2(ii) If SNOMED codes are used in messages, laboratories should use the SNOMED CT-AU code set.

C6.2(iii) A laboratory may use non-LOINC observational identifiers.

- You can use local codes in messages, but you **must** also use a SPIA LOINC code
- If SNOMED codes are used, they should be from the SPIA SNOMED-CT AU set

What is ADRM?

- Australian Diagnostics and Referral Messaging - Localization of HL7 Version 2.4 (Current version 2021.1)
- Addresses HL7 Orders, Results and Referrals Messages for use in Australia
- “Formalisms” – Prescribed Non-Clinical Data in prescribed places e.g. (HL7au:000040) MSH-12 Version ID Field Conformance Points
- HL7 v2 Segments Allowed or Prohibited in Pathology Messages Australia
- Data Type Structures, Field / Component / Subcomponent Structures
- Required or Recommended Values for Coded Data for use in Australia

HL7 Australia

Australian Diagnostics and Referral Messaging - Localisation of HL7 Version 2.4

HL7AUSD-STD-OO-ADRM-2021.1

548 pages

~300 Technical conformance points

HL7 Australia Limited
Lvl 24,Tower 3, 300 Barangaroo Ave
Barangaroo NSW 2000 Australia

www.hl7.org.au

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RCPAQAP Tools

- RCPAQAP HL7 Validation Orchestrator
- RCPAQAP SPIA eRequesting Terms Lookup Tool
- RCPAQAP SNOMED Code &Terms Lookup Tool
- RCPAQAP LOINC Code Lookup Tool
- RCPAQAP SPIA Coding Performance Reporting Tool
- RCPAQAP Conformant Order Generator App
- RCPAQAP Conformant Result Generator App (WIP)

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What can they do?

- Checks HL7 messages for compliance with ADRM, SPIA (& QAP)
- Produces a (very) detailed report (with references)
- SPIA SNOMED/LOINC compliance summary
- Generate and ADRM conformant order message
- Generate an ADRM conformant result message
- SNOMED & LOINC code lookup

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HL7 v2 Diagnostic Messaging in Australia

Validate Orders and Results Messages ⚠

Select a file containing a HL7 v2 Delimited message which to validate for conformance with one or more of the implemented conformance profiles, depending on the message type and option selections:

1. Minimal HL7 v2 message header content
2. HL7 Australian Diagnostics and Referral Messaging Standard - ADRM-2021.1
3. RCPA SPIA Guidelines v4.0, e-Requesting, Section 2
4. RCPA SPIA Guidelines v4.0, Reporting, Sections 3, 5, 6 and 8
5. RCPA Colorectal Cancer Protocol, 3rd Edition, 2016
6. RCPAQAP EQA Programmes supporting e-Requesting and e-Resulting

