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Review Article

The Good Physicians for Prospective Diagnosis: The Next Steps

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Abstract

Evidence-based medicine has enabled an individualized approach to medical decision-making and has become part of modern clinical practice. Health technologies are tools that can be used to prevent, diagnose, and treat diseases. Despite the technological progress, diagnostic problems persist. This work is a commentary on the work already done in predicting the appropriate physicians for the prospective of the right diagnosis and is a description of the challenges to be faced in the next work.

Keywords: diagnostic errors; evidence-based medicine; prediction models

Introduction

Missed and even delayed diagnoses have a huge impact on patients' health and even their lives. Diagnostic errors occur across the spectrum of health care, including hospital services, emergency departments, intensive care units, and ambulatory services; they occur in all specialties. Despite its importance, wrong, missed or delayed diagnoses is a poorly studied area of research. One of the reasons for the lack of studies on diagnostic errors is that they are complex to define, hard to detect, and study [3].

A diagnostic error can be defined as any error or failure in the diagnostic process leading to missed diagnosis or delayed diagnosis [2]. A medical diagnosis is one of the activities at the core of medical practice. Given the unpredictability and variability observed in diseases, there is a large number of possible diagnoses that can be considered, but only one is the right one. The fact that diagnoses are accurate most of the time is almost surprising given that diagnosis is a very uncertain and imperfectprocess [4].

Approaches to reduce diagnostic errors can be broken down into improvements at each phase of the diagnostic process, starting with the patient's entry into the healthcare system [6]. For example, diagnostic errors can be reduced by improving patient interview, physical examination, and clinical testing. Each of these phases requires different health care professionals, each of whom is an expert in a field. Thus, the accuracy of a medical diagnosis depends on clinical expertise, the reliability of evidence and the appropriate use of diagnostic tests.

However, diagnostic activity can take place within or outside a healthcare system and clinical examinations are sometimes limited. Medical diagnosis is therefore a mainly cognitive process that depends largely on the clinical reasoning of experts, and therefore depends on the health professionals perform diagnostic procedures. One way to reduce the risk of missed diagnosis is to choose the appropriate expertsat the appropriate time.

Evidence-based medicine or the current era of evidence-based health care requires an individualized approach to medical decision-making [7]. In various fields, including medicine, an appropriate prediction model can ensure better decision-making. A model that can predict which physician is appropriate in a given situation can reduce medical diagnostic errors.

2. Prospective of the right diagnosis

A complete and accurate diagnosis explains the physical manifestations, predicts the natural evolution and probable outcome, anticipates potential complications, and leads to suggested treatment options. A missed ordelayed diagnosis can result in reduced opportunities for intervention or change the natural course of the disease. A missed diagnosis can lead to ineffective or even dangerous actions that can complicate the disease.

The work done by Nfongourain et al. in Ref. [5] is a good basis for selectingthe qualified physicians who can diagnose a patient and thus reduce the risk of Diagnostic errors. In this work, based on the patient's profile a probabilistic model estimates the probability that a physician has of being able to diagnose a patient. An order can be established between physicians based on the calculated probabilities. Physicians with a higher probability are more likely to diagnose the patient than those with a low probability. This work assumes that medical competence is a simple or atomic concept. However, a physician's competence is complex. In clinical routine, a physician uses not only technical skills to effectively solve patients' problems but also human aspects.

According to Ibanez Gladys et al. in Ref. [1], whatever the point of view (patient, physician or trainer), a "good physician" must have several qualities that can be classified into *three* categories: medical skills, relational skills and human/ethical values. Without being exhaustive, Table (1) presents the competencies as well as the dimensions that can be considered for a physician in the prospective of the right diagnosis.

Category	Skills	Dimensions
1	Medical	Theoretical knowledge Experience Efficiency/Effectiveness
2	Relational	Communication with the patient Affordable
3	Human Value/ethics	Professionalism Empathy Ability to work in a team

Table 1: The Skills and Dimensions of a Physician that can be considered forProspective of Right Diagnosis.

Competence is not just a quality but a three-dimensional concept that includes *know*, *action*, *and being*. The future predictive models must take into account three aspects of competence: medical, relational, and ethical/human. Each of these aspects of physician competence may include several dimensions. Medical competence may vary according to several criteria. For example, the number of years of experience or the number of previously successful diagnoses may have an impact on the current diagnosis. Similarly, a lack of training can have an impact on the quality of medical diagnosis. The effectiveness of a physician who suggests the

relevance of his choices is an important dimension. The consideration of effectiveness and/or efficiency can be an asset in defining a physician's medical competencies. Relational and human skills are associated with human behaviour which is very dynamic. There is a strong interaction between behaviour and thinking and therefore behaviour could influence the physician's competence.

The solution to any patient's problem can be formulated asfollows:

Patient Problem *=f (Number Specialist, Patient Profile, Physician Competencies*

Patient Profile represents the patient's profile that provides a representation ofthe patient and their current health status and Physician Competencies represents the expert's skill set. By considering the relevant characteristics of the patient, the adequate competencies of the physicians, and the optimal number of specialists to be involved, any patient problem can be solved effectively. In some situations, it is difficult for a physician to make the right diagnosis for this type of case, it is desirable that the diagnosis be made by a team of heterogeneous physicians. As mentioned in Ref. [5], the group of specialists must be flexible, i.e., it should be possible to replace a physician with the best possible option based on availability. However, the number of specialists who can and, above all, must participate in the multidisciplinary diagnosis is not unlimited. Future work should focus on the optimal number of physicians and specialists to collaborate in solving the patient problem. This collaboration can only be effective if the selected physicians are willing to work together. This suggests that the collective behaviour of the selected physicians should be taken into account.

Conclusion

The explosion of open source data, advances in machine learning, and the consideration of human behavior are essential in future modeling in medicine. The ability to select the appropriate expert to work on a patient'sproblem can be an interesting way to reduce the risk of error in medicine. Predicting the appropriate physician is no guarantee that he or she will be able to solve the patient's problem. However, a multidisciplinary approach, integrating the technical and behavioural skills of physicians, can contribute to the development of predictive models that can help reduce diagnostic errors.

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