Biases in Medical Decision-Making

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Navigating a complex clinical case is among the greatest challenges in medicine. Previous issues of the *Israel Medical Association Journal* (*IMAJ*) have published two accounts that show why. In the first account, Peled et al. [1] followed a single patient for 26 years. The patient presented with unstable angina and three-vessel disease treated by bypass grafting in 1993. He presented with a type A aortic dissection in 1999. In addition, he underwent a transcatheter aortic valve implantation. Later he presented with progressive ventricular dilatation and heart failure. The authors reviewed ethical principles against the background of the realities of practicing medicine and of the enormous advances in therapeutics with the narrative deliberately organized around clauses of the Hippocratic Oath [1]. One of those clauses is important for our purposes: "I will not be ashamed to say, 'I know not,' nor will I fail to call in my colleagues when the skills of another are needed for a patient's recovery". Written somewhere between the 5th and 3rd centuries BCE, this quote is a remarkably exact statement of a problem in modern terms: clinicians' capacity to recognize the limits of their own judgment and to act on that recognition.

The second article, published in 2026, describes a 60-year-old woman who developed progressive neuropathic symptoms and was diagnosed with chronic inflammatory demyelinating polyneuropathy [2]. She became steroid-dependent. Persistent thrombocytopenia was attributed to immune thrombocytopenic purpura. Only when splenomegaly, ascites, effusions, sclerotic bone lesions, and 15 kilograms of unintentional weight loss had accumulated was the diagnosis revised to polyneuropathy, organomegaly, endocrinopathy, monoclonal plasma cell disorder, and skin changes (POEMS) syndrome. Up to half of patients with POEMS are labelled as having demyelinating polyneuropathy before systemic features emerge. In this patient, as the authors observed, the initial response to steroids further reinforced the presumed diagnosis. Vascular endothelial growth factor (VEGF), a major diagnostic criterion, was measured and found normal while the patient was receiving the corticosteroids that suppressed it.

Neither of these cases is a story about missing knowledge. The physicians involved were familiar with POEMS syndrome and knew the limitations of a VEGF assay. What the second case illustrates is a sequence that is discussed throughout this issue of *IMAJ*: an early diagnostic label set before the picture was complete, a partial treatment response read as confirmation rather than as weak and ambiguous evidence, and a test result that was uninformative by construction allowed to argue against the alternative. Those points are, respectively, anchoring, confirmation bias, and a failure of the monitoring that should have asked what the normal VEGF meant. The reviews by Mintz and Riskin [3] and by Riskin and Riskin [4] addressed these points. The interval between the first symptom and the correct diagnosis was measured in years.

This special issue of *IMAJ* is devoted to that territory: the prevalence and the role of biases and emotions in medical decision-making.

THREE FAMILIES OF BIAS

Broadly, three classes of bias impact clinical judgment.

- Cognitive biases arise from heuristics, the mental shortcuts that make rapid judgment possible and that fail in predictable ways when applied outside the con-

ditions they suit [5-7]. They include availability, anchoring, overconfidence, the neglect of critical information, locking onto a preferred alternative, and what might be called shooting from the hip.

- Sociodemographic biases operate based on who the patient is rather than what is wrong with them, and encompass race, ethnicity, gender, socioeconomic status, age, and sexual orientation [8,9].
- Machine and algorithmic biases are the newest family: algorithmic distortion, selection bias, automation bias and overreliance on model output, fabricated data entering the corpora on which large language models are trained, and inconsistent recommendations across systems and across successive prompts to the same system [10,11].

THE CORE OF MEDICINE: THE IRREPLACEABLE PATIENT ENCOUNTER

At the heart of clinical practice lies the human connection. Flugelman and Riskin [12] established that clinical reasoning is the intellectual core of medicine, and they note a troubling paradox. It is rarely taught explicitly, even though most diagnostic errors stem from cognitive failure rather than lack of knowledge. Guidelines and artificial intelligence can improve care, but they carry limitations that make strong clinical reasoning more essential, not less.

