

# APFCB Masterclass in Interpretative Commenting

## Thyroid function test results

Sam Vasikaran

PathWest-Laboratory Medicine WA

Perth, Western Australia



ASIA-PACIFIC FEDERATION FOR CLINICAL  
BIOCHEMISTRY AND LABORATORY MEDICINE



# Today's Agenda

1. Interpretative commenting in Clinical Chemistry
  - What, Why, How
2. Series of common TFT results
  - Interpretative comments

**What?**

# The organisational model for Laboratory Medicine

## The primary laboratory operations

### Manufacturing processes

Patient preparation

Sample collection

Testing

Report transmission

## Efficiency

# The organisational model for Laboratory Medicine

## The primary laboratory operations

Manufacturing processes

## Value adding

knowledge application processes

Appropriate test selection

Result interpretation

→ Impact on health and outcome

Effectiveness

# The organisational model for Laboratory Medicine of the 21<sup>st</sup> century

- knowledge application processes
  - Will be the primary activities
- test manufacturing processes
  - Will be supporting activities
- Clinical scientists and pathologists that fail to be perceived by clinical colleagues as medical value contributors will be at risk

- There must be advice readily available at all times to explain to requesting clinicians what reports mean if that is not clear to them
  - Clinical Pathology Accreditation (UK) standard D4 (1992)

- A test request is a referral for specialist opinion
- Reports be supported by comments where appropriate

- RCPA (UK) Chemical Pathology Guidelines



**Why?**

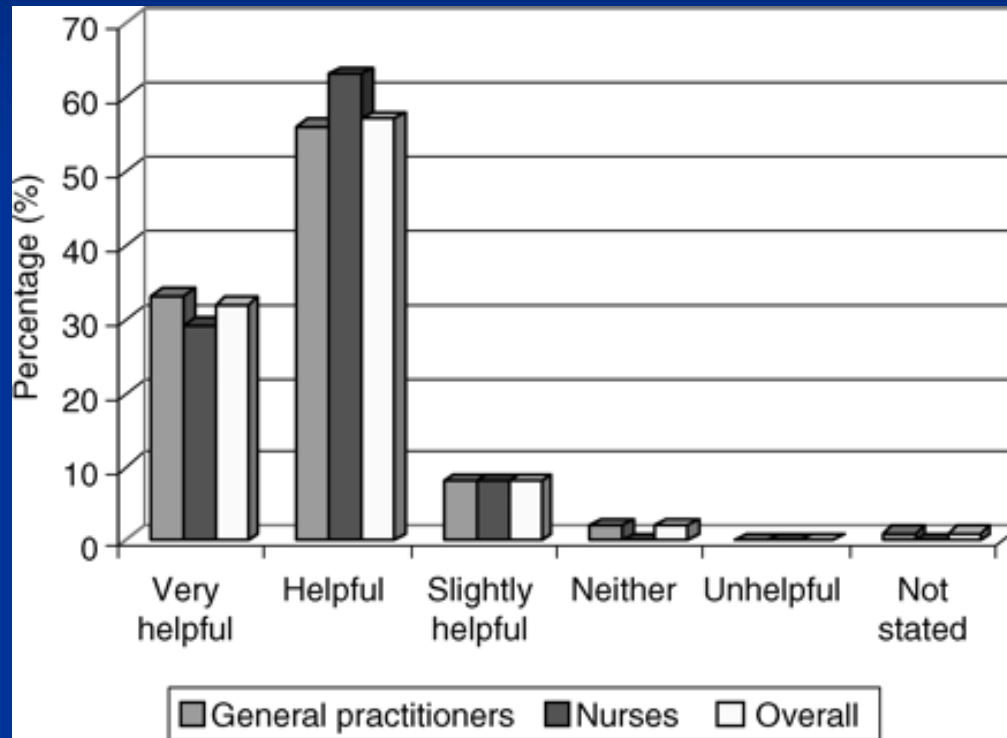
# Survey of junior doctors' knowledge in clinical biochemistry

Khromova K, Gray T. *Ann Clin Biochem* 2008;45:33–8

- Not confident requesting or interpreting
  - Mg, PO<sub>4</sub>, PTH, short Synacthen tests, and urine Na and osmolality
- Confident requesting, but less confident in interpreting
  - LFTs, proteins and haematinics
- Some 'very confident' in requesting tests they are 'not confident' in interpreting.
- Unsure of effects of common problems like haemolysis on results.

