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"Preflight Checklists" for diagnosis: a personal experience

Abstract: As physicians, we take pride in our ability to generate, from memory, a complete differential diagnosis for our patients' presenting symptoms. We expect this of ourselves and our trainees, but we do not do it reliably. Studies have found that the most common cause of diagnostic error is the physician's failure to consider the correct diagnosis as a possibility. Other professionals, like airline pilots and nuclear plant operators, have accepted the fallibility of their memories and have learned how to ensure reliable completion of critical tasks by using checklists. But our culture in medicine glorifies physicians who complete the critical task of diagnosis using their memories and disparages those who cheat by referring to a list. Recent studies have supported the use of checklists in the operating room and intensive care unit, but so far they have not been used to make diagnosis more reliable. This essay explores a possible use for differential-diagnosis checklists by describing the author's experience with them in a primary care clinic.

Keywords: checklist; diagnostic error; differential diagnosis; primary care.

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I made many diagnostic errors in my 40 years of family practice, and several of my patients died as a result. Sometimes I failed to even consider the correct diagnosis as a possibility – it simply was not on the radar screen. Failing to consider the correct diagnosis turned out to be the most common cause of diagnostic errors in two recent studies [1, 2], and it often serves as the final common pathway for the well-known cognitive biases and failed heuristics associated with errors [3]. Failing to consider the correct diagnosis also occurs when we feel pressured to arrive at a single diagnosis rather than a differential diagnosis, a pressure that comes from patients, insurance companies, and ourselves, all seeking the comfort of a single diagnosis with a familiar name and a well-defined billing code. But after naming the diagnosis, we might better serve our patients by stepping back and asking "What else could this be?" [4].

I thought an obvious solution for failing to consider the correct diagnosis would be to go through a checklist of diagnoses that could cause the symptom before the patient left the office – similar to a preflight checklist used by an airline pilot (The complete set of checklists is available as Supplemental Data, which accompanies the article at http://www.degruyter.com/view/j/dx.2014.1.issue-1/issue-files/dx.2014.1.issue-1.xml. Printed copies can be ordered from RTI Press.)

The airline industry is generally considered safer than the healthcare industry and safety experts have wondered whether physicians could borrow from the practices of airline pilots. Unlike physicians, pilots have learned to compensate for their fallible memories by incorporating checklists into every aspect of their work. The role of checklists in medicine is less clear, but they have been effective in assuring completion of observable tasks in the operating room and intensive care unit [5]. We do not know whether checklists would be effective in assuring completion of the unobservable mental tasks involved with diagnosis.

I initially froze at the prospect of creating checklists for all the presenting symptoms in primary care with all the diagnoses that could cause them, but then I recalled the Pareto principle, also known as the 80-20 rule, a rule that applies to many natural phenomena in economics and other fields [6]. For example, 80% of the sales come from 20% of the customers, 80% of the land is owned by 20% of the people, and so on. Although 80:20 is the most familiar ratio, other ratios have been described, and I was hoping for more like 99 to 1, where 30 or 40 symptoms – maybe 1% of all symptoms – would encompass 99% of patients seen in primary care. And where 30 or 40 diagnoses for each symptom – 1% of all diagnoses – would prove to be the cause 99% of the time. I ended up with 64 symptoms and an average of 22 diagnoses for each symptom [7]. Each symptom and its associated diagnoses were printed on 4×6 cards, which I carry in my lab coat pocket and use with patients (Figure 1). I have revised the checklists many times, based on my readings, patient-care experiences, and discussions with colleagues. The checklists have helped broaden my differential diagnosis in clinic, and several faculty members, residents, and physician assistants have requested copies.

At first, I hesitated to read the checklists aloud in the exam room, fearing that patients would lose confidence

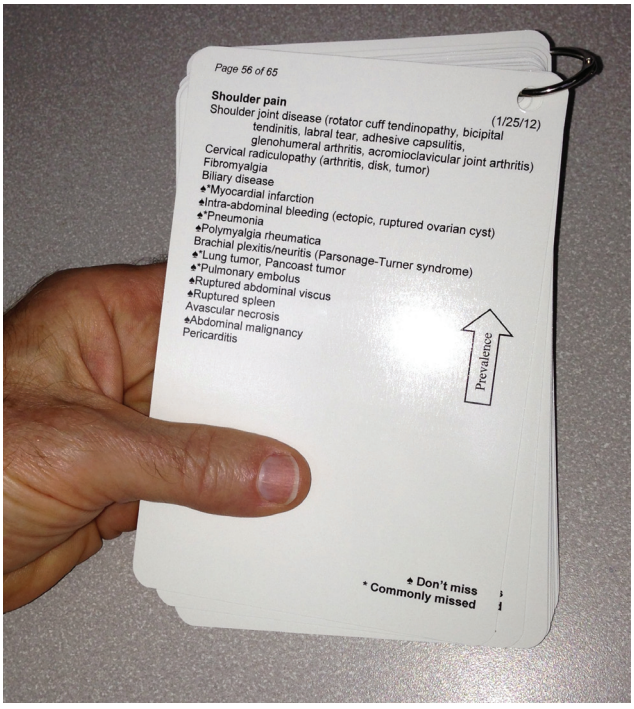

Figure 1 Example of diagnostic checklist.

in my abilities or cringe at hearing diagnoses like cancer, sexual abuse, and anxiety. But most patients seemed to appreciate the systematic consideration of all reasonable causes for their symptoms, and the checklists turned out to be a gentle way of addressing sensitive topics. For example, patients with abdominal pain could see that I asked about "depression" and "sexual abuse" because they were on the checklist, not because I thought they were particularly likely. One seemingly cheerful patient started to cry when I got to "depression," and another stopped me when I got to "sexual abuse" – diagnoses I would not have considered otherwise.

