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The role of patient involvement in the diagnostic process in internal medicine: A cognitive approach

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ABSTRACT

Much cognitive and clinical research has addressed clinical reasoning, pointing out that physicians often have difficulties in following a linear course when making accurate diagnoses. Some authors suspect that physicians make mistakes because they unknowingly fail to observe the laws of formal logic and that their reasoning becomes influenced by contextual factors.

In this paper, we introduce some basic principles of the cognitive approach to medical decision making and we describe the cognitive balanced model. Then we discuss the relationship between construction of mental models, cognitive biases and patient involvement by the use of a clinical vignette.

Medical decisions may be considered fundamentally biased since the use of judgment heuristics and a combination of cognitive-related and system-related factors limit physicians' rationality.

While traditional understanding of clinical reasoning has failed to consider contextual factors, most techniques designed to avoid biases seem to fail in promoting sound and safer medical practice. In particular, we argue that an unbiased process requires the use of a cognitive balanced model, in which analytical and intuitive mind skills should be properly integrated.

In order to improve medical decision making and thereby lessen incidence of adverse events, it is fundamental to include the patient perspective in a balanced model. Physicians and patients should improve their collective intelligence by sharing mental models within a framework of distributed intelligence.

1. Introduction

The diagnostic process is probably the most relevant component in medical decision making from a cognitive point of view. In fact, physicians need to work like an information processor, which collects data from the environment, infers judgments and produces clinical scenarios. Much research has been devoted to this important topic but most is superficial, both when it succeeds and when it fails. Actually, diagnostic error accounts for a substantial portion of all medical errors, receiving increased attention in the last 30 years [1]. However, it is astonishing that the error rate seems to remain constant over time and space, as demonstrated in two studies (one in the US and one in Germany) which indicate how the error rate has not substantially changed over since 1980, remaining firmly anchored in both countries at a rate of around 10%, although alarmingly a recent systematic review reported a rate as high as 24% [2].

Generally speaking, most errors are reported to occur within the information analysis stage. Physicians declare failures or delays in identifying significant clues and in prioritizing clinical information. In this stage, physicians, as any other expert decision makers, need to gather data from the environment and to organize them onto a so called mental model. Indeed, the human mind works on well-structured data that may be represented and cognitively processed, in order to define a problem, highlights solutions and takes actions in a cognitive loop (see Fig. 1). Thus, all the incoming information needs to be weighted for relevance and tested for reliability before being integrated in a mental model [3].

The activation of a first mental model starts with the diagnostic process. In fact, using this mental structure based on schemes stored in the long-term memory, a physician may evaluate the consequences of each possible choice (diagnostic or therapeutic interventions), in order to plan future actions, choose scenarios, or even review the active mental model.

A number of studies have highlighted the complex nature of making medical decisions, which cannot be considered a cognitive exercise completely based on rational and technical skills [4,5]. In particular, cognitive research has shown that the clinical setting is influenced by heuristic processes, intuition and a number of biases, or cognitive illusions, that can lead a physician far from ideal clinical reasoning [6]. Recent studies showed that it is possible to understand and prevent errors in internal medicine starting by the recognition of the interaction between cognitive-related and system-related causes [7] and learning to detect early warnings [8].

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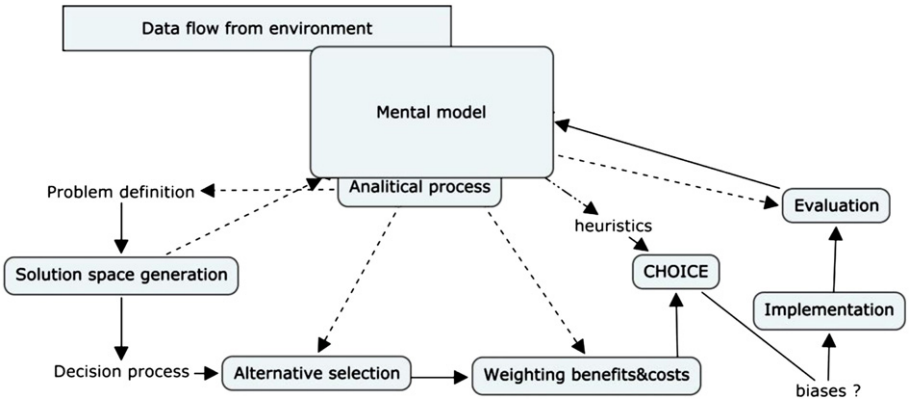

Fig. 1. A schematic representation of the decision making process. In particular, the scheme highlights the role of the mental model in guiding the cognitive course (analytical versus heuristic).