# How helpful are thyroid function test comments? A survey of doctors and nurses (UK)

Barlow IM. *Ann Clin Biochem* 2008;45(1):88-90



Most general practitioners and nurses found that thyroid function test interpretative comments were helpful

# Questionnaire to junior doctors in our hospital on interpretative comments in lab reports

Do you find the interpretative comments  
attached to the following results in this hospital useful?

	Yes	No	Not noticed
Thyroid function tests	74%	17%	9%
Iron Studies	87%	13%	
Glucose tolerance tests	78%		22%
Synacthen test	78%		22%

# Can addition of interpretative comments to lab reports influence outcome?

Kilpatrick ES. *Ann Clin Biochem* 2004; 41: 227–229

- A study of TFT requests by GPs
  - for 8281 patients taking thyroxine.
- Under-replacement of thyroxine (defined as a raised TSH) was commented on in the biochemical report by the lab
- In the years following introduction of comments, the proportions of samples with a raised TSH were significantly reduced ( $P < 0.0001$ ).

**How?**

- Interpretation should be provided by an appropriately qualified person
- Comments more appropriate for GPs and junior doctors
  - but not always so - Ascertain user requirements
- Over-interpretation may be misleading
  - RCPA (UK) Chemical Pathology Guidelines

# **RCPATH (UK) guidelines for provision of interpretative comments on biochemical reports**

Comments might be appropriate when:

- a management / treatment decision is indicated by results
- a result is unexpected
- a specific question has been posed but it is not obvious whether the results provide the answer
- a clinician has requested a test with which they are unlikely to be familiar



# Possible components of an interpretative comment

- The absence or presence of an abnormality and its degree or severity
- Possible implications of abnormality
  - diagnosis, prognosis, change in status etc
- Suggested action/follow-up

## Pitfalls to be avoided

- Restating the obvious
- Commenting on reports to a doctor who does not want them
- Commenting on speciality reports to a specialist in the field
- Telling the clinician how to do his/her job
- Suggestion for invasive (non-laboratory) investigations

# Communication with clinicians

- To:
  - Agree on test protocols & diagnostic criteria
  - Get feedback about the comments
- Unusual and interesting results could be triggers for direct (verbal) communication and discussion

# Common TFT results

# Patient: 28-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Lethargy
- TFT s
  - TSH      0.67 mU/L      (0.50–4.0)
  - Free T4   16 pmol/L      (10–20)

# Patient: 28-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Lethargy
- TFT s
  - TSH      0.67 mU/L      (0.50–4.0)
  - Free T4   16 pmol/L      (10–20)
  - Comment:  
Normal T4 and TSH are consistent with an euthyroid state.

# Patient: 28-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Lethargy
- TFT s
  - TSH      0.67 mU/L      (0.50–4.0)

# Patient: 28-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Lethargy
- TFT s
  - TSH      0.67 mU/L      (0.50–4.0)
- Comment

Normal TSH is consistent with an euthyroid state.



# Patient: 28-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Lethargy
- TFT s
  - TSH 0.67 mU/L (0.50–4.0)
  - Free T4 8 pmol/L (10–20)

# Patient: 28-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Lethargy

- TFT s

- TSH      0.67 mU/L      (0.50–4.0)

- Free T4    8 pmol/L      (10–20)

- Comment

A mildly reduced FT4 with a normal TSH may be due to non-thyroidal illness or pituitary hypothyroidism.

# Patient: 57-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Weight gain
- TFT s
  - TSH      7.4 mU/L      (0.50–4.0)

# Patient: 57-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Weight gain

## ■ TFT s

■ TSH      7.4 mU/L      (0.50–4.0)

## ■ Comment

Mildly increased TSH may be found in patients with subclinical hypothyroidism or sick euthyroid syndrome.

Suggest measurement of FT4, TSH and TPO antibodies in 6 weeks.

# Patient: 57-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Weight gain
- TFT s
  - TSH 7.4 mU/L (0.50–4.0)
  - Free T4 13 pmol/L (10–20)

# Patient: 57-year-old female

- Patient Location: General Practice

- Clinical Notes on Request Form: Weight gain

- TFT s

- TSH      7.4 mU/L      (0.50–4.0)

- Free T4    13 pmol/L      (10–20)

- Comment

Mild increase in TSH with a normal fT4 may be found in patients with subclinical hypothyroidism or non-thyroidal illness.

