

# THE Art AND Science OF Clinical Decision Making



Thinking about how you make clinical decisions is the first step toward making better ones.

**D**octors' clinical decision making has received much attention over the last 18 months, due in part to Dr. Jerome Groopman's best-selling book *How Doctors Think*.<sup>1</sup> Before Groopman's book climbed the *New York Times* best-seller list last year, a November 2006 study in the *British Medical Journal* reported that the search engine Google was able to arrive at a correct diagnosis 58 percent of the time when presented with three symptoms.<sup>2</sup> Reports of the study in the national media raised questions about how we physicians

make clinical decisions. Articles in *The New Yorker*, *Time* and *Newsweek* followed,<sup>3-5</sup> leaving patients and physicians alike with newfound interest in this critically important skill.

There are many paths to a clinical decision, and what works well for one physician may not work well for another. The purpose of this article is to help you discover, or perhaps rediscover, the thought processes that work best for you, to formalize your approach and, ultimately, improve your patient care. ►

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## Diagnostic tools and other resources

The growing emphasis on evidence has helped fuel interest in the art and science of making clinical decisions. While few of us would question the value of having good evidence to inform the process, many would probably agree that practicing evidence-based medicine is easier said than done and not something we can accomplish every 15 minutes, five days a week. To be implemented effectively, evidence needs to be easily accessible, accurate and applicable to the patient we're seeing, and this is too seldom the case.

It has taken me a long time to let go of my old medical texts, especially for skin problems because I like to look at the pictures. Six months ago I gave up my *Pocket Pharmacopoeia* for ePocrates (<http://www.epocrates.com>) on my personal digital assistant; I haven't looked back. I also use UpToDate (<http://www.uptodate.com>), DynaMed (<http://www.dynamicmedical.com>) and, yes, Google (<http://www.google.com>). Having evidence at the point of care, or at least in my office, has changed the way I practice. A study by the founder of DynaMed revealed that primary care clinicians answered more questions and changed clinical decisions more often when using a synthesized evidence database rather than their usual information sources.<sup>6</sup> Perhaps surprisingly, the study did not find that use of these resources resulted in a decrease in overall search time.

More and more physicians are finding ways to incorporate evidence into their practices, but in many cases, we find that the

accuracy and applicability of the evidence aren't what they should be. We've been taught for years that randomized controlled trials are the gold standard on which to base clinical decisions, but the limitations of these studies, particularly in their generalizability to patients with comorbid conditions, are increasingly well-known.<sup>7-9</sup>

When the evidence isn't helpful, and even when it is, we likely also need to rely on other tools. Algorithms and clinical guidelines can help us to organize the way we think. Physicians tend to love them or hate them. They do provide clear direction, but they may narrow our focus too quickly, limiting some thoughts and options we would have otherwise considered. Some physicians say tools such as these take the art out of practicing medicine, but I'm not sure that's possible, particularly given all the variety and complexity of primary care.

Sometimes, despite what the evidence-based-medicine enthusiasts might have you believe, your best decision-making resources are not books or computer programs but rather the physicians you practice with. Not only do they have a wealth of knowledge about clinical medicine, but they also know the same patient population that you know. No textbook can help you with the probabilities and epidemiology of your unique patient population, but your colleagues certainly can.

## The decision-making process

In other fields, heuristics are central to discussions about decision making. We use them in medicine too; we just don't talk about them much. Heuristics are simply informal problem-solving methods, such as trial and error, that lead quickly to solutions. Experts are seldom conscious of the heuristic cognitive pathways they use to make decisions. While heuristics are crucial to our ability to make

■ A best-selling book, a controversial study and several articles in national magazines have generated new interest in doctors' clinical decision making.

■ The potential and pitfalls of evidence-based medicine have been key elements in these discussions.

■ Non-evidence-based tools and resources must also be used.

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### About the Author

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difficult decisions for multiple patients each day, our use of them also needs to be regularly reassessed and integrated into a practical problem-solving format that will promote consistency and accuracy in our clinical judgments.

