Test Result Sequence "Down the Page" for common Chemical Pathology tests

Draft Proposal following harmonisation meeting 19/5/22

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Summary

Harmonisation of the layout of pathology reports is recommended as a way of facilitating report reading with the aim of minimising reading errors, and therefore possible patient management errors, and minimise time taken to read the report.

One aspect not yet covered in PITUS reports is the sequence of tests down the page in columnar reporting.

The following "down the page" sequences for tests within the stated groups are recommended by the AACB harmonisation Committee (see additional explanatory notes below):

Urea, Electrolytes, Creatinine (UEC)

Sodium, Potassium, Chloride, Bicarbonate, (anion gap), Urea, Creatinine, eGFR.

Liver Function Tests (LFT)

Total Protein, Albumin, (globulins), Bilirubin (conjugated bilirubin or other bilirubin fractions), ALT, AST, ALP, GGT

Calcium, Magnesium Phosphate (CMP)

Calcium, (Calcium adjusted for albumin), Magnesium, Phosphate

Iron Studies

Ferritin, Iron, Transferrin, Transferrin saturation

Thyroid Function Tests (TFT)

TSH, Free T4, Free T3

Lipid Studies

Cholesterol, Triglycerides, HDL cholesterol, LDL cholesterol, Non-HDL-Cholesterol, Cholesterol/HDL ratio

Additional general comments.

For laboratories which do not include all the components of a group in a report, the missing test result is omitted and the sequence of the remaining tests is maintained.

Tests in brackets are those which are commonly not included with all requests, but if reported, should be included at the indicated location.

The sequence of test groups (as shown in bold above) is not addressed in this recommendation.

This proposal does not recommend that the tests in each group should always be performed together, only that if any tests within each group are co-requested, they are reported in one group.

Full report

Introduction

Harmonisation of the layout of pathology reports is recommended as a way of facilitating report reading with the aim of minimising reading errors, and therefore possible patient management errors, and minimise time taken to read the report. There are agreed recommendations for many aspects of report formatting developed by the RCPA and published in Standardised Pathology Informatics in Australasia (SPIA) guidelines (RCPA SPIA 2021).

One aspect not yet formally covered in PITUS reports is the sequence of tests down the page in columnar reporting, although sequences do, by necessity, appear in the RCPA exemplar reports. Previous work using a convenience sample of haematology reports has indicated this is an issue for full blood count results (Mukerji, 2021). It is considered that there may also be wide variation in reports of chemical pathology results "down the page". This work presents examples of the current variation between laboratories for this factor for common groups of biochemistry tests and then aims to provide guidance for harmonising this issue.

Methods

An assessment of current variability was made using pdf reports supplied by laboratories participating in the RCPAQAP Liquid Serum Chemistry program. The formats supplied are assumed to represent the type of report made available to doctors, and uploaded to My Health Record for participating laboratories. A total of 105 uploads were received from 68 participants. A sample of these reports (n=32), identified to represent separate organisations, were analysed for the sequence of tests down the page for a range of common tests in separate groupings. Only one report was analysed if more than one was received from the same laboratory network. Additional data was obtained from several sources reflecting reporting on electronic systems.

This data and a preliminary recommendations were presented at the AACB harmonisation meeting (Sydney and online, 19/5/2022). After discussion proposals were assessed by a vote. With one exception all proposals (determined after discussion) were accepted overwhelmingly.

Below are the proposals for each test group, the data presented, and a brief discussion on the rationale for the proposal.

Urea, Electrolytes, Creatinine (UEC)

Proposal: Sodium, Potassium, Chloride, Bicarbonate, (anion gap), Urea, Creatinine, eGFR.

