



Autopsy and Case Reports

E-ISSN: 2236-1960

autopsy.hu@gmail.com

Hospital Universitário da Universidade de  
São Paulo  
Brasil

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Autopsy and Case Reports, vol. 5, núm. 4, octubre-diciembre, 2015, pp. 1-4

Hospital Universitário da Universidade de São Paulo

São Paulo, Brasil

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## Operational contemporary diagnostic reasoning

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Mansur AJ. Operational contemporary diagnostic reasoning. [editorial]. Autopsy Case Rep [Internet]. 2015;5(4):1-4. <http://dx.doi.org/10.4322/acr.2015.031>

Diagnosis is a key step in medical practice and in the care of patients.<sup>1</sup> Over the decades, progress in diagnostic skills has been impressive either in the translation from complaints to their subcellular and molecular bases, or in the fast spread of new knowledge into practice due to better communication and sometimes instantaneous sharing of emerging concepts.

Medical and scientific technologies have been pillars of this progress. However, as with every powerful tool, recently there have been caveats to modulate their judicious use as well as their clinical implications.<sup>2-4</sup> Mutual inquiry<sup>1</sup> with colleagues in case discussions and in seminars with students and residents in the context of the current literature about the way this knowledge turns into practice are continuously stimulated. This experience is summarized in the following selected topics:

### TIME

Contemporary culture has become used to immediate and fast answers associated with worldwide computer processing. However, humans are humans, not silicon processors.<sup>1</sup> Time is a condition involved in most social and professional interactions, including listening and caring for patients. On the other hand, time-pressure issues are plenty for different reasons.

Complex data gathering, as it occurs in medical history, may not be properly dealt with when there

are time constraints—not to mention the human dimension of the clinical encounter. Patients' narratives provide the necessary and sometimes unique data necessary for medical diagnosis and therapeutic decisions. They also carry other dimensions of the human condition—suffering, fear, alarm, anxiety, apprehension, etc.—among the many needs involved in such interactions.

A recent study demonstrated an inverse relationship of patient satisfaction with computer use: patients in a clinical encounter with high computer use were less likely to rate care as excellent (12 of 25 [48%] vs. 16 of 19 [83%] patients;  $p = 0.04$ ).<sup>5</sup> The more time physicians spend interacting with the computer screen, the less time remains for eye contact with patients.<sup>6</sup> The full development of satisfactory and efficient communication with patients demands a critical minimum of time, which may not be excessive, but long enough to give more than just immediate answers.

The way patients are listened to (quality) and the dedicated time spent with them (quantity) are expected to be efficiently combined.<sup>7</sup> In a study, the time spent with hospitalized patients in medical visits by attending physicians was  $3 \pm 3$  minutes and by house officers  $3 \pm 2$  minutes.<sup>8</sup> Short encounters may leave patients thinking that the physician is not interested in their well-being.<sup>9</sup> The short time dedicated to consultations makes consultation bureaucratic without the critical time for proper human interaction and leads to the dissatisfaction of both the patient and the doctor.<sup>10</sup>

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## HEURISTICS

The process of diagnosis depends on data obtained in the sequence anamnesis, physical examination and, when clinically sound, additional testing. Sometimes, there may be a risk of shortcuts of this sequence:<sup>11</sup>

- a) to order tests and then make an interpretation of the patient on the basis of the results (not an interpretation of the results after examining the patient<sup>12</sup>);
- b) algorithmization of a complaint to the point where practitioners might be inclined to bypass anamnesis and try out an algorithm (or guideline, or protocol) that a patient would fit, before interpreting the whole clinical picture of the patient;
- c) to understand epidemiology or past medical history as a deterministic equation in such a way that before anamnesis and differential diagnosis of an individual patient, the possible diagnoses are predicted on the basis of presumed epidemiological characteristics without the full data of clinical examination. In this way, individual patients might be examined as a population;
- d) the axis clinical question-randomized trial-guideline has evolved to the point that often the discussion is not about the interpretation of the patients, but what a chosen guideline says, which is fashionable as a modern medievalism: the observation of empirical experience of clinical examination controlled by a rule that influences and limits the potential of careful attention to a clinical problem. In addition, maybe it would not be feasible to have guidelines for every clinical demand at the highest scientific level of evidence. We do not have sufficient data or prevalence statistics to justify or support certain guidelines;
- e) some diagnostic criteria developed for epidemiological studies have been incorporated in practice for the clinical diagnosis of individual patients and may not suffice.<sup>13</sup> One such difficulty is when the advertisement of the guideline is worked out as a checklist, because full application of the criteria requires previous clinical information;
- f) a new test is not necessarily better than the “old” one; the basic question of a new technology is what it adds to the already known scenario. Sometimes this question may be formulated during the busy, everyday practice.

