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REVIEW

How to be a Better Doctor: Recognizing How Cognitive Biases Shape—and Distort—Clinical Evidence

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Abstract

Rather than the absence of any harm, it is the expectation of an overall benefit of a medical treatment that is the foundation of the implicit doctor-patient contract. In the context of an expectation of efficacy, powerful cognitive biases can blind clinicians to obvious signs that a treatment is not helping, or may even be harming their patients. With examples from medical history and current clinical controversies, this paper examines how systematic psychological biases can distort not just individual decision making, but perceptions of the evidence base upon which clinical decisions are built. These distortions can perpetuate harmful practices in medicine long after the objective evidence points in a different direction. By becoming aware of these biases and the way they shape perceptions of the evidence base, doctors can reduce the negative impact they may have on the patients in their care.

Key words: evidence based practice; cognitive bias; iatrogenesis; cognitive dissonance; whistle-blowing

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Introduction

"Medicine being a compendium of the successive and contradictory mistakes of medical practitioners … when we summon the wisest of them to our aid, the chances are that we may be relying on a scientific truth, the error of which will be recognised in a few years' time" — Marcel Proust.

All doctors harm their patients. It is difficult to think of a medical treatment that does not have some kind of adverse effect, albeit minor. In many medical specialities, such as oncology and surgery, the harms associated with routine treatments are significant and irreversible. If every doctor stuck rigidly to the directive to 'First Do No Harm', there would be very little ammunition left in our armoury against disease. Doctors would essentially be reduced to lifestyle gurus offering an apple a day and not much else (NB: Caution should even be applied to apples. One gram of apple seeds contains around 0.6 mg of cyanide. The lethal dose of cyanide starts at around 50 mg). Rather than the absence of harm, it is the expectation of a net benefit that underpins most treatments. Regulatory approvals ensure a firm, objective evidence base for many treatments. However, in a medical landscape where there are 20 major medical specialities (St Georges University, 2023), each with multiple subspecialities that deal with over ten thousand specific illnesses (Croskerry and

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Norman, 2008), there is a sizable treatment gap where there are no approved treatments for the condition and/or patient presenting with it. Some treatment practices in this off-label space can become widely accepted as 'standard practice' without having undergone the rigorous testing required for regulatory approval. It is in this treatment gap that the combination of cognitive biases and group dynamics can significantly influence the perception of the evidence base. Whilst much has been written about the impact of cognitive biases in the decision making processes of individual clinicians (Bornstein and Emler, 2001; Croskerry, 2003; O'Sullivan and Schofield, 2018; Schiff, 2008), the ways in which systematic biases combine with group dynamics to shape perceptions of the evidence base for clinical practice has received less attention in the literature. This paper examines how systematic psychological biases can influence not just clinical decision making in the individual, but also perceptions of the evidence base for many routine clinical practices. It explores how these biases can perpetuate harmful practices long after the objective evidence points in a different direction.

Lessons from the History of Medicine

"A desire to take medicine is, perhaps, the greatest feature which distinguishes man from other animals." — Sir William Osler (Cushing, 1925).

The history of medicine features far more harm than healing. For millennia, 'medicine' was primarily the product of superstition, ritual, religion, and coincidence. The human body has a remarkable capacity to fight disease and heal itself. The apparent success of many historical and contemporary 'cures' reflects the normal healing process. The patient would have recovered regardless of the lotion applied or potion imbibed.

Sometimes, medical 'cures' are ineffective but relatively harmless. In the 1890s, abstaining from chocolate and amorous love songs was thought to be an efficacious treatment for epilepsy, the effectiveness of which had apparently been 'abundantly proven' (Price, 1892). Misery aside, this treatment regime is unlikely to have made someone's seizures worse. However, it is extraordinary how often in the history of medicine, common treatments made things much worse for the patient, sometimes fatally.

