Disclosure Information

I hereby declare that I have had business or personal interests in the following industrial enterprises since 1 September 2016:

Name of the enterprise / Nature of the interest

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<tr>
<th>Enterprise</th>
<th>Interest</th>
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Errare human est......

We all make mistakes....

Those who think they never make mistakes....

......are erroneous......
Diagnostic “errors” are very prevalent:
- 15% -

Diagnostic errors are encountered in every specialty, and are generally lowest for the 2 perceptual specialties, radiology and pathology, which are by nature reflective.

“The error rates in clinical radiology and anatomic pathology probably range from 2% to 5%,…”

How many cases do you sign out / year…….?
Why do well-trained professionals who keep their knowledge up to date and who want the best for their patients make such mistakes, while thinking they do the right thing?

Lack of knowledge?
This has to do with **the way we think**

- Clinical reasoning
- Medical decision making

This process of thinking is disturbed by a range of phenomena collectively called: “cognitive bias”
Knowledge versus cognitive bias


Reply: Croskerry, Patel, Bergl Acad Med 92(8):1064, 2017

Reply: Norman Acad Med 92(8):1065, 2017

Should we train our residents in knowledge acquisition or avoidance of bias?
case history

Male, 17 yr,

- general malaise for several weeks, tired, subfebrile temperature, night sweats.
- noticed a lump in the neck.

At physical examination the GP finds a 3 cm lymph node in the neck.

Suspecting a lymphoma the GP immediately refers the patient to a professor in hemato-

(Google: “specialized in the treatment of leukemia and lymph node cancer”)

The hematologist asks for an excisional biopsy
lymph node biopsy

CD30
This boy has infectious mononucleosis...

All’s well that ends well?

If you ignore the considerable stress and the scar in his neck......
What is the fallacy in the clinical reasoning?
- a lack of knowledge?

Availability bias

The hematologist sees Hodgkin cases every day.

Mononucleosis never!

Norman G. et al Acad Med 2014; 89:277-84
Cognitive bias
(See: wikipedia)

» Hindsight bias, outcome bias.

» **Premature closure**: the tendency to stop considering other possibilities after reaching a diagnosis. Also: “search satisficing”.

» **Confirmation bias**: the tendency to seek data to confirm, not refute, the diagnosis.
The science of decision making is real science

Daniel Kahneman
Nobel prize Economy 2002

economy, politics, law
aviation……however……

The science of medical decision making is still in its infancy……

Pat Croskerry: Our better angels and black boxes.
Thinking about thinking is an ethical imperative
Clinical reasoning in the ideal world

Observation # 1
Observation # 2
Observation # 3
Observation # 4
Observation # 5
Observation # 6

Think

diagnosis

Dream on……
Clinical reasoning in the real world

Observation #1

Observation #2

Primary diagnosis

Observations may change under the influence of the primary diagnosis
Two views on pathology

- **The stamp collection**  
  - Pathology consists of a collection of diseases: “stamps”
  - Making the diagnosis relies on the recognition of “the stamp”.

- **The “flora”**
  - Disease entities are based on pathogenetische parameters
  - Building up from these parameters you can “determine” a disease

The dual process theory of decision making
System I
-intuitive-

- Advantages: fast, reflexive, pattern recognition, requiring minimal cognitive resources. For the expert.

- Disadvantages: relies on experience; sensitive to premature closure, confirmation bias and overconfidence; unreliable, unscientific

“Spot diagnosis: impressive but unsafe”

Croskerry et al. Deciding about fast and slow decisions. Acad Med 2014;89:285-91
System II
- analytical -

• Advantages: deliberate, accurate and reliable, scientific; avoiding many types of bias.

• Disadvantages: slow, demands more conscious effort. Still bias vulnerable. For the novice?

..the tendency to default to a state that consumes fewer cognitive resources… (Croskerry)
System I vs. System II

- System I is not necessarily bad
  - in fact most of our work is done in System I
  - System I mostly serves us well
  - System I is sometimes catastrophic

- System II is not always right
  - System II is vulnerable to bias too

Only when System I gets stuck in a cognitive minefield, you have to call in help from System II
How to avoid diagnostic error?