Choose File | Test EUC.txt

Results

☑ ADRM ☑ SPIA Cds. ☑ S.Units ☑ S.Ref Int ☐ EQA ☐ E.UoM ☐ E.UCUM

Load Message | Validate Message | View Report | Download Report | Interpretation | TFFFFFFFFF

```
MSH|^~\&|SuperLIS|PITUSPathology^9999^AUSNATA|Best Practice 1.8.5.743|DermatologyClinic^D101F20B-1453-47A1-AD3F-A2845964A84E^GUID|20191202075500+1000|
PID|1||719909917^^^DermatologyClinic^MR~28125278357^^^AUSHIC^MC~8003606088940543^^^AUSHIC^NI||FERNIE^Glenn^Neville^^^^L||19680528|M|||456 James Terrac
ORC|RE|00000002^PathologyOrder|1978881822^PITUSPathology^9999^AUSNATA|20000002^PathologyGroupOrder|CM|||20191130+1000|||FAMTRI^Familydr^Trish^^^Dr^^^
OBR|1|00000002^PathologyOrder|1978881822^PITUSPathology^9999^AUSNATA|444164000^Electrolytes Urea Creatinine^SCT^EUC^Electrolytes Urea Creatinine^NATA9
OBX|1|NM|2951-2^Sodium^LN^Na^Sodium^NATA9999||136|mmol/L|135-145|||F|||20191202074500+1000|""
OBX|2|NM|2823-3^Potassium^LN^K^Potassium^NATA9999||5.2|mmol/L|3.5-5.2|||F|||20191202074500+1000|""
OBX|3|NM|2075-0^Chloride^LN^Cl^Chloride^NATA9999||9.6|mmol/L|95-110|||F|||20191202074500+1000|""
OBX|4|NM|1963-8^Bicarbonate^LN^BICARB^Bicarbonate^NATA9999||27|mmol/L|22-32|||F|||20191202074500+1000|""
OBX|5|NM|22664-7^Urea^LN^UREA^Urea^NATA9999||5.7|mmol/L|3.0-8.5|||F|||20191202074500+1000|""
OBX|6|NM|14682-9^Creatinine^LN^CREAT^Creatinine^NATA9999||87|umol/L|60-110|||F|||20191202074500+1000|""
OBX|7|NM|62238-1^eGFR^LN^EGFR^Glomerular filtration rate estimated^NATA9999||88|mL/min/1.73m\S\2|60-120|||F|||20191202074500+1000|""
OBX|8|ST|^^^INTERP^Interpretation^NATA9999||All chemistry parameters are within normal limits for age and sex.|||||F|||20191202074500+1000|""
OBX|9|ED|PDF^Display Format in PDF^AUSPDI||^application^pdf^Base64^[Base64 PDF Content here]|||||F|||20191202074500+1000|""
```

References

- Orders and Results, including Colorectal Cancer Reporting (ORM^O01, ORU^R01)
  - The minimal message header content requirements that permit messages to be parsed and attributed
  - The Australian Diagnostics and Referral Messaging - Localisation of HL7 Version 2.4 (ADRM-2021.1) Standard - See ADRM 2021.1 Validation Rules for implementation notes.

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Close Report

HL7 v2 Message Validation Report

Message validation was performed on 2024-05-14, at 20:36:05.

The message was checked for conformance with the requirements of the RCPAQAP HL7 Conformance Profile for the Australian Diagnostics and Referral Messaging - Localisation of HL7 Version 2.4 (ADRM-2021.1) Standard. The HL7 Message **does NOT conform** to the requirements of the ADRM-2021.1 Standard.

The message was checked for conformance with the requirements of the RCPAQAP HL7 Conformance Profile for the Royal College of Pathologists of Australasia RCPA Standardised Pathology Informatics in Australia (SPIA), Guidelines v4.0 for Reporting. The HL7 Message **does NOT conform** to the requirements of the RCPA SPIA Guidelines v4.0.

Message Identification Details

- Sending Facility: PITUSPathology - 9999
- Message Control Id: E48CFF2E-CF87-486B-B679-10101034AC29
- Date/Time of Message: 20191202075500+1000
- HL7 Message Source: HL7 message body from Web Service Request
- Conformance Profile Id: "TFFFFTTTFF" / "TFFFFTTTFF"

Message Validation Results

This message **Does NOT** conform to the requirements of the HL7AUSD-STD-OO-ADRM-2021.1 - Australian Diagnostics and Referral Messaging - Localisation of HL7 Version 2.4 Standard, profiled in the RCPAQAP HL7 Conformance Profile for Pathology Ordering and Observation Reporting in Australia.

This message **Does NOT** conform to the requirements of the Royal College of Pathologists of Australasia RCPA Standardised Pathology Informatics in Australia (SPIA), Guidelines v4.0 for Reporting profiled in the RCPAQAP HL7 Conformance Profile for Pathology Ordering and Observation Reporting in Australia.

The table below describes issues identified in the message.