Fatal Cures

Powdered dog excrement, disguised by the fancy name of "Album Graecum", became popular as a treatment for eye infections in medieval Europe. Physicians believed that the dried and powdered faeces could reduce inflammation and draw out infection with its astringent properties. Album Graecum had remarkable longevity. It was only in the 19th century that it was eventually abandoned, following the rise of antiseptic techniques and a better understanding of the role of bacteria in infection control.

Mercury also had remarkable longevity as a medical treatment. The earliest records of medicinal mercury can be traced back to around 1500 Before Common Era (BCE), where in China and India it was believed to have life-extending properties (extending to immortality in some records). During the Renaissance, the medicinal use of mercury expanded into Europe, when it became the go-to treatment for syphilis, a sexually transmitted disease that has been subjected to more than its fair share of quackery over the centuries. Promotors of the treatment believed that mercury could expel the "poison" of syphilis from the body, leading to the common adage "A night in the arms of Venus leads to a lifetime on Mercury". For many, the subsequent lifetime was short, with the beleaguered patient battling both the disease and mercury poisoning, the effects of which included excessive salivation and tooth loss, neurological dysfunction, major organ failure and ultimately coma and death. Despite this, mercury prescribing extended well beyond desperate people with syphilis. Mercury cures were also recommended for skin conditions, parasitic infections, and even melancholia (a perennial example of throwing virtually anything at mental illness in the hope it might help). The belief in mercury's curative properties persisted long after the very real dangers became apparent. Described as "a barbarous practice, the inconsistency, folly, and injury of which no words can sufficiently describe" by the prominent chemist Thomas Graham (1848), mercury remained a common ingredient in patent medicines such as the popular 'Calomel' (not to be confused with Calpol) which was still used in the early 20th century for various ailments. The eventual decline of mercurial cures came with advancements in medical science, particularly the discovery of safer and more effective treatments, such as antibiotics for many of the conditions it was used to treat.

A consistent theme throughout the history of medicine is that 'cures', such as Album Graecum and mercury do not fall out of fashion because they are ineffective or injurious, even when the harm is obvious and severe. These iatrogenic approaches are only abandoned when they are replaced by more effective treatments. The history of medicine teaches us that clinicians and their patients will persist with even grossly injurious treatments in the absence of other alternatives. Why do people persevere with treatments that are clearly causing harm despite clear evidence to the contrary?

Lessons from Psychology

Cognitive Biases: Introduction

"To err is human" (Alexander Pope, 1713), but an appreciation of the systematic ways in which we err is relatively recent. The study of systematic errors in human judgment dates back to the mid-20th century when Herbert Simon (1957) introduced the concept of "bounded rationality"—the idea that decision-making is limited by the information available, cognitive capacity, and time. Further challenges to 'rational' decision making arose from the understanding that people often rely on mental shortcuts, or heuristics, to make decisions (Tversky and Kahneman, 1974). In three decades of work that eventually led to a Nobel prize in 2002, Kahneman formalized the study of these mental shortcuts, identifying a large number of systematic cognitive biases that lead people to make irrational decisions (Kahneman, 2011).