2. A cognitive balanced model

In previous work [9], we have defined a cognitive balanced model to describe how the clinical decision setting should be represented by a functional balance between analysis and intuition, that is, between the two basic components of the human mind [10]. The cognitive balanced model is based on the assumption that the use of concepts and logical reasoning should be developed in medical education along with specific training within the realm of intuitive skills. In particular, it emphasizes the importance of developing specific awareness about of the need for balance, since the lack of awareness will inevitably expose physicians and patients to clinical hazards. Indeed, an overconfidence in analytical skills or the underestimation of the importance of implicit thought will increase the likelihood of falling into cognitive traps [11], and failure to understand the origin of many errors.

Of course, the development of analytical skills and intuition follows different paths. To follow logical and analytical schemas it is necessary to learn general methods, specific concepts and techniques as well as how to apply them in certain domains.

Intuition, in contrast, is developed with experience, essentially during everyday activity and thus it is difficult to plan training specifically aimed at developing intuitive skills. However, it is possible to design education programs compatible with the needs of the intuitive mind. Generally speaking, a strong learning environment [12], characterized by consistency, regularity, timely feedback and meta-cognitive moments can be considered to be “pro-intuitive” [13].

Medical practitioners must learn to trust their intuition, but also to know its limits. In particular, intuition is much more powerful and reliable, when functioning within the specific context in which it was developed. Doctors' expert eye should not be transferred automatically from one medical context to another.

The cognitive balanced model highlights how these meta-skills should belong to the cognitive background of a doctor. Without this background, error prevention protocols and techniques to cut down biases will always be partial solutions [14]. The cognitive balanced model also implies that doctors should be properly supported in both their training, and in their clinical everyday practice by specific decision aids. However, also these support systems should be designed to balance the strength of analytical methods with the need for intuitive evaluation. In contrast, most existing support systems have a cognitive architecture mainly based on analytical algorithms and static knowledge structures such as decision trees and deterministic decision-making methods.

Furthermore, our perspective proposes use of general processes that can be analyzed as a whole, instead of addressing simple and elementary “mind bugs”. In particular, while agreeing with the literature data [15] we argue that there are two general conditions that often lead to an unbalanced decision-making process and to potential adverse events: overconfidence bias and premature closure.

Premature closure is the tendency to avoid considering other possibilities after reaching a diagnosis, while overconfidence bias is the tendency to overestimate one's judgment ability. Premature closure can lead to stopping the diagnostic process even before a favored diagnosis is actually confirmed by appropriate clinical examination. It should derive from a strong cognitive load which depends on several factors (personal, inter-personal and contextual) and is time-dependent. More specifically, premature closure may be the result of the combination of an individual's need for cognitive closure along with certain contextual factors. It is obvious that intuitive thinking is strongly associated with premature closure, even if specific training could teach physician both to trust in their intuition and to activate subsequent meta-cognitive control on it.

Also overconfidence is a consequence of a number of direct and indirect drivers, including age and experience. In particular, overconfidence bias seems to be particularly significant for expert doctors, since they have developed sound competences and confidence in them.

Interestingly, experienced physicians are as likely as novices to exhibit premature closure and indeed senior physicians may be particularly predisposed both to premature closure and overconfidence, probably because of the development of age-related cognitive constraints [16].

The special importance that overconfidence and premature closure seem to play in the diagnostic process probably lies in some basic mind processes. The overconfidence bias leads to the creation of a conservative mental model, ready to use, and the need for closure exerts pressure to confirm the same mental model in order to avoid cognitive and emotional overloading. A particular mental model, by itself, can also contain complex analytical processes and procedures, incorporating both intuitive and analytical knowledge. Nevertheless, a lack of awareness about decision making mechanisms may lead to the use of unbalanced models.

In order to avoid the cognitive pitfalls it would be desirable to implement an unbiased process in which incoming data are organized in a mental model that highlights essential information and leads to a safer diagnostic process.

However, we propose that a balanced process cannot really be effective within a clinical context if it is built in isolation from the context. The medical scenario includes different actors, in particular physicians and patients. To avoid errors and to strengthen the power of cognitive processes, mental structures should be shared and the related intelligence distributed.

3. Patient involvement and error prevention

Although progress has been made in a number of specific areas of prevention of errors, the patient's role in protecting and promoting his or her own safety has long been neglected.