



## Cognitive Diagnostic Errors

During an overseas flight I had the pleasure to read the book *How Doctors Think* by Jerome Groopman.<sup>1</sup> In this book, the author explores clinical decision-making with a particular emphasis on cognitive errors that often lead to misdiagnosis and inappropriate treatment. This book, and the numerous case reports submitted for publication to the journal pointing to diagnostic mistakes, inspired this editorial. Indeed, the case reports almost invariably describe patients with a wrong initial diagnosis of temporomandibular disorders (TMD) that is questioned and reconsidered only after several treatment failures.

Diagnostic mistakes typically involve system-related and cognitive factors.<sup>2</sup> The latter may be caused by inadequate knowledge (knowledge gap), faulty data gathering, inaccurate clinical reasoning, and erroneous verification of diagnostic hypotheses.<sup>2</sup> Thus, cognitive errors may involve faulty thought processes and subconscious bias,<sup>3</sup> and are intrinsic to the pitfalls of using heuristic approaches, eg, experience-based reasoning shortcuts, unconsciously used by clinicians to arrive at a quick diagnosis.

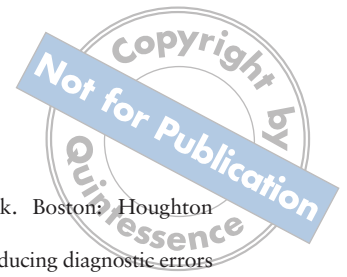
In medicine, diagnostic mistakes are more often caused by cognitive errors than knowledge gaps. However, it is evident from reading the case reports that knowledge gaps contribute in a number of cases to the diagnostic errors made when evaluating patients with orofacial pain. This is not surprising given the large number of pathologies and disorders leading to orofacial pain and the lack of a medical education of the vast majority of dentists.

In the following I am highlighting those cognitive errors I consider most likely to occur due to the nature of orofacial pain and the limited training of dental practitioners in making a differential diagnosis. These are anchoring, availability bias, premature closure, confirmation bias, and framing effect (for a full list see Croskerry,<sup>4</sup> Nendaz and Perrier,<sup>5</sup> and Stiegler et al<sup>3</sup>). Anchoring refers to the tendency to hang on to the first diagnosis and failing to consider the full spectrum of differential diagnoses, and availability bias refers to considering a diagnosis more likely because it readily comes to mind. Premature closure is the propensity to accept prematurely a diagnosis without considering other possible causes, and confirmation bias refers to interpreting clinical findings only to support the first diagnostic hypothesis without looking for, or even disregarding, disconfirming evidence. Framing effect refers to the fact that ensuing thinking is influenced by leading

aspects of the initial presentation. Because TMD is the most frequent cause of chronic orofacial pain, it is most often seen by dentists. Therefore, it is easy for dentists to consider this diagnosis more likely than other ones because it readily comes to mind (anchoring and availability biases). Moreover, the presence in the clinical examination of the “classical” signs of TMD is often considered sufficient to confirm the diagnosis of TMD (confirmation bias). This, in turn, often prevents widening the differential diagnosis (premature closure).

The International Research Diagnostic Criteria for TMD Consortium Network and Orofacial Pain Special Interest Group of the International Association for the Study of Pain worked together to improve the validity of the diagnostic criteria for the most common TMD, and they now include criteria for modification of pain by function, movement, or parafunction, and for replication of the patient’s pain complaint by provocation tests (familiar pain).<sup>6</sup> The new criteria have increased sensitivity and specificity. The clinician must, however, acknowledge that this may lead to increasing the risk of a confirmation bias. Thus, it is necessary during the diagnostic process to keep in mind that the presence of “familiar pain” during jaw movement or palpation of the associated structures is not associated exclusively with a myalgia, a myofascial pain with referral, or an arthralgia, as it is also present with other diseases or disorders affecting these structures, such as a temporomandibular joint inflammation, a myositis, and a metabolic muscle disease. In order for the criterion to warrant a diagnosis, the signs must explain the symptoms (signs plausibility vs confirmation bias) and the history, or additional assessment, must effectively rule out other competing diagnoses.<sup>7</sup>

Different strategies have been proposed to decrease the likelihood of cognitive errors. A thorough history, the foundation of a reliable diagnosis, must be initiated keeping in mind all diseases and disorders that can elicit orofacial pain. These will be ruled in or out during the history-taking process. This approach reduces the likelihood of making a premature closure error and avoids anchoring and availability biases. Other strategies imply debiasing and metacognition. The latter refers to the analysis of one’s own thinking, eg, the process by which the clinician reflects upon, and has the option of regulating, what he/she is thinking.<sup>8</sup> Thus, during the diagnostic process the clinician should systematically ask himself/herself questions that force him/her to explore



other diagnostic possibilities (reflective thinking or reasoning): Are all the patient's findings accounted for by my working diagnosis? Do my working diagnosis and/or the clinical signs explain the patient's symptoms (plausibility)? Which alternative diagnoses should be considered? In addition, the clinician should list the findings that either support or do not support his/her working diagnosis and rank the different working hypotheses in order of likelihood.<sup>9,10</sup>

It will always be impossible to rule out diagnostic errors. However, to reduce their likelihood, the astute clinician must engage in reflective thinking when diagnosing an orofacial pain patient. In particular, he/she must reconsider the correctness of his/her diagnosis and not of the therapy, in case this fails within a reasonable time period of a maximum of 2 to 3 months.

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## References

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