To ensure that we make the best decisions possible, we need to deliberately incorporate our knowledge and experience, including lessons learned from mistakes, and conscientiously revisit and reconsider the medical “truths” that we learn at various stages of our medical training. We must also remain on guard, especially when stressed or tired, to avoid slipping back into lower levels of decision making where we fail to question old “truths” and rush to arrive at closure.<sup>10</sup>

Let’s review some of the decision-making approaches we use:

**Patterns.** Most of us were trained in medical school to recognize patterns. Consider these examples: If we see a 28-year-old woman with new onset chest pain, we’re probably thinking about anxiety or musculoskeletal issues. Some additional history tells us that she has a 6-week-old infant, her first child. She’s otherwise healthy and has no chronic medical conditions. She tends to notice this chest pain most often when she’s going to the park carrying her new infant. We’re still thinking about anxiety or musculoskeletal problems, or maybe gastroesopha-

geal reflux disease (GERD). However, if we see a 65-year-old man with new onset chest pain, we’re probably thinking about cardiac issues. Like the female patient, he also has some changes in his life. He recently became a grandfather. His past medical history is notable for hypertension and hyperlipidemia. He notices the chest pain most when he’s going to the park with his new grandchild. Now we’re almost certainly considering a cardiac work-up.

Clearly we need some other strategies to help keep us alert and prevent us from getting caught up in patterns, because the female patient that we ended up treating for anxiety may have a myocardial infarction (MI), and the male patient who endured a battery of cardiac tests may have debilitating anxiety.

**Scientific method.** I like to think of each patient encounter as a miniature research project and apply the scientific method to it – starting with a problem, developing a hypothesis, collecting and analyzing data, and then confirming or rejecting my hypothesis. While most of us don’t think about it in quite this way, this is more or less what we do.

For example, a patient presents with a fever, productive cough and decreased appetite. The hypothesis is pneumonia, bronchitis or an upper respiratory infection (URI). We collect some data to help us confirm or reject our hypothesis. The data tell us that our patient has a temperature of 102 degrees and some rhonchi at the right base on auscultation. We decide that’s not quite enough information on which to base a decision, so we also order a chest X-ray. It shows a right lower lobe infiltrate. We’re then able to confirm our diagnosis of pneumonia.

**Probabilities.** Probabilities can make nonstatisticians nervous. But this approach really just boils down to knowing your patient, gathering a little data and establishing an opinion of the likelihood of a given outcome.

Consideration of probabilities is helpful in selecting the right test and helping to interpret the utility of its results. When the pre-test probability is very low, the likeli-

■ Heuristics, informal problem-solving methods, are one element of clinical decision making, but physicians must engage in higher-level decision making as well.

■ Pattern recognition is a heuristic approach.

■ Many physicians apply the scientific method to their patient encounters.

## FOUR PITFALLS IN CLINICAL DECISION MAKING

In his book *How Doctors Think*, Jerome Groopman, MD, identified traps that physicians must avoid on the path to a clinical decision, including these:

**“Satisfaction of the search.”** The tendency to fall back on lower-level decision-making rules when we want to eliminate alternatives.

**“Diagnosis momentum.”** The tendency to ignore findings that might lead us in a different direction than the one we’re already headed in.

**“Commission bias.”** The tendency to do *something* rather than watching and waiting.

**“Intuitive leaps.”** The tendency to make a jump to a diagnosis that may not be supported by evidence or even by logic.

hood of a false-positive result is very high. We can get caught in this trap when we are uncertain about a diagnosis. If a patient sees a cardiologist, testing is focused on the heart. But, sometimes, as a family physician assessing a patient for the first time, we find that the constellation of signs and symptoms have yet to settle on a particular organ system or pathophysiologic process. Although we may have some ideas, our testing usually starts in broad strokes. If we don't give some consideration to the pre-test probabilities and try to eliminate the tests that seem least likely to be useful, we can be forced down a tangential pathway trying to sort out a falsely abnormal result that had nothing to do with the patient's initial presentation.

