

them, or on the failure to match the appropriate reasoning strategy to the task at hand.

The article concentrates on diagnostic errors and the role of heuristic biases in causes of mistakes

Clearly a diligent, comprehensive, detailed but readable analysis of the literature surrounding diagnostic and management errors and clinical reasoning is still a goal worth aiming for, but Norman and Eva³ have made an impressive

start. This is not an 'all or none' situation; diagnostic reasoning is only one part of the equation. What the clinician does with the information in terms of management, including making a personal recognition of the possibility of error and ensuring the presence of adequate safety netting in case of error, is almost as important. There has been a great deal of research undertaken in the area and an objective analysis of the whole might be considerably more informative than a sum of its parts, albeit that it requires devilish perseverance.

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The power of feedback

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Feedback can have a very powerful effect on learning. In a review of the general education literature, Hattie and Timperley¹ reported a synthesis of over 500 meta-analyses involving hundreds of thousands of studies and effect sizes, and millions of students. Over 100 factors that might influence achievement were cited, including attributes of the schools, students, teachers and curricula. The average effect size was 0.40 (achievement improved 40% of a standard deviation), but the effect size for feedback was 0.79, which, at about twice the average effect size, ranks feedback among the top influences.

Feedback can have a very powerful effect on learning

Veloski *et al.*² reviewed the literature on the effect of feedback in medical education. Of the studies that met their criteria for inclusion, 74% demonstrated that feedback alone had a positive influence on doctor performance. Feedback combined with another intervention (e.g. reminders, practice guidelines) was similarly effective (77% of studies). A Cochrane review of feedback in the context of continuing medical education produced similar results, but, by contrast with results in general education, the effect sizes were usually small.³

For feedback to occur in the setting of clinical education, performance must be observed in some fashion. Unfortunately, this happens infrequently, if at all. In a study of medical students, Kassebaun and Eagen found that structured

observation during clerkships was carried out for only 7–23% of students.⁴ Similarly, Kogan and Hauer⁵ found that only 28% of internal medicine clerkships had a formative assessment strategy. Things are no better at postgraduate level. Day *et al.*⁶ found that 82% of first-year internal medicine trainees were observed only once in a clinical encounter and Isaacson *et al.*⁷ found that 80% of residents were observed never or infrequently.

For feedback to occur in the setting of clinical education, performance must be observed

The recent interest in workplace-based formative assessment is one step in encouraging observation.⁸ For example, properly completed, the Foundation Programme in the UK requires multiple observations by multiple faculty members in a variety of clinical settings.⁹ Even more important than the

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assessment information that derives from this process is the feedback, which can increase learning.

In their review, Hattie and Timperley also reported that, despite the magnitude of the average effect size, there was considerable variability in the studies reviewed. This implies that some types of feedback are more effective than others.¹ Consequently, Hattie and Timperley also reviewed the evidence related to the focus of feedback, which influences its effectiveness. Feedback can be about a particular task, the process used in accomplishing the task, self-regulation, or about the person him- or herself. These categories are not mutually exclusive and feedback that focuses on the first three is differentially beneficial depending on the nature of the trainee and his or her performance. Feedback at the level of the self (e.g. praise) is rarely effective.

The focus of feedback influences its effectiveness

In the context of these developments, Archer reviews the literature on effective feedback from the perspective of the health professions.¹⁰ He examines the literature pertaining to the types of feedback

and approaches that may enhance the learning of trainees. Importantly, he also highlights the recent work of others who suggest that it is critical to create a culture of feedback that takes advantage of the multiple opportunities for learning and that includes the trainee as an active participant in the feedback process.

Some types of feedback are more effective than others

Initiatives that intend to increase the amount of feedback and change the culture will face two very practical impediments. Firstly, faculty participation is a significant limiting factor and it is essential to reward busy clinicians in a manner that recognises their commitment to a culture of feedback and protects some of their time to engage in it. Secondly, a large faculty development effort is needed to ensure that the feedback process optimises learning and the quality of patient care. As the scientific work progresses, it will be essential to address these practical problems too.

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