To Think Is Good:
Querying an Initial Hypothesis Reduces Diagnostic Error in Medical Students

Reference:

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PubMed URL

Tags

Clinical domain
Medical Expert

Educational domain
Curriculum

Background
Diagnostic error is an area of growing attention for clinicians and educators. Current psychology theories suggest that there are two processing systems (System 1: unconscious, non-analytic, rapid, “error prone”; and System 2: conscious, analytical, slow, methodical). Experimental evidence suggests that the development of system 1 thinking is a mark of expertise. As educators, how do we promote diagnostic automaticity (i.e. System 1 thinking), yet protect our patients and our learners from diagnostic biases (i.e. cognitive errors) that seem related to this system of thinking?

Purpose
To determine if querying an initial hypothesis improved the accuracy of diagnosis in first year medical students.

Type of paper
- Research: prospective, randomized, cross-over

Key Points on the Methods
67 medical students were randomized to one of 2 groups and were tested using four common clinical presentations that the students had previously encountered in their first year courses: chest pain, jaundice/abnormal liver enzymes, dyspnea, and anemia.

For each case, there was a single set of “primary data” and two versions of the “secondary” dataset: one concordant and one discordant. In concordant cases, the primary and secondary data supported the same diagnosis, so the initial diagnostic hypothesis and final diagnosis should be the same. Conversely, the primary and secondary data supported different diagnoses in discordant cases, and for each of these the secondary data supported the correct final diagnosis.

Group 1 would receive the concordant secondary data for the first case, while Group 2 would receive the discordant data. Both groups were tested in the same order for all 8 of the cases (4 primary cases with a concordant + a discordant secondary data version)

**Key Outcomes**

For concordant cases, students retained 84.2% of their initial diagnoses and were equally likely to move toward a correct as incorrect final diagnosis (6.9% versus 8.9%, \( P = .3 \)); no difference existed in the accuracy of initial and final diagnoses: 85.9% versus 84.0% (\( P = .4 \)). By contrast, for discordant cases, students retained only 23.3% of initial diagnoses, change was almost invariably from incorrect to correct (76.3% versus 0.4%, \( P = .001 \)), and final diagnoses were more accurate than initial diagnoses: 80.7% versus 4.8% (\( P = .001 \)). Overall, no difference existed in the accuracy of final diagnoses for concordant and discordant cases (\( P = .18 \)).

**Key Conclusions**

*The authors conclude*...

The authors suggest that within an artificial testing environment quering a “correct” diagnosis does not “harm” (i.e. lead to incorrectly changing) the diagnosis, while quering an “incorrect” diagnosis facilitates the development of a correct diagnosis.

The design of this study may have some important limitations. Setting aside the fact that a first year medical student has limited (if any) expertise (and hence limited System 1 reasoning), this may be simply a study of the epidemiology of disease burden for common differential diagnoses. The sample case they provide of a middle-age man with ulcerative colitis, itching and abnormal enzymes (initial data required to make "diagnosis") has lab values more suggestive of sclerosing cholangitis in the concordant secondary data and more suggestive of viral hepatitis in the discordant secondary data set. Minimal other differences are provided in (this example) secondary data.

The design of the study (use of novices, no impetus to involve system 1 – speeded thinking, the repeated use of the same primary data for 50% of the cases) may not force the activation of system 2 as a check on system 1. Rather, this study demonstrates that as more information is provided to the clinician the probability of various diagnoses in the differential changes.
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