This human-centered foundation will be reinforced a review in the January 2027 issue of *IMAJ*. That article will show the physician–patient relationship as the first link in the diagnostic and therapeutic chain. Revisiting the classic models of that relationship and the stages of the clinical encounter, the author examines how two modern forces–patient-held information from the internet and the entry of artificial intelligence (AI) into practice–are reshaping the bond. Flugelman and Riskin [12] related to this view. They showed that the medical interview builds the therapeutic trust that underpins every subsequent decision, and no algorithm replicates it. The 26-year journey of the patient mentioned by Peled and colleagues [1] illustrates this point. Each successive intervention was made possible by technology, but the decisions about when to intervene, and when to stop, were made inside a relationship.

In a review in the January 2027 issue of *IMAJ*, the point will be pressed further, identifying a paradox at the center of the ideal. Patient-centered care has been adopted almost universally. However, clinical reasoning itself, which is the movement from presentation to diagnosis, prognosis and treatment, is still conducted largely away from the patient, in meeting rooms and in front of screens. Guidelines are written for the average patient rather than negotiated with the specific one in the room, and the dominant theories of reasoning model the clinician's cognition while casting the patient as a source of data rather than a partner in the thinking. The remedy is concrete and teachable: build trust on which candid disclosure depends, treat the patient as a continuing source of information rather than a one-time data point, and let the patient confirm or correct the working picture at each stage.

INDIVIDUAL MINDSETS: COGNITIVE BIASES, EMOTIONS, AND METACOGNITION

When clinical reasoning fails, it usually does so in patterns rather than randomly. Mintz and Riskin [3] showed that cognitive biases are systematic, predictable deviations from rational reasoning, arising from heuristics that are ordinarily adaptive. The authors set out the most consequential: anchoring, availability, confirmation bias, premature closure, and overconfidence.

Liberman [13] expanded the conversation by addressing psychological processes. that are under-recognized in medicine but consequential within it, specifically the discounting of possibilities that are never explicitly named, the illusion that one sees a clinical situation objectively while colleagues who disagree must be misinformed, and the conditions under which two clinicians reasoning together do better than either alone. The topic is not only how doctors think but how they think in the company of others.

Gover and Riskin [14] added the role of emotions, which influence clinical decisions through integral pathways, arising from the encounter itself and incidental pathways carried in from unrelated events. Drawing on the appraisal tendency framework, they show that discrete emotions produce specific and predictable distortions independent of whether the emotion is pleasant: anger increases confidence and lowers perceived risk; fear raises perceived risk and drives defensive testing.

The unifying thread is metacognition, monitoring and regulating one's own thinking. Riskin and Riskin [4] presented metacognition as the mechanism through which biases both arise and are corrected. They argued that anchoring and premature closure are at bottom failures of System 2 monitoring over System 1 output. Errors happen when clinicians do not think about their own thinking. Returning to the patient, the question that would have changed her course, "Why is this presentation not behaving as the diagnosis predicts?"

required no additional knowledge, only the habit of asking it [2].

SYSTEMIC FAILURES: GROUP DYNAMICS AND SOCIODEMOGRAPHIC BIAS

Clinical decisions are not made in a vacuum. Moving from individual psychology to team behavior, Riskin and Mintz [15] showed that medical teams are structurally predisposed to groupthink, which is the premature consensus driven by hierarchical authority, time pressure, and cohesion. This groupthink suppresses the dissenting information that might have prevented the error [16]. They paired groupthink with its mirror image, polythink, a team so fragmented by competing professional perspectives that no single plan is agreed on and a decision arrives too late, if at all. They also identified a striking behavioral trigger: workplace incivility. Even low-level rudeness from a third party measurably impairs a team's diagnostic and procedural performance, while expressions of gratitude reliably improve it [17]. The Hippocratic injunction to call in colleagues assumes that colleagues can be heard. These findings describe the conditions under which they cannot.

On a broader scale, Riskin and Gover [9] documented sociodemographic biases spanning multiple specialties and translating into measurable inequities in diagnosis, treatment intensity and outcome. Clinical reasoning is vulnerable not only to cognitive shortcuts but to systemic prejudice.