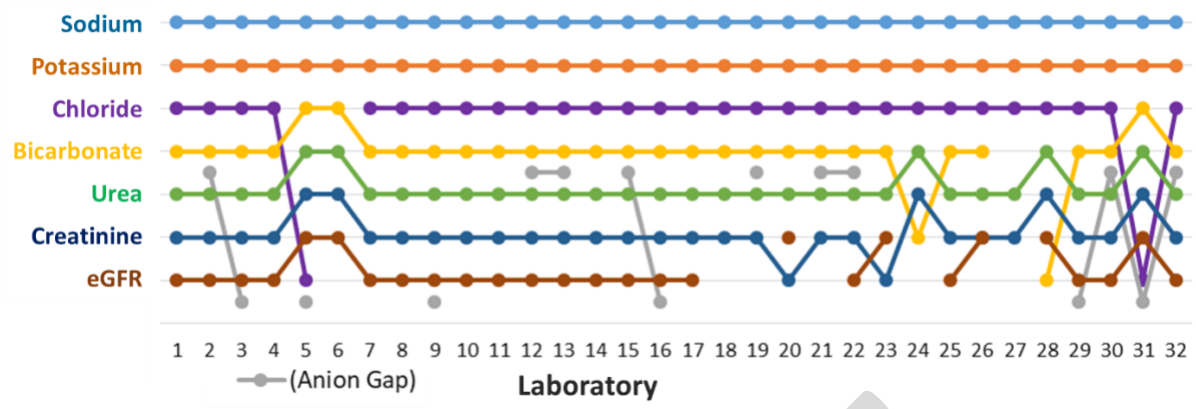

Figure: Sequence of common tests down the page in the UEC group.

Commentary. The current almost universal use of the proposed sequence supports this recommendation. For laboratories not routinely measuring chloride, maintaining the sequence of the other tests is recommended. Anion Gap is not commonly reported, but placing the result, if included, immediately below its input components can assist with interpretation of this result.

Note: This sequence matches the current version of the RCPA exemplar report.

		Latest results		
Collection date	18-May-18	**09-Nov-19**		
Collection time	14:23	**07:40**		
Request ID	187772756	**1978881856**		
Specimen	Serum	**Serum**	Reference	Units
Sodium	140	138	(135–145)	mmol/L
Potassium	4.2	4.3	(3.5–5.2)	mmol/L
Chloride	104	107	(950–110)	mmol/L
Bicarbonate	29	32	(22–32)	mmol/L
Urea	**110 H**	104	(83–108)	mmol/L
Creatinine	**119 H**	**101 H**	(60–110)	mmol/L
eGFR	**122 H**	113	(90–120)	{mL/min/1.73m^2}

Liver Function Tests (LFT)

Proposal: Total Protein, Albumin, (globulins), Bilirubin (conjugated bilirubin or other bilirubin fractions), ALT, AST, ALP, GGT

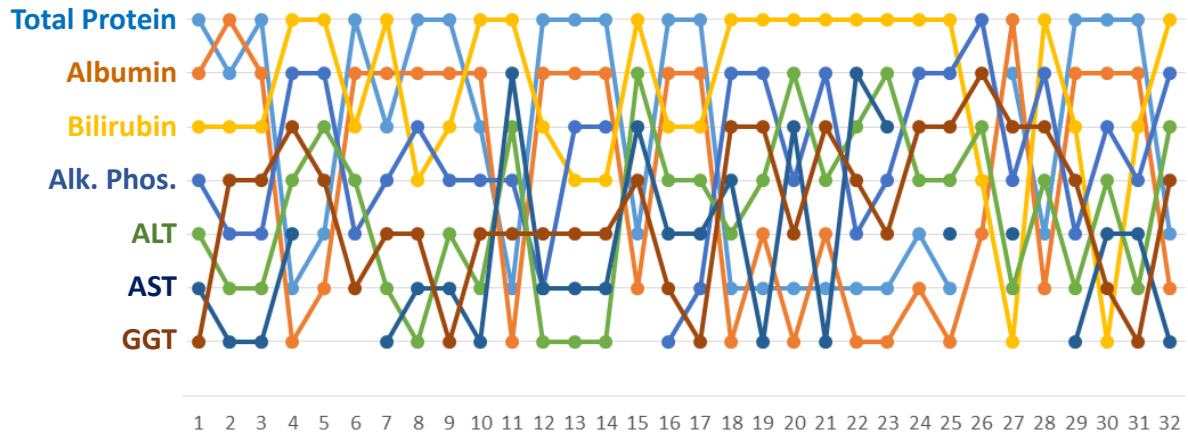

Figure: Sequence of common tests down the page in the Liver Function Tests (LFT) group.