## IMAGING

Imaging techniques have become a cornerstone of modern medical practice recognized as “image intensive practice style”.<sup>12</sup> We are fortunate to have these resources. However, according to some

experiences, quite often specialized tests are ordered to replace good clinical examination, compounding the ever-increasing cost of medical care.<sup>14</sup> Sometimes imaging examinations may be requested by the patients on the basis of non-professional information.<sup>3</sup> Recently, a health policy statement by 15 medical societies, including imaging specialists, emphasized that tests should not be ordered before clinical examination of the patients.<sup>12</sup> Personal views stressed the commonplace experience of anxiety associated with some findings in imaging examinations.<sup>15</sup>

## TESTING

Testing has become so common in practice to the point of becoming excessively used. Some organizations (e.g. the American Board of Internal Medicine) are involved in promoting avoidance of what might be unnecessary tests or testing before clinical data that give support to the ordering of a test.<sup>16</sup> One recent suggestion was not to include laboratory tests in asymptomatic patients submitted for check-up; instead, the examination should emphasize medical history and social situation.<sup>17</sup>

In addition to economic costs and time wasting by patients submitted to unnecessary testing, there may be other consequences.

Jargon that is frequently used in medical reports may make patients worried about their meaning when they read it. Many patients go to the internet and become more anxious about their condition.<sup>15</sup>

Other effects are related to comments about the findings of the examination being performed made by the operator during the procedure (mainly when the operator is a physician)<sup>18</sup>; such comments on the clinical interpretation or clinical implications of the findings without knowing the details of the clinical picture may be stimulated by the questions of the patients. However, even when the patient has not requested any information, the operator may sometimes make comments during the examination. Patients can often become anxious after such comments.

In addition to the costs of a specific test, the effects associated with downstream testing were reported, such as further testing or invasive procedures. Interestingly, in exercise treadmill testing, symptoms, when present, were more important than the results of the testing; inconclusive results were the reason for further testing in 63% of the patients.<sup>19</sup>

Some tests were listed as “not reflecting high quality care.” A test should not be performed if there is a low pre-test probability of disease, if the result will not change the management of the condition, and if there is a risk of downstream costs of new tests.<sup>20</sup>

Recently, the increase in exposure to radiation of some tests (computed tomography, magnetic resonance imaging, nuclear medicine, and positron emission tomography) has been recognized.<sup>21</sup> One study suggested that exposure to a high level of low-dose ionizing radiation from cardiac imaging and procedures after myocardial infarction was associated with an increased risk of cancer.<sup>22</sup>

## DEFENSIVE MEDICINE

Medical care provided to patients solely to reduce the threat of malpractice liability rather than diagnostic accuracy includes excessive testing. Recent reports suggest that more resources spent on testing were associated with a decrease in malpractice claims.<sup>23</sup>

## REDUCTIONISM

The progress of medicine has developed many new fields of research, diagnosis, and therapy. The enormous amount of knowledge and information available make it impossible to master every medical field. As a consequence, professionals fix limits for their practice. However, there is the risk of the delimitation becoming so strict that the broad medical view of the clinical encounter may be hindered and restricted only to a single or a few aspects of the whole clinical picture, which may not be representative of the patient.

In conclusion, medical practice in a time of exploding knowledge gives rise to the opportunities of further reassessing diagnostic reasoning, including time and heuristic issues, in an updated clinical epistemology to avoid the risk of superficial reasoning due to methodological shortage.<sup>4</sup>

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