Cognitive Biases in Medicine

Systematic cognitive biases can have a significant impact on decision making in medical settings throughout the patient journey (Bornstein and Emler, 2001; Croskerry, 2003; O'Sullivan and Schofield, 2018). Anchoring bias is a narrowing of focus that can occur right at the beginning of a patient consultation. This happens when doctors rely too heavily on the first information they encounter (the "anchor"). The first symptom or test result that a doctor encounters can strongly influence their subsequent diagnosis and treatment plan. Once 'anchored', it can be extraordinarily difficult to change an initial diagnosis as further biases come into play (Berner et al, 2003). Confirmation bias refers to the tendency to search for, interpret, and remember information in a way that confirms our preconceptions or initial hypotheses while giving less consideration to alternative possibilities. In medical decision-making, once a doctor has an idea about an initial diagnosis, they will look for evidence that supports that diagnosis while overlooking or dismissing evidence that contradicts it. The availability heuristic is a psychological shortcut that relies on immediate examples that come to mind when evaluating a specific topic or decision. In a medical context, a doctor is more likely to diagnose a condition they have encountered frequently or recently rather than considering all possible diagnoses. In many healthcare systems, an increased susceptibility to anchoring bias, confirmation bias and the availability heuristic is built into the system, as symptoms will be interpreted via the specialism of the physician seeing the patient. Many hospital doctors work in highly specialised areas of medicine, making them particularly susceptible to interpreting symptoms through the lens of their speciality since these are the patients they see most often. This can lead to overconfidence. The overconfidence bias refers to the tendency of individuals to overestimate their knowledge, abilities, or the accuracy of their predictions (Berner and Graber, 2008; Croskerry and Norman, 2008). This bias is by no means unique to medicine. Twenty five percent of students place themselves in the top 1% when it comes to rating their ability to get on with other people, whilst 94% of academics rate themselves in the top half of their profession (Cross, 1977). However, in medicine, overconfidence is further fostered by a culture where uncertainty is considered a weakness and the 'memeplex of certainty, overconfidence, autonomy and an all knowing paternalism' are rife (Croskerry and Norman, 2008). In medicine, overconfidence can lead doctors to make decisions without fully considering all the evidence or consulting colleagues or other specialists. This bias can be particularly hazardous in complex cases where thorough investigation and collaboration are necessary.

Once a diagnosis has been made and a course of treatment has been embarked upon, another bias comes into play that blinds both doctors and their patients to the true impact of the treatment. The sunk cost fallacy is the tendency to continue a course of action because of the resources already invested, even when continuing is no longer the best option. In medical decision-making, this bias might lead doctors to persist with a treatment plan despite evidence that it is ineffective, simply because of the effort and resources (time, money, effort, pain, suffering) already expended. Ironically, since these 'costs' include pain and suffering caused by the treatment, the treatments that cause the most harm are most susceptible to this bias. The sunk cost fallacy in medicine leads to prolonged suffering and unnecessary expense and is also associated with missed opportunities to explore more effective alternatives. The sunk cost fallacy likely played a significant role in the suffering and death of many of the victims of mercury poisoning over the centuries.

The sunk cost fallacy is not the only cognitive bias contributing to the longevity of harmful practices. Additional biases significantly contribute to maintaining poor clinical practices on a widespread basis, even after clear evidence emerges that a treatment is ineffective, harmful, or both. The status quo bias is the preference for maintaining the current state of affairs rather than making changes. In healthcare, this bias manifests as a reluctance to adopt new treatments, technologies, or approaches, even when the evidence suggests they might be better than existing practices. The bandwagon effect can aid this inertia and resistance to change. This refers to the tendency to do (or believe) things because many others do (or believe) the same. It can also lead to the widespread adoption of practices or treatments simply because they appear to be popular or widely accepted, without sufficient critical evaluation by individual clinicians. For example, a diagnostic test or treatment might become standard practice in a specialty, not because it is evidence based, but because everyone else is using it. As with the other biases, this can perpetuate suboptimal practices and inhibit the adoption of better alternatives.

Even if doctors are able to overcome all of these biases and they are able to identify a significant issue with a treatment, they still may not take action to abandon it. A bystander effect may come into play where the individual assumes that someone else will intervene or that the issue cannot be as serious as it appears, reasoning that if it were, somebody else would have surely noticed and done something about it. If someone does decide to raise the alarm, they will come up against the authority principle, where individuals in a group are socialised to trust those in power. Individuals who challenge those in power may be perceived as unreliable troublemakers or motivated by prejudice, self-interest, or malice, causing their claims to be dismissed without due consideration. Social proof, a psychological phenomenon where individuals look to the behaviours of others to determine the appropriate way to behave, may prevent even a cursory engagement with the actual arguments of a whistleblower, particularly in rigid hierarchical medical environments where the authority principle is strong. If the whistleblowers are heard, their message is likely to create powerful cognitive dissonance in those who have been offering the treatment, creating a situation where someone is forced to reconcile their beliefs with markedly discordant information. In these circumstances an individual will often work hard to dismiss the evidence of harm in order to maintain psychological equipoise. Reconciling the tension by accepting the evidence has a very personal element in medicine, requiring the physician to recognise that while they thought they were helping their patients, they were actually harming them. For some the inability to change course at this stage becomes a hill they will die on.