Commentary: LFTs constitute a number of subgroups of tests which are commonly interpreted together. It is proposed to keep these pairs together, i.e Albumin and Total Protein (protein synthesis), ALT and AST (hepatocellular damage); ALP and GGT (cholestasis). Within the pairs it is proposed to place Total Protein before Albumin, a factor being that albumin is a subfraction of total protein. ALT to be placed before AST as it is more liver specific (and the group is called LFT), and some laboratories do not routinely include AST. ALP to be placed before GGT as it is generally considered to be more informative.

The sequence of the groups is tests is proposed as follows. TP and Albumin first, strongly influenced by current practice. ALT & AST before ALP & GGT was supported by a close vote (17 to 15). Bilirubin to be placed after TP and albumin based on general use and supported by the concept that albumin and bilirubin may be considered liver function tests more than some other tests (liver damage tests).

Note: This recommendation matches the RCPA Exemplar report with one change, placing Total Protein before Albumin.

Albumin	48		(40–50)	g/L
Protein	74		(60–80)	g/L
Globulin	36		(28–37)	g/L
Bilirubin	19.2 H		(1.0–20.0)	umol/L
Alanine aminotransferase	38 H		(5–40)	IU/L
Aspartate aminotransferase	47 H		(5–35)	IU/L
Alkaline phosphatase	98		(30–110)	IU/L
Gamma glutamyltransferase	41 H		(5–50)	IU/L

Calcium, Magnesium Phosphate (CMP)

Proposal: Calcium, (Calcium adjusted for albumin), Magnesium, Phosphate

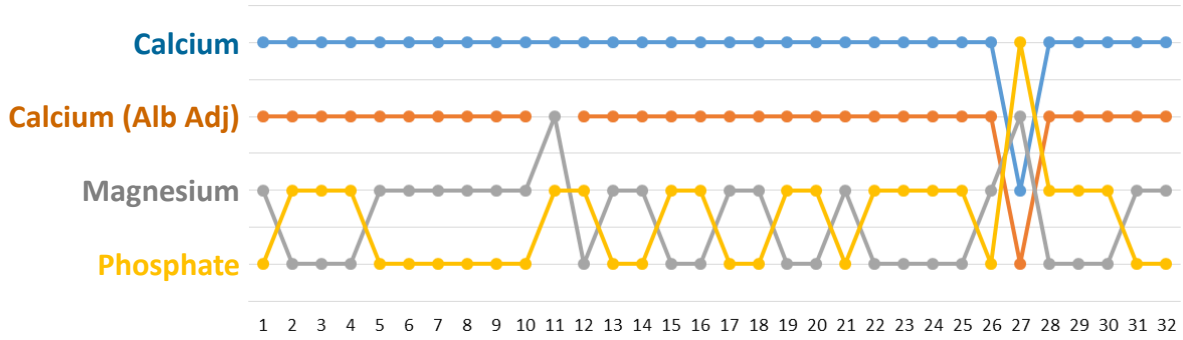

Figure: Sequence of common tests down the page in the Calcium Magnesium Phosphate group.

Commentary: Calcium is clearly the most common 1st test in this group. Keeping calcium adjusted for albumin near total calcium is appropriate as the latter can assist with the interpretation of the former. While there is no clear evidence of a more common sequence for magnesium or phosphate, placing magnesium before phosphate is consistent with the common group terminology of "CMP".