This can also happen when using preset laboratory test panels. These panels yield many more results than we need or care to know. We should narrow our requests to only the values we really want. Like trying to figure out if a neighbor's shiny new Mercedes came as a result of winning the lottery, ordering "shotgun" studies with very low pre-test probabilities will usually result in much wasted time and energy.

**Differential diagnoses.** In medical school, we generated many lists of differential diagnoses. We still do this, but our lists are narrower. We don't have the time or inclination to identify the breadth of differential diagnoses that we once did, but the "zebras" are in the backs of our minds, waiting to be recognized. Many of us take a probabilistic approach in which we begin by analyzing the diagnoses that seem most likely. The downside of this strategy is that we may tend to hone our focus a little too soon. Some may begin by focusing on the worst diagnoses and trying to rule those out. Some take a more pragmatic approach, focusing on the diagnoses that we can actually do something about today. It certainly makes us feel better to come up with a treatment plan at the time of the initial visit.

**Tests.** Of course, test results affect how we make clinical decisions. It's important to be aware of the limitations of the tests we choose to do. Because they can be influenced by other factors, index tests provide only surrogate answers – for example, an adrenocorticotrophic hormone (ACTH) stimulation test for adrenal insufficiency. The gold standard test in this

case would be an adrenal gland biopsy, but that is probably unnecessarily invasive, so we use the index blood work instead. We also have to remember that the "normal" range for a laboratory test is two standard deviations from the mean, which means that roughly 5 percent of abnormal results are truly normal. Finally, we may need to question a test result when things just don't add up and either repeat the test or consider taking a different approach to get the answer we need.

**Treatment thresholds.** Once we've arrived at a diagnosis, we often have to make complicated decisions about treatment. One way to do this is by establishing thresholds that must be crossed before initiating a particular treatment. When the treatment has marked benefit for the diseased person and low risk for the non-diseased person, the threshold is low. When the treatment has only limited benefit for those with the disease and a moderate risk for those without the disease, the threshold is higher. For example, decongestants or expectorants for URI are low threshold treatments. Most people are not going to be harmed by them, even those who don't actually have a URI, and those who do have a URI probably will benefit from their use. We have a much higher threshold for the use of oral antifungals for onychomycosis, for example. Even if taken properly, these drugs offer limited benefit, help only some patients and have the potential to cause liver damage.

Of course, the threshold isn't always high or low, and any number of other influences can come into play that make it difficult to formulate treatment plans. For example, whether to prescribe narcotics for pain can be one of the toughest treatment decisions of all.

### The context: your patient's and your own

By virtue of our training, family physicians know better than most physicians how critical it is to consider the patient's context, both in the process of diagnosing the problem and in developing a treatment plan. We must consider our patients' life circumstances, including their socioeconomic status, health insurance coverage, work schedule, support structure, and religious and cultural preferences, and ask ourselves how likely the patient is to adhere to

Assessing probabilities is a key to deciding which tests to order.

When narrowing lists of potential diagnoses, physicians may start with the worst diagnoses, the most likely diagnoses or the ones they can do something about today.

When analyzing results, it is important to keep the limitations of the test in mind.

## By virtue of our training, family physicians know better than most physicians how critical it is to consider the patient's context.

our plan, both in terms of treatment and follow-up. The patient is the ultimate determiner of whether the plan is successful.

We also need to look at ourselves and our care teams and consider what factors may get in the way of our making the right decisions on a given day. Maybe you were called in at 2 a.m. for a difficult delivery before a full morning of patient visits. Maybe there's conflict within your care team. Maybe you're intent on getting to your child's birthday party promptly at 5:30 p.m. Maybe you're still bothered by comments Mr. Smith made about your practice at his last visit. We have to work hard to maintain our focus every time we head into the exam room and be aware of how our own issues might affect our interactions with our patients.