During the 1960s and 70s, Dr. Harry Bailey worked as a psychiatrist in a small private hospital in Sydney, Australia. Extrapolating wildly from some of the more cautious approaches with medication he had observed in Europe and isolated from mainstream clinical practice in his private clinic, he developed a radical new treatment for his patients, administering massive doses of barbiturates to place them in a comatose state for weeks at a time. Twenty-six patients died while undergoing the therapy or shortly afterwards. In the resulting lawsuit, many more patients came forward reporting long-term neurological difficulties resulting from the therapy. Despite literally being confronted with dead bodies in his clinic, Dr Bailey never accepted that his ‘deep sleep therapy’ was harmful. He died by suicide in 1985, aged 61, before his trial for the death of one of his patients had concluded. His belief in the treatment that he had pioneered remained steadfast to the end. His suicide note read “Let it be known that (…) the forces of madness have won”.

Finally, even when proven right, whistleblowers often face ostracism and hostility from the group (Lennane, 2012). One study of whistleblowers found that 90% lost their jobs or were demoted after raising concerns, and nearly one in three were subject to lawsuits themselves. Seventeen percent lost their home, and 10% attempted suicide after whistleblowing (Lennane, 2012). Witnessing this metaphorical ‘shooting of the messenger’ makes it much less likely that anyone who has seen someone go through this process will come forward if they suspect something awry in their own medical field.

In summary, cognitive biases and group dynamics have evolved to help us deal with the world and cooperate with each other, but they can systematically distort our perceptions of reality. They play a significant role in medical decision-making, leading to errors in diagnosis, treatment, and the evaluation of outcomes. The structure of many advanced healthcare systems, with medical specialities operating in their own silos, and limited opportunities to learn from feedback (Berner and Graber, 2008) often amplifies the impact of these biases in medical decision-making at all points along the patient journey.

Challenging Cognitive Biases

There is a large literature looking at the impact of these biases on decisions made in real life medical settings (O’Sullivan and Schofield, 2018) particularly in emergency medicine where decisions are made under pressure (Hartigan et al, 2020; Jala et al, 2023). However, there are long term hidden harms that cognitive biases can also cause to other groups, particularly those with chronic and refractory diseases. The impact of overconfidence has received particular attention (Berner and Graber, 2008; Croskerry and Norman, 2008). Berner and Graber (2008)’s excellent review presents sobering statistics on the scale of the failure of clinicians to recognise their likelihood to misdiagnose. Whilst most clinicians recognise the problem of misdiagnosis in medicine, only 1% admit to making a diagnostic error in the past year. Although most physicians acknowledge the possibility of medical errors, they tend to believe that mistakes are generally made by others. This lack of awareness is perpetuated in part, by a lack of feedback with respect to poor outcomes, preventing doctors from being able to calibrate the extent of their mistakes (Berner and Graber, 2008).

