# Are We Right When We're Certain? Overconfidence in Medicine

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Why do the overwhelming majority of college professors, medical students, and clinicians rate their skill as "above average?" (**Table 1**)

Humans can be inappropriately overconfident in our skill, reasoning, and decisions. Overconfidence describes the misalignment between actual competence or accuracy compared to subjective, self-rated expertise.[1,2] In medicine, overconfidence contributes to poor decision-making, medical error, sub-standard patient care, and increased risk of bad clinical, organizational, and research outcomes. Our objective in this commentary is to explore the cognitive and cultural aspects of overconfidence and its effect on clinical decision-making.

## What are the cognitive underpinnings of overconfidence?

The human brain has a limited capacity to perceive and integrate the innumerable stimuli continually presented for analysis. Consequently, we may erroneously fit incomplete, unclear or contradictory data to fit the oversimplified ways we want to see the world.[3] For example, we may jump to a too quick conclusion about a positive laboratory result, without looking up its accuracy and examining any disconfirming data. Moreover, these beliefs are often resistant to change, despite contradictory evidence. Overconfidence encompasses a failure of metacognition, or the capacity for self-reflection in recognizing our own deficiencies, assumptions, and biases.[4]

## Does Dr. Google facilitate overconfidence?

Today, it is all too simple to "Google" the capital of Alabama or a differential diagnosis of dyspnea with a few taps on the keyboard. This frictionless access to unlimited material may make learners less motivated to gain a deep understanding of the content. Instead of knowing evidence-based antibiotic prescribing guidelines, we tend to remember that online guidelines exist and where to access them.[5] Self-questioning morphs from "What do I know?" to "Where can I find it?"

While the availability of resources such as UpToDate and Epocrates has greatly enhanced clinical practice, impaired cognition and an "illusion of knowledge" occur when people conflate access to information with understanding information. Studies demonstrate searching the Internet for information can result in exaggeration in self-assessed knowledge for even unrelated domains.[6] Furthermore, experimental evidence suggests that after Googling answers to questions, many people are convinced they knew these answers independently of the resource, termed an exaggerated "cognitive self-esteem," a marker of overconfidence.[6] Clinicians must remember the existence of unlimited online data is not equivalent to a personal understanding of it.

**Table 1.** Overconfidence in Medicine Examples

| Construct | Description |
|---|---|
| Clinical Procedures | When performing clinical procedures, resident physicians had no correlation between self-rated confidence and supervisor-assessed competence.[11] |
| Diagnostic Ability | Diagnosing vignette cases, physicians made correct diagnoses in 55% of easy cases and 6% of difficult cases even though self-rated confidence was similar for both easy and difficult cases.[2] |
| Ultrasound Imaging | For difficult ultrasound cases, the least experienced and most inaccurate clinicians were most overconfident.[12] |
| Diagnostic Certainty | Among physicians self-rating their diagnostic certainty as "definite" antemortem, 46% of cases were misdiagnosed at autopsy.[13] |
| Cancer Diagnoses | When asked to diagnose melanoma, dermatologists were "confident" in 55% of cases, but were incorrect in 30% of these diagnoses.[14] |
| Teaching Ability | Ninety-four percent of professors rated their teaching ability as above average.[15] |
| Medical Student Exam | Medical students' self-assessment of anatomy knowledge correlated weakly to actual performance.[16] |

## Who is most at risk for overconfidence?

Individual overconfidence can be situational or a fixed personal trait. Inbred inaccurate self-assessment of ability seems to be more common in those with specific personal characteristics such as level of risk-taking behavior, tolerance of uncertainty, impulsivity, narcissism, arrogance, or complacency. Overconfident physicians seem to be more susceptible than their peers to a "therapeutic illusion" of deciding that a positive outcome is due to their expert decision-making.[7]

Perhaps surprisingly, those with the least ability or knowledge tend to be the most overconfident, termed the Dunning-Kruger effect.[8,9] In their landmark study, Kruger and Dunning demonstrated that students scoring in the lowest quartile had the largest discordance between actual and self-rated competence.[9] Thus, the less expert one is at a task, the more likely there will be a mismatch between an inflated

self-perception and actual expertise. This miscalibration renders these lowest performing individuals both error-prone and unaware of their lack of ability.

The prevalence of overconfidence in diverse settings is impossible to determine. The vast literature includes both clinical and experimental studies, widely variable definitions, study populations, diagnoses, contexts, process measures, and outcomes. Yet, most investigators rate overconfidence bias as one of the most common, consequential cognitive vulnerabilities encountered in medicine.[1,3,4,8]

## What are the clinical consequences of overconfidence?

Cognitive biases in thinking, such as overconfidence, rather than a lack of knowledge or experience, may be the most frequent cause of medical error. Overconfident clinicians may oversimplify the complexity of clinical reasoning. Physicians' personal level of confidence influences how often they request additional resources and support from others. When overconfident, physicians may curtail questions about symptoms, abandon or fail to search for relevant medical literature, and order fewer diagnostic tests or consultations independent of whether this high confidence is justified.[2]

Overconfident clinicians are more likely to discontinue active cognitive reasoning and stop investigating, termed "premature diagnostic closure." Overconfident clinicians tend to downplay or ignore new data which questions their current clinical impression. Furthermore, confirmation bias propels overconfident individuals to search for evidence confirming their existing hypothesis. This error-engendering flaw reflects a failure to ask vital questions, "What else could this be?" or "Do I know enough?"[2] Uncertainty can be protective, as it may guard against overconfidence and encourages clinicians to continue to keep an open mind.

Underconfidence, or having lower confidence than accuracy, also impairs decision-making and can be equally dangerous. For example, underconfident clinicians tend to mistrust their physical examination skills which can result in overuse of technology, such as CT scans.[10] Indecisiveness leads to unnecessary over-testing or consultations, which may delay appropriate patient care and increase medical interventions and resource utilization.

Knowing what we don't know is critical for doctors. Yet, at times, confidence in our knowledge and insights misaligns with actual knowledge and performance. This miscalibration reflects impaired self-awareness and unwarranted overconfidence. Determining the origin and identifying individuals at a higher risk for overconfidence is difficult. Too commonly, the least experienced or skilled physicians exhibit the most striking overestimation of their own ability. Failure of self-reflection can lead to poor decisions, inappropriate use of resources, diagnostic error and adverse healthcare outcomes for patients and institutions.

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