THE TECHNOLOGICAL FRONTIER: PROMISE AND PERIL

As healthcare comes to rely on artificial intelligence, the technology introduces biases of its own. Riskin and Gover [9] identified a dangerous feedback loop: large language models replicate and sometimes amplify the human sociodemographic biases embedded in the data they were trained on. Glebov and Mintz [11] deepen the warning, setting out the risks of medical AI across the whole lifecycle, such as unrepresentative data, inappropriate outcome proxies, opacity, automation bias, hallucination, and fabricated evidence, as well as recommendations that differ across systems, across model versions, and even across repeated prompts to the same model [11].

The most instructive finding may be one that joins the oldest bias in this issue to the newest. In two experiments, physicians interacting with an AI system that had misclassified fictitious patients received feedback that should have taught them the classification was wrong. They largely trusted the algorithm and failed to learn from the disconfirming evidence. In the second experiment, they did not even register that the treatment was ineffective [18]. Automation bias, in other words, is confirmation bias wearing new clothes and it is the same failure of monitoring that let a normal VEGF pass unexamined.

THE PATH FORWARD: INTEGRATED INTERVENTIONS

Across the eight reviews in this issue of *IMAJ*, the authors converge on an overlapping toolkit.

- At the level of the encounter itself, Flugelman et al. [12] argued for patient-inclusive reasoning: building the trust on which candid disclosure depends and letting the patient confirm or correct the working picture as it forms rather than only ratify the conclusion once it has been reached.
- At the individual level, Mintz and Riskin [3] and Riskin and Riskin [4] advocated structured reflection, checklists, the deliberate consideration of alternatives, calibration feedback and explicit metacognitive training. For emotional influences, Gover and Riskin [14] recommended cognitive reappraisal, mindfulness, and emotional intelligence training. Liberman [13] emphasized guarding against the blind spots that distort communication and collaboration.
- At the team level, Riskin and Mintz [15] proposed psychological safety, structured debriefing, and formally assigned devil's advocate roles to break hierarchical groupthink.
- At the institutional level, Riskin and Gover [9] and Glebov and Mintz [11] called for multilevel intervention combining individual bias literacy with standardized protocols and algorithmic fairness standards for clinical AI.

Together, these contributions describe a single argument. Technology will keep advancing, and the therapeutic options available to physicians in 2026 would have been unimaginable in 1993. What has not changed, and shows no sign of changing, is that the quality of a clinical decision depends on clinicians' willingness to examine their own reasoning, to hear a colleague who disagrees, and to say as the Hippocratic Oath has asked for two and a half millennia: *I know not.*

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Capsule

A joint risk for osteoarthritis

Both osteoarthritis and hypertension are common in older adults. Traditionally, osteoarthritis was thought to be due to age-associated wear and tear on the joints, but accumulating evidence points to metabolic and inflammatory influences on this condition. Using data from a nationwide longitudinal clinical cohort, **Kim** et al. identified a correlation between hypertension and osteoarthritis in older participants. The authors then turned to models to understand the underlying mechanism by using two mouse models of hypertension with or without osteoarthritis. The authors demonstrated that arginine vasopressin, a peptide hormone up-regulated in the setting of hypertension, promotes osteoarthritis progression, but only in joints that were already primed by injury or aging and that expressed the appropriate receptor, providing a mechanistic link between the two conditions.

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Capsule

Nurturing neutrophils

During early human pregnancy, placenta-derived extravillous trophoblasts invade the decidua and remodel the maternal-fetal interface, but the contribution of maternal neutrophils to this process is poorly understood. **Höbler** and co-authors analyzed tissue and blood samples from pregnant individuals, identifying a neutrophil subset localized to the Rohr's layer of the maternal-fetal interface that was phenotypically and functionally distinct from peripheral blood neutrophils. This decidual fibrinoid-associated neutrophil subset supported placental invasion during gestation by secreting matrix metalloproteinase-9, which simultaneously activated latent transforming growth factor-b and reprogrammed peripheral blood neutrophils toward a state supporting placental invasion.

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