Researchers have also focused on ways in which these biases can be reduced (Christenson et al, 2022; Croskerry, 2003; Royce et al, 2019; Schiff, 2008; Sibbald et al, 2019; Sullivan and Whyte, 2019). Remedial strategies fall into two broad categories, those that focus on the individual and those that modify the environment in which the doctor practices. For individuals, the use of knowledge retrieval checklists alone doesn't overcome their cognitive biases (Sibbald et al, 2019). More effective strategies range from programs to enhance critical thinking (Christenson et al, 2022; Royce et al, 2019) to targeted training in 'cognitive debiasing' (Croskerry, 2003). Debiasing strategies include using a working diagnosis (Sullivan and Whyte, 2019) or reframing a diagnosis as a relationship rather than a label (Schiff, 2008) to reduce anchoring. Much of this literature emphasises the importance of systematic feedback to keep overconfidence in check (Berner and Graber, 2008; Croskerry and Norman, 2008; Schiff, 2008). Healthcare professionals can also improve their decision-making processes by actively questioning their initial judgments, seeking second opinions, and being open to new information and perspectives. Whilst some of these strategies can reduce the impact, no surefire methods exist to completely eradicate biases in medical decision making on an individual basis (Bornstein and Emler, 2001).

Cognitive Biases and the Evidence Base

As outlined above, much of the literature on the impact of cognitive biases on medical practice focuses on the decisions that doctors make for individual patients and the ways in which they routinely and systematically deviate from 'best practice'. However, the influence of cognitive biases on what constitutes best practice is often overlooked. Regulatory approvals for medications and National Institute for Health and Care Excellence (NICE) guidelines establish a solid evidence base for many treatments, yet there remains a substantial gap where no approved treatments exist for certain conditions or specific patient groups. In this off-label treatment space, some practices may gain acceptance as "standard care" despite lacking the rigorous testing required for regulatory endorsement. In this context, cognitive biases and group dynamics can significantly shape perceptions of the evidence base, potentially resulting in iatrogenic care at a systemic level.

The Impact of Cognitive Biases in The Treatment Gap

There is a treatment gap in modern medicine where doctors have considerable latitude in the treatments they may offer via the route of off-label prescribing. Radley et al (2006) found that roughly one in five of all prescriptions were for off-label uses, most without sound scientific support. This number can exceed 50% in some fields of medicine (e.g., psychiatry, oncology, and paediatrics). Up to 80% of drugs prescribed in some paediatric settings are off-label, with the practice most prevalent in neonatal and adolescent medicine (Hoon et al, 2019).

Some off-label prescribing patterns stay relatively close to the original approvals whilst other prescribing practices have veered off in dramatic tangents away from the original approvals. For example, Botox received Food and Drug Administration (FDA) approval as a treatment for strabismus in 1989. Today off-label uses have proliferated to treat a diverse range of conditions, ranging from atrial fibrillation to vaginismus. Botox has also been used to treat psychiatric conditions such as social anxiety and depression, the rationale for the latter being that relaxing the facial muscles involved in frowning may alleviate the symptoms of low mood (Finzi and Rosenthal, 2014).

Botox is by no means the only treatment whose current use has strayed far beyond the original approvals. Gonadotropin-releasing hormone (GnRH) analogues regulate the production of sex hormones (estrogen and testosterone). These drugs were initially approved by the FDA for the palliative treatment of advanced prostate cancer in men and six years later for the treatment of hormone receptor-positive breast cancer in premenopausal women. In 1993, the first and only approval of the use of these drugs in children was granted for the treatment of precocious puberty. In the late 1990s GnRH analogues began to be prescribed off-label to treat children with gender dysphoria. While all clinicians who prescribe for this group agree on the primary function of the drug (to pause puberty), various rationales are given as to why stopping a normal, physiological developmental process would be beneficial for these children. Some argue that pausing development allows a child 'time to think' about their future treatment options. Others argue that the drugs play a critical role in preventing the development of secondary sex characteristics associated with a child's natal sex in children whose gender identity differs from their natal sex. Others argue that the drugs are a 'life-saving' mental health intervention (Rew et al, 2021).