Entry Id	Element Type	Position	Message Line No	Validation Diagnostics
0	Message		1	ERROR Required PV1 Segment is missing Failing HL7AUSD-STD-OO-ADRM-2021.1 conformance point HL7au:00046.5 (r2) Conformance Point Text: Receiving implementations when receiving HL7 messages and converting their contents to data values must treat segments that were expected but are not present as an error.
1	Segment	MSH	1	ERROR Component MSH.12.2 Internationalization Code is not valued Failing HL7AUSD-STD-OO-ADRM-2021.1 conformance point HL7au:000040.2 (r2) Conformance Point Text: MSH-12 Version ID component must be valued "AUS&Australia&ISO3166_1"
2	Segment	MSH	1	ERROR Component MSH.12.3 internal version ID is not valued Failing HL7AUSD-STD-OO-ADRM-2021.1 conformance point HL7au:000040.3 Conformance Point Text: MSH-12 Version ID component must be valued as "HL7AU-OO-201701&&L"
3	Segment	MSH	1	ERROR Field MSH.19 - Principal Language Of Message is not valued Failing HL7AUSD-STD-OO-ADRM-2021.1 conformance point HL7au:000042 Conformance Point Text: MSH-19 must be valued as "en^English^ISO639".
4	Segment	MSH	1	ERROR MSH-16 Application acknowledgement type (ID) must be AL. It is NE
				match the OBX.6.1 Units value [mL/min/1.73m^2] - Failing validation for conformance with the expectations of the SPIA_Guidelines_v4.0, Section 6 Units of measure, Guideline G6 Guiding principles: 1. A single, test-specific, standardised unit of measure is preferred for use in reports from pathology laboratories. 2. Units should be represented in electronic messages that facilitates receiving systems to readily convert units under the clinical governance of the receivers. UCUM is to be used as the logical representation of units of measure in electronic messages to allow for Principle 1. 3. Numeric results should always be displayed with their appropriate units and should never be displayed without them.
100	Component	OBX.3.3	12	ERROR Component obx[8].3.3 Name Of Coding System is not populated - continuing validation of this component for conformance with the expectations of the SPIA_Guidelines_v4.0, Section 3 Reporting terminology and codes, Guideline G3.01 Guideline Text: Codes for terms used to report pathology tests should be sourced from well-maintained and recognised international terminologies. LOINC should be the first choice and used where it is adequate
101	Component	OBX.3.1	12	ERROR Component obx[8].3.1 Identifier is not populated - Failing validation for conformance with the expectations of the SPIA_Guidelines_v4.0, Section 3 Reporting terminology and codes, Guideline G3.01 Guideline Text: Codes for terms used to report pathology tests should be sourced from well-maintained and recognised international terminologies. LOINC should be the first choice and used where it is adequate