### Shared decision making

The best decisions are often made in partnership with our patients. We have knowledge of diagnostic techniques, diseases, prognoses, treatment options, preventive strategies and the like. Our patients are experts as well. They have knowledge of their prior illnesses, social circumstances, habits and behaviors, risk tolerance, values and preferences.

The process of sharing these two bodies of knowledge has several names, including patient-centered care and informed decision making. I like this definition: the process of interacting with patients to arrive at an informed, values-based choice among medically reasonable alternatives.<sup>11</sup>

Of course, not all patients are interested in this level of involvement, and some aren't able to participate actively. However, we might be surprised by the number of patients willing to engage with physicians in this way.

### Putting it all together

The bottom line is that there is no one correct way to approach clinical decision making. Used in combination, the strategies reviewed in this article form a modified scientific method that you may find helpful, either to implement or to compare with your own process. I have found that this approach works well:

1. Determine your probabilities. In other words, what is the likelihood that your patient has a specific diagnosis, based on his or her symptoms, history, etc.?

2. Gather data by further evaluating the patient – additional history, vital signs and physical exam.

3. Update your probabilities, including the pre-test probability of any test you may want to order. Then, carefully collect and interpret additional data from diagnostic tests.

4. Consider an intervention to see whether it crosses your treatment threshold. If it does, consider the patient's context before moving forward. If you don't have enough information to convince yourself to cross the threshold, consider other options, which may include gathering additional data or watchful waiting.


Here's a clinical example: It is January and you are working in a busy clinic in New England. Your patient is a 42-year-old man who is well known to you. He presents with acute onset of fever, chills and cough. He also complains of marked fatigue.

With just this information, you can begin to determine some probabilities – influenza, viral URI and community-acquired pneumonia. Additional data gathering reveals that symptoms have been present for about 24 hours and he has had some ill co-workers. He is otherwise healthy except for hypertension,

■ Thresholds that take into account risks and benefits are useful in developing treatment plans.

■ Knowledge of the patient's life circumstances and awareness of physician or practice issues that may affect the encounter should play a key role in decision making.

■ When possible, shared decision making should be pursued.



## Clinical decision making is a **balancing act** – of art and science, intuition and analysis, gut instinct and evidence, experience and knowledge.

which has been well controlled on hydrochlorothiazide. His temperature is 102 degrees, respiratory rate is 14, pulse is 88, blood pressure is 142/85 and room air pulse oximetry is 97 percent. His physical exam is non-focal – lungs are clear with good air movement and oropharyngeal mucus membranes are slightly erythematous.

Epidemiologic data are also important in this case. There has been a recent spike in the number of confirmed influenza cases in your area. Your patient did not get a flu shot this year. With this you update your probabilities, and influenza emerges at the top of your differential diagnosis list. The pre-test probability for an influenza swab is relatively high, so the test would have good utility in establishing a true diagnosis. On the other hand, the pre-test probability for a chest X-ray is quite low in this patient with a cough, no respiratory findings and normal pulse oximetry, limiting the usefulness of X-ray as a diagnostic tool.

It is now time to consider an intervention applied in the context of your patient's life. You know that your patient is on the maintenance crew at a local college and that he has comprehensive private health insurance through his employer. You also know that he is a single father of three children and that his illness could be a serious hardship to his family. Given that symptoms have been present for only 24 hours, this patient may be a good candidate for oseltamivir. You give him a prescription and tell him you will call with the results of his influenza swab later in the day to let him know if he should fill the prescription and start the medication.

### A balancing act

As the previous example helps illustrate, clinical decision making is a balancing act –

of art and science, intuition and analysis, gut instinct and evidence, experience and knowledge. Formalizing our own personal approaches to the process will help us to make clinical decisions with greater confidence.

Sometimes, as physicians, we may still feel like we are in the dark, but we must remember that this is the nature of medicine. A reasoned decision-making approach will help light the way to diagnosis and treatment. **FPM**

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■ There are many different paths to good clinical decisions.

■ The author suggests a modified scientific method.

■ Formalizing a personal approach to clinical decision making can help to improve the process.