In the absence of data from well-constructed clinical trials, off-label prescribing ought to emerge from a strong rationale for using a drug, with the meticulous monitoring of outcomes to ensure patient safety and efficacy. In practice, there is often no firm consensus on the rationale for the treatment. Does the physical inability to frown really lift depression? Some argue that gender dysphoria is the inevitable result of being "born in the wrong body", while others contend that for at least some children in the current cohort, it is a symptom of adolescent distress that will resolve following natural puberty. Lack of clinical consensus increases in conditions with a substantial psychological component, where diagnostic criteria are subjective and ill-defined, or where the cause is unknown. As a result, off-label prescribing can lead to significant variations in treatment standards. At the time of writing, prescribing puberty blockers to treat gender dysphoria is effectively prohibited in the UK. UK Government (2024) and parts of northern Europe, while some regions in the USA have been designated 'sanctuary' states to allow access to these medications for citizens beyond their borders (Hernandez, 2023). Both groups of clinicians sincerely believe they are doing their best for their patients, but these are fundamentally incompatible positions.

With such polarised positions emerging from off-label prescribing practices, some off-label prescribing practices could be seen as a portal back to a time when drugs were unregulated. When evidence is absent, treatments are constructed with conjecture plugging the gaps. It is in these often-substantial gaps that a potent mix of opinion and belief leech back into the system, where they can run riot, fuelled by the psychological biases and group dynamics that have shaped problematic medical practices for millennia.

What Constitutes Evidence?

Fortunately, there is a way out of polarised medical opinion, which comes in the form of two pyramids. The first is the evidence pyramid, a visual representation of the hierarchy of evidence in medical research. It represents the relative strength and reliability of different types of evidence when making clinical decisions. While all levels of evidence contribute to scientific understanding, the confidence one can have in the conclusions increases as one moves up the pyramid. See Fig. 1.

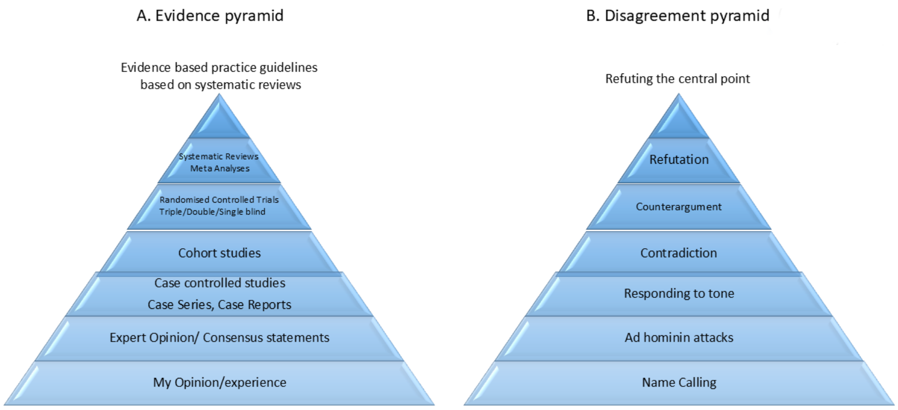

Fig. 1. Pyramids of evidence and disagreement: Tools in the appraisal of evidence and resolution of opposing views in medicine (Graham, 2008). The figure was created in PowerPoint (Microsoft PowerPoint Version 2108. Microsoft Corporation. Redmond, WA, USA).

Comparing conclusions from evidence at the bottom of the pyramid (expert consensus) to that at the top (systematic reviews) is a sobering lesson in the impact of cognitive bias on medical practice. While we expect certainty and confidence to reduce as more robust evidence is required to support a conclusion, we hope the evidence emerging from every level points in the same direction. However, all too often, conclusions from studies at the top of the evidence pyramid directly contradict those from lower down. This is particularly stark when expert consensus goes head-to-head with evidence from systematic reviews.

It is an uncomfortable fact that expert consensus is frequently wrong in medicine, sometimes with catastrophic consequences. Up until the early 1990s, the expert advice of paediatricians to new mothers was to put their newborns to sleep on their front, even though the evidence was available in 1970 that the practice was associated with an elevated risk of sudden infant death syndrome. If a systematic review of the evidence had been conducted in 1970 and the results acted upon, over 50,000 infant deaths in Europe, the USA, and Australasia may have been avoided (Gilbert et al, 2005). As it was, the harmful 'expert consensus' continued to guide clinical practice for over two decades after the evidence base clearly pointed in a different direction.