HL7 Message


```
1: MSH|^~\&|SuperLIS|PITUSPathology^9999^AUSNATA|Best Practice 1.8.5.743|DermatologyClinic^D101F20B-1453-47A1-AD3F-A2845964A84E^GUID|20191202075500+1000||O
2: PID|1||719909917^^^DermatologyClinic^MR~2812527835^^^AUSHIC^MC~8003606088940543^^^AUSHIC^NI||FERNIE^Glenn^Neville^^^^L|||19680528|M|||456 James Terrace^
3: ORC|RE|00000002^PathologyOrder|1978881822^PITUSPathology^9999^AUSNATA|20000002^PathologyGroupOrder|CM|||20191130+1000|||FAMTRI^Family^Trish^^^Dr^^^NA
4: OBR|1|00000002^PathologyOrder|1978881822^PITUSPathology^9999^AUSNATA|444164000^Electrolytes Urea Creatinine^SCT^EUC^Electrolytes Urea Creatinine^NATA999
5: OBX|1|NM|2951-2^Sodium^LN^Na^Sodium^NATA9999||136|mmol/L|135-145|||F|||20191202074500+1000|""
6: OBX|2|NM|2823-3^Potassium^LN^K^Potassium^NATA9999||5.2|mmol/L|3.5-5.2|||F|||20191202074500+1000|""
7: OBX|3|NM|2075-0^Chloride^LN^Cl^Chloride^NATA9999||9.6|mmol/L|95-110|||F|||20191202074500+1000|""
8: OBX|4|NM|1963-8^Bicarbonate^LN^BICARB^Bicarbonate^NATA9999||27|mmol/L|22-32|||F|||20191202074500+1000|""
9: OBX|5|NM|22664-7^Urea^LN^UREA^Urea^NATA9999||5.7|mmol/L|3.0-8.5|||F|||20191202074500+1000|""
10: OBX|6|NM|14682-9^Creatinine^LN^CREAT^Creatinine^NATA9999||87|umol/L|60-110|||F|||20191202074500+1000|""
11: OBX|7|NM|62238-1^eGFR^LN^EGFR^Glomerular filtration rate estimated^NATA9999||88|mL/min/1.73m\S\2|60-120|||F|||20191202074500+1000|""
12: OBX|8|ST|^^^INTERP^Interpretation^NATA9999||All chemistry parameters are within normal limits for age and sex.|||||F|||20191202074500+1000|""
13: OBX|9|ED|PDF^Display Format in PDF^AUSPDI||^application^pdf^Base64^[Base64 PDF Content here]|||||F|||20191202074500+1000|""
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References

- SPIA Terminology Reference Sets and Information Models
- Relevant Requesting Pathology SPIA resources:
  - RCPA SPIA RequestingAllergens Terminology Reference Set v4.0
  - RCPA SPIA Requesting Pathology Terminology Reference Set v4.2

RCPAQAP HL7 Conformance Profile for selected Pathology HL7 messages was developed using the Caristix Conformance tool.
The message was validated using the RCPAQAP's QAP Validation Orchestrator which wraps the Caristix Validate Live service with additional functionality.

RCPAQAP
The Royal College of Pathologists of Australasia
Quality Assurance Programs

SPIA Coding Performance Summary Table

Prepared: 09/05/2024, 8:04:54 pm

Test/Panel Group	Test/Panel	SPIA Preferred Term	SPIA LOINC Code	Identified as LOINC	SPIA Reporting Unit	UCUM Unit	Identified as UCUM	SPIA SNOMED-CT Code	Identified as SCT	
EUC	Potassium	Yes (Potassium)	Yes (2823-3)	No	Yes (mmol/L)	Yes (mmol/L)	No	No (2921244)	No	
EUC	Chloride	Yes (Chloride)	Yes (2075-0)	No	Yes (mmol/L)	Yes (mmol/L)	No	No (2921244)	No	
EUC	Bicarbonate	Yes (Bicarbonate)	Yes (1963-8)	No	Yes (mmol/L)	Yes (mmol/L)	No	No (2921244)	No	
EUC	Anion Gap	Yes (Anion Gap)	Yes (1863-0)	No	Yes (mmol/L)	Yes (mmol/L)	No	No (2921244)	No	Preferred Term: Anion gap 4
EUC	Urea	No (Urea)*	No (14937-7)*	No	No (mmol/L)*	No (mmol/L)*	No	No (2921244)	No	* LOINC Code 14937-7 not f
EUC	Creatinine	Yes (Creatinine)	Yes (14682-9)	No	Yes (umol/L)	Yes (umol/L)	No	No (2921244)	No	
FBC	Haemoglobin	Yes (Haemoglobin)	Yes (718-7)	No	Yes (g/L)	Yes (g/L)	No	No (23707965)	No	
FBC	White Cell Count	No (White Cell Count)	Yes (6690-2)	No	No (x10^9/L)	No (x10^9/L)	No	No (23707965)	No	
FBC	Platelet Count	No (Platelet Count)	Yes (777-3)	No	No (x10^9/L)	No (x10^9/L)	No	No (23707965)	No	