I also feared that the checklists would encourage mental laziness on my part, serving as a crutch to avoid the hard mental work of diagnosis. As physicians, we pride ourselves on our ability to generate a comprehensive differential diagnosis from memory, we celebrate those who can do it well, and we try harder when we fail to do it adequately, but we have not learned how to do it reliably. As Berwick noted, "Genius diagnosticians make great stories, but they don't make great health care. The idea is to make accuracy reliable, not heroic" [8]. In the past, airline pilots also prided themselves on memorizing routine and emergency procedures, but after some spectacular lapses, they developed checklists to prevent problems and deal with emergencies. Some observers believe pilots have progressed further than physicians in assuring the reliable completion of important tasks because, in addition to their passengers, their own lives are at stake. A sad commentary, but in any case, diagnostic work should not be about mental prowess, it should be about getting the right diagnosis. Besides, there is still plenty of mental work involved with the use of diagnostic checklists, deciding which diagnoses deserve serious consideration and which can be "checked off." I still tell patients what I think they have immediately after the history and physical, and before any diagnostic testing. But then I say, "Before you leave, I just want to review the causes of fatigue (or whatever the symptom is) to make sure I've considered all the possibilities."

To construct the checklists, I started by reviewing published differential diagnoses [9–11], but had to modify the published lists because they did not address some of the common complaints in primary care, such as inconsolable crying in an infant or a sense of feeling cold in an adult (which is almost never due to hypothyroidism). And the published differential diagnoses were organized by anatomy, pathophysiology, or body system, rather than disease prevalence, which is a characteristic more likely to be helpful in practice. Also, clinicians need different lumping and splitting strategies. For example, all the microbial causes of pneumonia are lumped into "pneumonia" because the fine points can wait until the first step has been accomplished, which is just to get pneumonia on the radar screen.

Diagnostic checklists are not like other checklists because they do not prompt observable tasks with clear criteria for completion. With a grocery list, you can check off cauliflower when cauliflower goes into the cart, but when can you check off pulmonary embolus? Many diagnoses can be checked off immediately (e.g., polymyalgia rheumatica in a 20-year-old) or after further history (e.g., Lyme disease after confirming no exposure possibility), but a few may require further diagnostic testing.

Checklists take time, but not much, and a little extra time spent on diagnosis would not be a bad thing. Usually it takes me about 2 min to read the whole list. I try to dwell on each diagnosis for at least 1 second before moving to the next, although some take 2 or 3 seconds, and some take longer, especially if I need to fill a gap in the history or physical exam, or order an additional test. More advanced decision support systems, such as Isabel and DXplain, automatically eliminate diagnoses that do not fit the patient's demographics or clinical data, but these systems lack the simplicity of a checklist, they are not free, they cannot be customized to meet individual needs, and they may be even less likely than a checklist to fit smoothly into the clinician's work flow [12].

Still, it is hard to get excited about a stupid little checklist. As Gawande noted in *The Checklist Manifesto*:

> "We don't like checklists. They can be painstaking. They're not much fun …. It somehow feels beneath us to use a checklist, an embarrassment. It runs counter to deeply held beliefs about how the truly great among us – those we aspire to be – handle situations of high stakes and complexity. The truly great are daring. They improvise. They do not have protocols and checklists" [13].

Physicians are unlikely to use diagnostic checklists unless they can be shown to benefit patients in a randomized clinical trial, a hurdle not faced by preflight checklists or grocery lists. But promoting the use of checklists in a busy practice may be premature because they might actually be harmful. For example, they could lead the physician away from a correct first impression, and they could prompt unnecessary testing. But these fears are hypothetical, and similar fears about disease management algorithms proved to be unfounded when they were used in practice [14, 15].

Instead of causing harm, checklists are more likely to be unnecessary in most cases. The trick is to know when to use them. They could be reserved for puzzling cases, but several investigators have found that a physician's confidence in the diagnosis is a poor predictor of diagnostic accuracy [16, 17]. Still, other criteria for selective use could be explored. Pilots use preflight checklists every time, but physicians could probably be more selective. For example, diagnostic checklists are unlikely to be helpful for symptoms like sore throat with its short differential diagnosis or rectal bleeding with its standard evaluation that catches all important causes, even if they are not considered initially.

The diagnostic checklists were designed with only one purpose in mind: to help avoid the most common cause of diagnostic error – failing to consider the correct diagnosis. They turned out to have other benefits that I did not anticipate – benefits that would prompt me to use them even if they cannot be shown to improve diagnostic accuracy in a clinical trial. They force me to slow down and think about something that deserves careful thought. They reassure patients that their concerns are being taken seriously. They help me fill important gaps in the history and physical exam. And they provide a more comfortable way for both me and the patient to address sensitive topics like mental illness and cancer. Finally, they help me write a better note that documents a comprehensive differential diagnosis along with my thoughts about why a diagnosis does or does not require serious consideration, an exercise that I think improves both my life-long learning and the quality of my patient care.

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