Iron studies

Proposal: Ferritin, Iron, Transferrin, Transferrin saturation

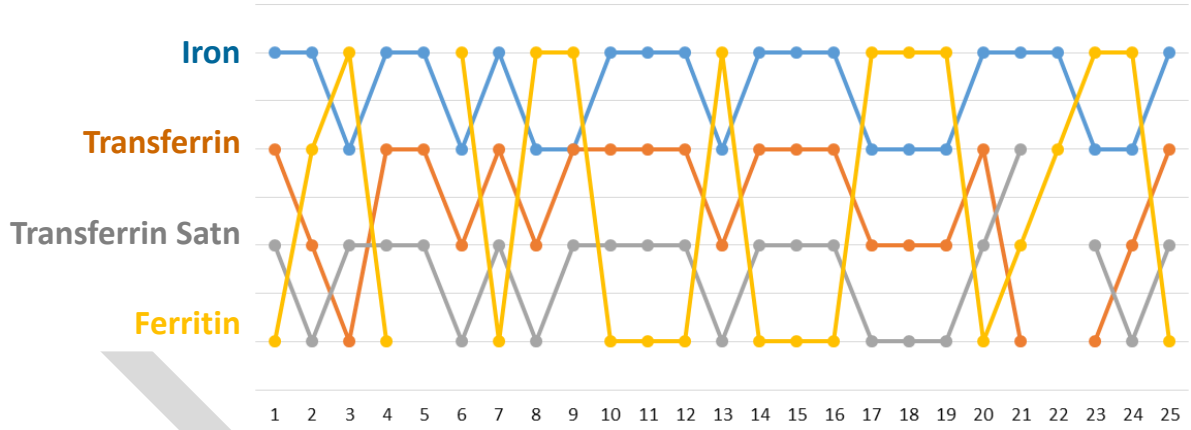

Figure: Sequence of common tests down the page in the irone studies group.

Commentary: The sequence of Iron – Transferrin - Transferrin saturation is the same in the majority of laboratories and maintaining this sequence is proposed. This also supports a sequence where a calculated result is reported immediately after its input values. Current practice generally places ferritin either at the top or bottom of the group. After discussion it was agreed that placing ferritin at the top was preferred as it is the most informative test, especially when compared with iron, which has limited value on its own. The recommendation to place ferritin at the top is made recognising that the tests are known as "Iron studies".

Note this matches the current version of the Iron Studied RCPA Exemplar report

		Latest results		
Collection date	11-May-18	09-Nov-19		
Collection time	14:23	08:45		
Request ID	1805772756	1978881829	Reference	Units
Specimen	Serum	Serum		
Ferritin	34	27 L	(30–120)	ug/L
Iron	9.4 L	8.7 L	(10.0–30.0)	umol/L
Transferrin	3.75	4.1 H	(2.10–3.80)	g/L
Transferrin saturation	18	14 L	(15–45)	%

Thyroid Function tests (TFT)

Proposal: TSH, Free T4, Free T3

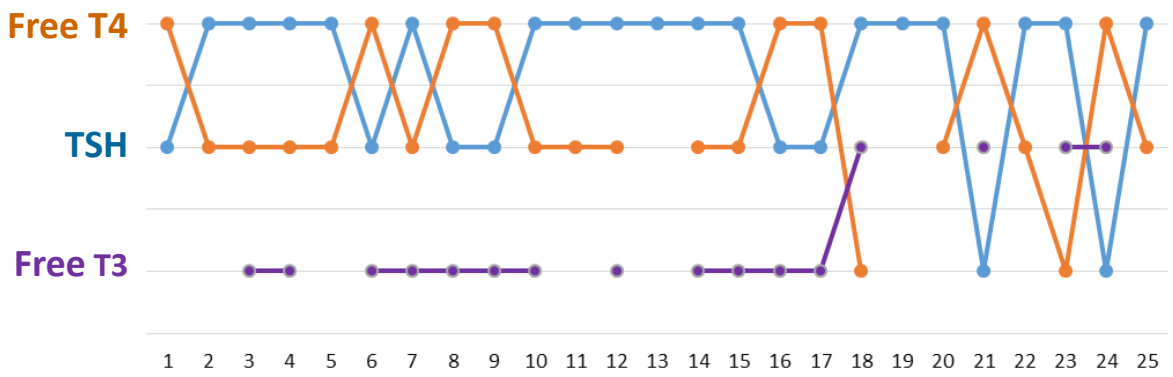

Figure: Sequence of common tests down the page in the Thyroid Function Test group.

