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Clinical Reasoning: the nuts and bolts

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• 3rd CReME Conference, York 2019
Biases are Heuristics

• Representativeness
• Confirmatory bias
• Availability bias
• Anchoring

Premature closure
Metacognition

“The process by which we reflect upon, and have the option of regulating, what we are thinking”

The Cognitive Imperative: Thinking about How We Think

Croskerry 2000 Academic Emergency Medicine
Cognitive de-biasing

• Using metacognition effectively
A theory of decision making: The Dual Process Diagram
Pattern Recognition

Pattern Processor

Patient Presentation

RECOGNIZED

TYPE 1 processes

Pattern Recognition

Rational override

Dysrationalia override

CALIBRATION

Decision

NOT RECOGNIZED

TYPE 2 processes

Intellectual Ability

Education

Training

Critical thinking

Logical competence

Rationality

Feedback

Context

Ambient conditions

Task difficulty

Task ambiguity

Mood and physical state

TYPE 1 processes

TYPE 2 processes
Cognitive Continuum Theory...

Intuition

‘Quasi-rationality’ [heuristics]

analysis

- Custers EJFM Acad Med.2013;88:1074-1080
What is clinical reasoning?
The GMC

(Clinical reasoning is) the cognitive process that is necessary to evaluate and manage a patient's medical problem.
Clinical reasoning includes gathering, interpreting, and synthesizing information, generating hypotheses and diagnoses, developing management and treatment plans, avoiding cognitive errors, and ensuring patient safety.
What do we need to be able to make clinical decisions?
The Building Blocks – knowledge and experience

Expert

Exemplars

Illness Scripts

Novice

Basic Mechanisms of Disease
Half of what you'll learn in medical school will be shown to be either dead wrong or out of date within five years of your graduation; the trouble is that nobody can tell you which half...

David Sackett ‘the father of evidence based medicine’.

806,000 medical papers are published each year

https://www.quora.com/How-many-medical-papers-are-published-each-year#

Many people seek to make money from those who don’t understand science. Doctors should call out bollocksology when they see it.

Margaret McCartney

https://www.bmj.com/content/bmj/362/bmj.k3745.full.pdf
How do you make diagnoses?
Opening statement

Pre-diagnostic interpretation
(is it acute/chronic/emergency, what system is it?)

Further questions with reference back to pre-diagnostic interpretation leading to new information

Diagnostic Hypothesis
Murtagh’s Diagnostic Strategy:
What is the most likely diagnosis for this patient?
What can be excluded?
What MUST be excluded even if not very likely?

Search for specific features (more history, examination, investigations)

DIAGNOSIS
Context, prior information


Opening statement

I’ve had a cough for a few weeks.

Pre-diagnostic interpretation

May be serious. Likely to be respiratory system. Could be cancer, could be infection.

Further questions

Started 6 weeks ago. Dry at start but now yellowish phlegm, occasional flecks of red blood. Short of breath. Weight loss half a stone, poor appetite, gone off cigarettes (not smoked any for a fortnight). Previously 15 a day for 40 years.

Diagnostic hypothesis (what is most likely for this patient, what can safely be excluded, what must be excluded?)

Most likely diagnosis: lung cancer
must exclude: infection (TB?)

Search for specific features (more history, examination, investigations)

Examination: apyrexial. No focal signs in chest.

Diagnosis

Lung Cancer
Hypothesis driven examination

• Patient’s narrative – forming diagnostic hypotheses
• Open and closed questions – testing hypotheses
• Search for physical findings – ‘focused’ or selective examination driven by diagnostic hypotheses
• Knowledge of probability (likelihood ratios)
Learning and teaching Clinical Reasoning
Ericsson 1990

• 10,000 hours to become an expert
• Sustained deliberate practice
• ‘Perfectly accurate feedback’
Deliberate practice ...with feedback
Ericsson 1990

Reflection:

• Self explanation using causal pathophysiology
• Free – no input from tutor
• Cued – some guidance from tutor
• Modelled – case ‘worked out’ with commentary from an expert
Cognitive Load Theory
Sweller 1998
Schema and illness scripts

- Chest pain
- Central
- Exertional
- Crushing
- Left arm and jaw
- Sweaty
- Breathless
- Nausea
- Low blood pressure

MYOCARDIAL INFARCTION
Three stage model of human memory (Atkinson-Shriffin)

- **Sensory Memory**
  - Sounds
  - Images
  - Touch
  - Smell
  - [Emotion]

- **Working Memory**

- **Long Term Memory**
  - Schema formation
  - Encoding, Storage
  - Retrieval

**Cognitive load**
Graded approach

• Acquire relevant knowledge
• Use self-explanation
• Develop illness scripts
• Compare and contrast ‘adjacent conditions’
• Use whole cases with novices
• Use serial cueing with more experienced learners
How to learn clinical reasoning...

- Learn and maintain knowledge of ‘basic sciences’
- Effective information gathering
- Critical appraisal skills
- Develop bank of illness scripts
- Gather exemplars
- See lots of patients
- Use metacognition: explain things to yourself
- Compare and contrast things
- Keep asking why
- Critically appraise all information
- Make sure you are using the right type of thinking
- Refer back to prior learning