# Patient: 77-year-old male

- Patient Location: General Practice
- Clinical Notes on Request Form: Routine check
- TFT s
  - TSH      4.5 mU/L      (0.50–4.0)
  - Free T4    15 pmol/L      (10–20)

# Patient: 77-year-old male

- Patient Location: General Practice
- Clinical Notes on Request Form: Routine check
- TFT s
  - TSH      4.5 mU/L      (0.50–4.0)
  - Free T4    15 pmol/L      (10–20)
  - Comment  
Mildly increased TSH with a normal fT4 can be seen in the euthyroid elderly



# Patient: 62-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Constipation
- TFT s
  - TSH 14.0 mU/L (0.50–4.0)
  - Free T4 11 pmol/L (10–20)

# Patient: 62-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Constipation
- TFT s
  - TSH      14.0 mU/L      (0.50–4.0)
  - Free T4   11 pmol/L      (10–20)
  - Comment  
A moderately increased TSH with a normal fT4 is consistent with (mild) primary hypothyroidism

# Patient: 24-year-old female

- Patient Location: Obstetric clinic

- Clinical Notes : POA 12/40

- TFT s

■ TSH	0.05 mU/L	(0.50–4.0)
■ Free T4	13 pmol/L	(10–20)

# Patient: 24-year-old female

- Patient Location: Obstetric clinic

- Clinical Notes : POA 12/40

- TFT s

- TSH 0.05 mU/L (0.50–4.0)
- Free T4 13 pmol/L (10–20)

- Comment

TSH reference intervals in pregnancy

1st trimester 0.02 – 2.5

2nd and 3rd trimester 0.30 – 3.0

# Patient: 31-year-old female

- Patient Location: General Practice

- Clinical Notes : Trying for a baby

- TFT s

■ TSH	4.6 mU/L	(0.50–4.0)
■ Free T4	13 pmol/L	(10–20)
■ TPO Antibodies	33 kU/L	(< 6 )

# Patient: 31-year-old female

- Patient Location: General Practice

- Clinical Notes : Trying for a baby

- TFT s

■ TSH	4.6 mU/L	(0.50–4.0)
■ Free T4	13 pmol/L	(10–20)
■ TPO Antibodies	33 kU/L	(< 6 )

- Comment

The mildly increased TSH and raised TPO antibodies indicate subclinical hypothyroidism due to autoimmune thyroid disease.

Suggest confirm subclinical hypothyroidism by repeat testing. Poor pregnancy outcomes have been described in women with a raised TSH.

If raised TSH confirmed, consider thyroxine replacement.

# Patient: 54-year-old male

- Patient Location: General Practice

- Clinical Notes : Feeling very tired

- TFT s

■ TSH	0.02 mU/L	(0.50–4.0)
■ Free T4	18 pmol/L	(10–20)

# Patient: 54-year-old male

- Patient Location: General Practice

- Clinical Notes : Feeling very tired

- TFT s

■ TSH	0.02 mU/L	(0.50–4.0)
■ Free T4	18 pmol/L	(10–20)

- Comment

The suppressed TSH and normal fT4 are consistent with subclinical hyperthyroidism.

Suggest measure fT3.



# Patient: 54-year-old male

- Patient Location: General Practice

- Clinical Notes : Hyperthyroid?

- TFT s

■ TSH	0.02 mU/L	(0.50–4.0)
■ Free T4	18 pmol/L	(10–20)
■ fT3	6.1 pmol/L	(3.0-5.5)

# Patient: 54-year-old male

- Patient Location: General Practice

- Clinical Notes : Hyperthyroid?

- TFT s

■ TSH	0.02 mU/L	(0.50–4.0)
■ Free T4	18 pmol/L	(10–20)
■ fT3	6.1 pmol/L	(3.0-5.5)

- Comment

The increased fT3 and suppressed TSH (with a normal fT4) are consistent with T3 toxicosis.

# Patient: 74-year-old male

- Patient Location: General Practice

- Clinical Notes : Hypothyroid?

- TFT s

■ TSH	59 mU/L	(0.50–4.0)
■ Free T4	<5 pmol/L	(10–20)

# Patient: 74-year-old male

- Patient Location: General Practice

- Clinical Notes : Hypothyroid?