Problem:
You are not **aware** that you are about to commit an error

You have to be aware that your system I is clouded by a form of cognitive bias and you have to call in help from system II

**It is all about awareness!!**
How to avoid diagnostic error?

- experience, knowledge
- feedback; at least learn from your errors
- **actively** fight your bias
- recognize **overconfidence**
- “think twice”
- “debiasing” or “metacognition”

Cognitive interventions to reduce diagnostic error: a narrative review

Mark L Graber,1,2,3 Stephanie Kissam,4 Vejma L Payne,4,5 Ashley N D Meyer,6,7 Asta Sorensen,5 Nancy Lenfestey,1 Elizabeth Tant,5 Kern Henrichsen,8 Kenneth LaBresh,9 Hardeep Singh1,6,7

ABSTRACT

Background: Errors in clinical reasoning cases in which the diagnosis is mistimed. The goal of this review was to identify interventions that might reduce the diagnostic errors.

Design: We searched PubMed and non-medical databases and identified literature through references in journals and suggestions from subject matter experts. We included if they either suggested intervention or formally evaluated them if they focused solely on diagnostic tests or provider satisfaction.

Results: We identified 141 articles of reporting tested interventions to reduce diagnostic errors. 100 containing one article with both suggested and interventions. Articles were classified in categories: (1) Interventions to improve cognitive processes; (2) Interventions to improve decision-making skills, such as and active metacognitive review; and (3) that provide cognitive ‘help’ that helps electronic and integrated decision-making aids for decision-making.

Conclusions: In a wide range of diagnostic errors, not all the suggestions have been tested in actual practice. Future work will require methodological refinement of the range of diagnostic errors.1

INTRODUCTION

Although the rate of diagnostic error is unknown, experts estimate it ranges from 5% to 15%.1

NARRATIVE REVIEW

Cognitive debiasing 1: origins of bias and theory of debiasing

Pat Croskerry,1 Geeta Singhal,2 Silvia Mamede3

ABSTRACT

Numerous studies found failure to consider the decision maker when debiasing psychological processes influencing the decision maker in the process.

Process. Theory general process to diagnostic error in cognitive and decision-making.

Cognitive debiasing 2: impediments to and strategies for change

Pat Croskerry,1 Geeta Singhal,1 Silvia Mamede3

ABSTRACT

In this companion paper, we proposed that cognitive debiasing is a skill essential to developing sound clinical reasoning to mitigate the incidence of diagnostic failure. We reviewed the origins of cognitive biases and the proposed mechanisms for how debiasing processes might work. In this paper, we first outline a general schema of how cognitive change occurs in the brain and the constraints that may apply. We review a variety of individual factors, many of them bias themselves, which may be impediments to change. We then examine the major strategies that have been developed in the social sciences and in medicine to achieve cognitive and affective debiasing, including the important concept of forcing functions. The abundance and rich variety of approaches that exist in the literature and in individual clinical domains illustrate the difficulties inherent in achieving cognitive change, and the need for such interventions. Ongoing cognitive debiasing is arguably the most important feature of the critical thinker and the well-calibrated mind. We outline three groups of suggested debiasing and then review multiple strategies to address them.

Over the years, various strategies have been adopted to deal with shortcomings and failures in decision making. As early as 1772, Ben Johnson outlined a "moral algebra" to improve his judgements and avoid rash decisions.2 Proverbs, aphorisms, maxims, mementos, lists and many other strategies have emerged that serve a similar purpose. Investigations on their effectiveness have not been so frequent and, presently, cognitive debiasing is an inexact science. Here, we offer a variety of strategies from both behavioral sciences and medicine that have been developed in recent years, which vary from experimental studies to simple observations to opinions, with varying levels of evidentiary support. Our purpose has been to develop an inclusive collection of strategies in a framework for learners, researchers and educators that will provide a practical scaffold for the work ahead.
Debiasing

» make it a system
» force yourself (“cognitive forcing”)
» focus on the observation that deviates the most from your diagnosis
» “consider the opposite”
» don’t think: “what is this?” but rather “what can I exclude?”
» recognize the traps and develop your own rules:
  » like: “it can always be a melanoma”
  » or: “it can be a complex sclerosing lesion”
Never ignore your gut feeling.........

Gut Feelings as a Third Track in General Practitioners’Diagnostic Reasoning

Erik Stolper, GP, PhD¹, Margje Van de Wiel, PhD², Paul Van Royen, GP, PhD³,
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J Gen Intern Med 26(2):197–203, 2010