FBC	Red Cell Count	No (Red Cell Count)	Yes (789-8)	No	No (x10^12/L)	No (x10^12/L)	No	No (23707965)	No	
FBC	Haematocrit	Yes (Haematocrit)	Yes (4544-3)	No	Yes (L/L)	Yes (L/L)	No	No (23707965)	No	
FBC	MCV	Yes (MCV)	Yes (787-2)	No	Yes (fL)	Yes (fL)	No	No (23707965)	No	Preferred Term: Mean cell vo
FBC	MCH	Yes (MCH)	Yes (785-6)	No	Yes (pg)	Yes (pg)	No	No (23707965)	No	Preferred Term: Mean cell ha
FBC	MCHC	Yes (MCHC)	Yes (786-4)	No	Yes (g/L)	Yes (g/L)	No	No (23707965)	No	Preferred Term: Mean cell ha
FBC	RDW	No (RDW)*	No (788-0)*	No	No (%)*	No (%)*	No	No (23707965)	No	* LOINC Code 788-0 not fou
FBC	Mean Platelet Volume	No (Mean Platelet Volume)*	No (23708748)*	No	No (fL)*	No (fL)*	No	No (23707965)	No	* LOINC Code 23708748 not
FBC	Neutrophils %	No (Neutrophils %)*	No (770-8)*	No	No (%)*	No (%)*	No	No (23707965)	No	* LOINC Code 770-8 not fou
FBC	Neutrophils	No (Neutrophils)*	No (751-8)*	No	No (x10^9/L)*	No (x10^9/L)*	No	No (23707965)	No	* LOINC Code 751-8 not fou
FBC	Lymphocytes %	No (Lymphocytes %)*	No (736-9)*	No	No (%)*	No (%)*	No	No (23707965)	No	* LOINC Code 736-9 not fou
FBC	Lymphocytes	No (Lymphocytes)*	No (731-0)*	No	No (x10^9/L)*	No (x10^9/L)*	No	No (23707965)	No	* LOINC Code 731-0 not fou
FBC	Monocytes %	No (Monocytes %)*	No (5905-5)*	No	No (%)*	No (%)*	No	No (23707965)	No	* LOINC Code 5905-5 not fo
FBC	Monocytes	No (Monocytes)*	No (742-7)*	No	No (x10^9/L)*	No (x10^9/L)*	No	No (23707965)	No	* LOINC Code 742-7 not fou
FBC	Eosinophils %	No (Eosinophils %)*	No (713-8)*	No	No (%)*	No (%)*	No	No (23707965)	No	* LOINC Code 713-8 not fou
FBC	Eosinophils	No (Eosinophils)*	No (711-2)*	No	No (x10^9/L)*	No (x10^9/L)*	No	No (23707965)	No	* LOINC Code 711-2 not fou
FBC	Basophils %	No (Basophils %)*	No (706-2)*	No	No (%)*	No (%)*	No	No (23707965)	No	* LOINC Code 706-2 not fou
FBC	Basophils	No (Basophils)*	No (704-7)*	No	No (x10^9/L)*	No (x10^9/L)*	No	No (23707965)	No	* LOINC Code 704-7 not fou
GLURNDM	Fasting	No (Fasting)*	No (32073711)*	No	No ()*	No ()*	No	No (26641647)	No	* LOINC Code 32073711 not
GLURNDM	Glucose	No (Glucose)	Yes (14749-6)	No	Yes (mmol/L)	Yes (mmol/L)	No	No (26641647)	No	
HBA1CIFCC	HbA1c	No (HbA1c)	Yes (59261-8)	No	Yes (mmol/mol)	Yes (mmol/mol)	No	No (21978844)	No	
HBA1CIFCC	HbA1c %	No (HbA1c %)*	No (17856-6)*	No	No (%)*	No (%)*	No	No (21978844)	No	* LOINC Code 17856-6 not f
HBA1CIFCC	HbA1c Comment	No (HbA1c Comment)*	No (30902987)*	No	No ()*	No ()*	No	No (21978844)	No	* LOINC Code 30902987 not
HEPB	Hepatitis B virus surface Ab	No (Hepatitis B virus surface Ab)*	No (30526113)*	No	No ()*	No ()*	No	No (22787696)	No	* LOINC Code 30526113 not
HEPB	Hepatitis B virus surface Ab IU/L	No (Hepatitis B virus surface Ab IU/L)*	No (30524297)*	No	No (IU/L)*	No (IU/L)*	No	No (22787696)	No	* LOINC Code 30524297 not
INR	Prothrombin Time	No (Prothrombin Time)*	No (5902-2)*	No	No (s)*	No (s)*	No	No (28626361)	No	* LOINC Code 5902-2 not fo
INR	INR	Yes (INR)	Yes (6301-6)	No	No (ratio)	No (ratio)	No	No (28626361)	No	
IRNSTD	Fasting	No (Fasting)*	No (32073711)*	No	No ()*	No ()*	No	No (22787835)	No	* LOINC Code 32073711 not
IRNSTD	Iron	Yes (Iron)	Yes (14798-3)	No	Yes (umol/L)	Yes (umol/L)	No	No (22787835)	No	

Acknowledgments

Michael Czapski (Czapski IT)

Ray Oreo (RCPAQAP)

Rizzi De Leon (RCPAQAP)

Anthony Green (RCPAQAP)

Tony Badrick (RCPAQAP)

Vanessa Cameron (RCPA)

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