Commentary: TSH is the most commonly requested of these tests, is the recommended first line test in many situations, and in most circumstances is the most important diagnostically. Placing TSH first is supported by these factors. Free T4 is more commonly requested and more clinically important in the majority of cases than Free T3, and is therefore placed above Free T3 in the sequence.

Lipid studies

Proposal: Cholesterol, Triglycerides, HDL cholesterol, LDL cholesterol, Non-HDL-Cholesterol, Cholesterol/HDL ratio

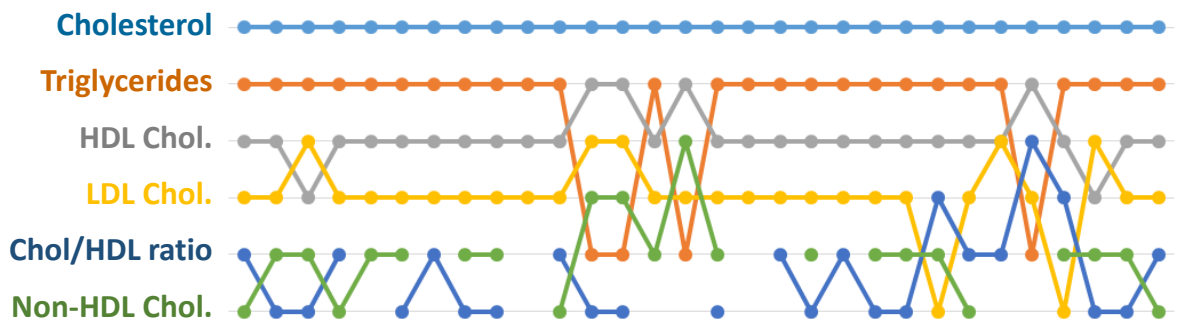

Figure: Sequence of common tests down the page in the Lipid group.

Commentary: Currently the Medicare request for "Lipids" is just Cholesterol and Triglycerides and this format keeps these together whether requested with other lipid parameters or not (Note: it is possible that this definition of the Medicare lipid panel may change). The sequence keeps the Cholesterol subfractions (HDLC, LDLC, non-HDLC) together. The sequence also keeps the parameters which are usually measured together (cholesterol triglycerides, HDL cholesterol), which are then followed by the calculated parameters. This proposal is also supported by current practice for the 1st 4 parameters).

Note. This proposal matches the current RCPA exemplar report with one change, placing non-HDL cholesterol above Cholesterol ratio.

			Latest results		
Collection date	09-Nov-15	15-Apr-17	**04-Dec-19**		
Collection time	07:51	07:09	**14:32**		
Request ID	1535552533	1746663644	**1978881822**		
Specimen	Serum	Serum	**Serum**	Reference	Units
Cholesterol	5.4	**5.6 H**	**6.2 H**	(< 5.5)	mmol/L
HDL Cholesterol	1.3	1.4	3.2	(> 1.2)	mmol/L
Triglycerides random	1.6	**2.1 H**	**2.3 H**	(< 2.0)	mmol/L
LDL Cholesterol	2.1	2.7	2.1	(< 3.0)	mmol/L
Cholesterol/HDL cholesterol	4.2	4.0	1.9	(< 3.5)	
Non HDL Cholesterol	2.1	2.3	2.1	(< 4.0)	mmol/L

References

Mukerji S, Jones GRD. Variation in haematology reporting – a drain on clinician time and source of clinician error. Pathology 2021;52:S116(Abstract)

RCPA STANDARDISED PATHOLOGY INFORMATICS IN AUSTRALIA (SPIA) GUIDELINES V4.0, June 2021