- TFT s

■ TSH	59 mU/L	(0.50–4.0)
■ Free T4	<5 pmol/L	(10–20)

- Comment

The severely increased TSH with a very low fT4 is consistent with primary hypothyroidism

# Patient: 74-year-old male (Contd.)

- One week later
- Patient Location: General Practice
- Clinical Notes : Hypothyroid, started T4 replacement 1/52 ago
- TFT s
  - TSH                      40 mU/L                      (0.50–4.0)
  - Free T4                      8 pmol/L                      (10–20)

# Patient: 74-year-old male (Contd.)

- One week later
- Patient Location: General Practice
- Clinical Notes : Hypothyroid, started T4 replacement

- TFT s

■ TSH	40 mU/L	(0.50–4.0)
■ Free T4	8 pmol/L	(10–20)

- Comment

Suggest repeat TFT measurement at least 4-6 weeks after commencement of T4 replacement.

# Patient: 43-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: On T4 replacement
- TFT s
  - TSH 0.72 mU/L (0.50–4.0)
  - Free T4 16 pmol/L (10–20)

# Patient: 43-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: On T4 replacement
- TFT s
  - TSH      0.72 mU/L      (0.50–4.0)
  - Free T4   16 pmol/L      (10–20)
  - Comment:  
The normal TSH and fT4 are consistent with adequate thyroid hormone replacement.



# Patient: 54-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: On T4 replacement
- TFT s
  - TSH 5.6 mU/L (0.50–4.0)
  - Free T4 12 pmol/L (10–20)

# Patient: 54-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: On T4 replacement

- TFT s

- TSH      5.6 mU/L      (0.50–4.0)

- Free T4   12 pmol/L      (10–20)

- Comment

Increased TSH suggests inadequate thyroid hormone replacement if the dose has not been changed for at least 6 weeks and patient has been taking the medication regularly.

Suggest review dose and repeat TFTs in in 6 weeks.

# Patient: 61-year-old male

- Patient Location: General Practice
- Clinical Notes on Request Form: On T4 replacement
- TFT s
  - TSH 0.02 mU/L (0.50–4.0)
  - Free T4 19 pmol/L (10–20)

# Patient: 61-year-old male

- Patient Location: General Practice
- Clinical Notes on Request Form: On T4 replacement
- TFT s
  - TSH      0.02 mU/L      (0.50–4.0)
  - Free T4   19 pmol/L      (10–20)
  - Comment: Suppressed TSH is consistent with excessive thyroid hormone replacement.

# Patient: 51-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Previous total thyroidectomy for thyroid cancer. On thyroxine.
- TFT s
  - TSH      0.02 mU/L      (0.50–4.0)
  - Free T4   19 pmol/L      (10–20)

# Patient: 51-year-old female

- Patient Location: General Practice
- Clinical Notes on Request Form: Previous total thyroidectomy for thyroid cancer. On thyroxine.
- TFT s
  - TSH      0.02 mU/L      (0.50–4.0)
  - Free T4   19 pmol/L      (10–20)
  - Comment:  
Previous history of thyroid Ca noted. Low TSH may be appropriate depending on treatment targets for this patient.

# Patient: 55-year-old female

- Patient Location: General Practice
- Clinical Notes : Subclinical hypothyroidism, follow-up
- TFT s
  - TSH        3.6 mU/L        (0.50–4.0)
  - Free T4    12 pmol/L        (10–20)
- Previous Results 6 months ago:
  - TSH        4.3 mU/L        (0.50–4.0)
  - Free T4    13 pmol/L        (10–20)

# Patient: 55-year-old female

- Patient Location: General Practice
- Clinical Notes : Subclinical hypothyroidism, follow-up
- TFT s
  - TSH        3.6 mU/L        (0.50–4.0)
  - Free T4    12 pmol/L       (10–20)
- Previous Results 6 months ago:
  - TSH        4.3 mU/L        (0.50–4.0)
  - Free T4    13 pmol/L       (10–20)
  - Comment  
Borderline TSH persists.  
Suggest repeat in one year with thyroid autoantibodies (TPO antibodies).



# Summary

- Most clinicians welcome appropriately applied interpretative comments on Clinical Chemistry reports
- TFT report comments may improve patient outcomes
- Pathologists and Clinical Scientists have a duty to add value to reports where appropriate, including through interpretative comments
- Go for it!

Thank you

**QUESTIONS**