Invited Commentary

Medical Overuse as a Physician Cognitive Error
Looking Under the Hood

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Medical overuse, or health services for which potential harms outweigh benefits, is common and persistent. Medical overuse is assumed to exist when regional variation occurs without improvements in outcomes and is believed to be driven largely by perverse financial incentives and local cultures of care.[1] In this issue of *JAMA Internal Medicine*, Schwartz and colleagues[2] quantified variations in primary care physician provision of low-value services (largely representing overuse) among Medicare beneficiaries and characterized associations with physician characteristics such as age, training, and research activities. Although practice varied widely within organizations, little variation was due to observable physician characteristics. These findings suggest that overuse drivers go beyond incentives and culture and that reducing overuse will require deeper understanding of physician behavior.

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Behavioral economics describes the following 2 modes of decision making: reflexive, intuitive processes and those that are conscious, reflective, and analytic.[3] Reflexive decisions require less cognitive effort and generally predominate; mental shortcuts, or heuristics, facilitate reflexive thought.[3] Practicing medicine involves both types of decision making. Reflexive clinical decisions may rely on unconscious pattern recognition (eg, diagnosing acne), whereas reflective decisions require complex reasoning, evidence interpretation, or nuanced communication. Common cognitive biases can lead to errors in both types of decision making, undermining analytic thinking and enabling inappropriate reflexive thinking when deeper analysis is warranted. In physicians these biases are associated with medical and diagnostic errors.[4] Medical overuse can thus be framed as a clinical cognitive error, explained by cognitive processes and biases involving suboptimal analytic thinking and erroneous intuitive decision making. Individual-level variations in overuse described by Schwartz et al[2] arise from differences in cognitive errors.

Overuse resulting from cognitive errors involves problems with reflexive and reflective decisions. Although physicians may overrely on heuristics in lieu of analytic thinking, when they do engage in thoughtful consideration they are also likely to make errors that can lead to overuse. Physicians have poor numeracy and generally overestimate the benefits and underestimate the harms of tests and treatments.[5] Knowledge and understanding of medical evidence and basic risk information needed to inform diagnostic and therapeutic decisions may also be poor. Resulting errors of risk-related reasoning vary among individuals and can partly explain why some physicians order tests and treatments that represent overuse.

Heuristics, cognitive biases, and other unconscious factors also vary among individuals and influence practice. Basic physician beliefs can facilitate erroneous reflective thinking and lead to overuse. These beliefs may include the assumption that more health services are better, that patients want more (rather than less), or that doing less will result in a lawsuit. Personality traits and attitudes also lead to individual variations in practice and in some cases to overuse. Managing uncertainty is a critical challenge in medical practice. Physicians who are risk avoidant, who experience more anxiety from uncertainty, or who anticipate greater regret from a missed diagnosis may practice more aggressively and overuse resources.[6,7] Similarly, fear of malpractice is a potent driver of aggressive care and overuse.

Well-known cognitive biases may also drive overuse by influencing reflexive and reflective thinking. These biases include the following:

- Availability: the tendency to overweigh factors that readily come to mind. For example, the availability of a recent bad patient outcome may contribute to a physician's overestimating its risk in the next patient, leading to unnecessary treatment of a benign condition.
- Framing: the conceptualization of options influencing actions. For example, focusing on the likelihood of a bad outcome rather than a good outcome (eg, 2% risk of infection rather than 98% chance of not having infection) may cause physicians to treat a condition overaggressively.
- Representativeness: overreliance on similarities or stereotypes in estimating the likelihood of an event. For example, a physician might overestimate the risk of myocardial infarction in a "type A" banker with high levels of work-related stress, resulting in ordering unnecessary cardiac testing.

Complicating matters, additional cognitive biases may function as barriers to efforts to reduce overuse. These include confirmation bias (the tendency to notice information that is consistent with expectations, which may lead physicians to overestimate the value of unnecessary treatment) and loss aversion (greater cognitive effect of loss, which may lead physicians to overvalue an unnecessary test they are accustomed to ordering).

Viewing overuse as a cognitive error implies the need for new approaches to reducing it, addressing reflective and reflexive decision making. Optimizing analytical processes requires improving physicians' risk understanding and ability to integrate risk estimates with knowledge of evidence at the bedside. There are potential educational and practice-level approaches to improving clinical analytic thought. First, we must rethink evidence-based medicine education. Evidence-based medicine instruction is pervasive in medical education. However, it often focuses on evidence retrieval, quality-of-evidence assessment, and clinical epidemiology.

Few curricula include specific training in diagnostic or therapeutic reasoning.[8] Refocusing evidence-based medicine instruction around clinical reasoning and shared decision making would better prepare physicians for the complexities of real-world decisions. Such instruction is needed at all levels from medical school to postgraduate education and could be required for maintenance of certification. In addition, there are opportunities to leverage the electronic medical record (EMR) to incorporate risk information to inform better clinical decisions. Electronic medical records could facilitate test interpretation in the context of the patient's specific baseline risk to improve diagnostic reasoning and present individualized probabilities of bad outcomes with and without treatment to improve therapeutic reasoning. Although aspirational at present, these functions may soon be possible.

Optimizing physicians' ability to understand evidence and risk must be coupled with efforts to address subconscious heuristics, cognitive biases, and attitudes. Unfortunately, little evidence is available to guide best approaches to changing cognitive biases and subconscious processes. Simple education about cognitive biases may foster awareness and facilitate more reflective decisions. Forcing reflective rather than reflexive thinking may also be effective, for example, requiring physicians to document a justification when ordering certain low-value services. However, physicians may resent the burden of this approach and are likely to find work-arounds, so it should be used sparingly.

Just as some cognitive biases facilitate overuse, others can be leveraged to reduce it. Such strategies are particularly helpful for reducing a specific overused service and some are commonly used; they can also influence behavior more broadly. First, people are sensitive to adhering to norms,[3] particularly local norms, and a strong professional identity may make norms particularly powerful to physicians. Because physician estimates of general and personal practice patterns are inaccurate, providing data to high users of low-value services about clinical behavior, benchmarked to colleagues, can be a potent motivator and can help override physician loss aversion and confirmation bias. Such data can involve a specific service of interest or a large set of services, addressing general practice styles, and ideally would be linked to outcomes. Second, because people tend to follow the path of least resistance, EMR defaults can be leveraged to reduce overuse. For example, EMRs (and pharmacies) often default to prescribing or dispensing generic rather than branded medications, requiring justification for name-brand prescribing. An optimized EMR could similarly be applied to preferred diagnostic or therapeutic strategies. In addition, knowledge of the effects of cognitive biases on patients can inform communication; work in this area is beginning to be developed.

Medical overuse, like all health care, ultimately reflects the collective decisions of individual physicians. By looking under the hood to understand and address the cognitive factors influencing every decision, we can meaningfully reduce overuse while improving care more broadly.

ARTICLE INFORMATION

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