Gender-affirming care for young people is another area of medicine where ‘expert consensus’ on the best treatment approach (Coleman et al, 2022) radically differs from the conclusions drawn from systematic data reviews (Cass, 2024). Clinicians in Europe revised their practices and changed course following the outcome of the Cass Review. Meanwhile, many in northern America continue to rely heavily on expert consensus (McNamara et al, 2024) to inform their practice.

Amoretti and Lalumera (2023) present an elegant case study of the numerous cognitive biases that influenced the fate of the Astra Zeneca Vaxzervria vaccine for COVID-19 in different countries of Europe during the pandemic. Following reports of rare blood clots associated with the vaccine, some countries such as Denmark, halted the vaccine entirely, whilst the UK continued its use, offering younger adults alternative options. Explorations of the evolution of the radically different policies that emerged across Europe neatly illustrates the ways in which the socio-political environment provided the anchor and fuelled the subsequent confirmation bias that led to each region to draw very different conclusions from the same data (Amoretti and Lalumera, 2023)

Hierarchies of Disagreement

Graham’s Hierarchy of Disagreement (Graham, 2008), is a model that categorises different types of arguments based on their validity and constructiveness in a debate. This is the second pyramid that can help us find a way through when medical opinions are polarised. This hierarchy encourages constructive and respectful discourse by highlighting the value of engaging with ideas, not just individuals.

In medicine the hierarchy of disagreement is a valuable tool for examining the arguments made by groups advocating different treatment approaches, particularly when combined with the evidence pyramid. Anyone wondering whether to rely on the recommendations of Cass Review or those who have rebuffed these arguments would be encouraged to annotate the critique published by (McNamara et al, 2024), with coloured highlighters to code the types of argument used against the conclusions of the Cass Review or try the same with Cheung et al.’s 2024 critique of McNamara’s critique - (Cheung et al, 2024). The resulting colour maps neatly illustrate the predominance of arguments from each level of the disagreement pyramid.

Why might clinicians continue with a treatment, even when evidence from systematic reviews suggests there is no evidence that it is helpful and may even harm some patients? Firstly, it is difficult to override personal experience. The doctor may be able to bring to mind several of their own patients who appeared to benefit from the treatment. In October 2024, the New York Times (Ghorayshi, 2024) published a story about why a long-awaited study of the impact of puberty blockers on the mental health of transgender youth remained unpublished. The data demonstrated that the puberty blockers did not lead to the improvements in mental health that had been anticipated. The lead researcher was concerned that these disappointing results would be weaponised in the highly polarised field of gender medicine but also noted “doctors’ clinical experience was often undervalued in discussions of research". Having prescribed puberty blockers and hormonal treatments to transgender children and adolescents for 17 years, the doctor reported that she had observed how profoundly beneficial they could be. This is a dramatic example of personal experience overriding the objective evidence, even evidence derived from studies designed and conducted by the doctor herself.

Second, the cognitive dissonance generated when someone is confronted with evidence that contradicts their core beliefs can be hard to tolerate. To reduce the discomfort, they either need to modify their beliefs to accommodate the new information or try to discredit the new evidence in an attempt to regain their psychological equilibrium. In most cases, modifying a belief about a medical treatment is straightforward. If a new treatment comes along that is better than an existing one, most doctors will change their practice accordingly. However, if evidence from a systematic review indicates that a treatment may harm a patient, any doctor who modifies their beliefs must also accept that they may have harmed some of their previous patients. This can be hard for some to even contemplate, never mind come to terms with. Accepting the new evidence also challenges their belief that they are a diligent, caring doctor or a pioneer in their field. If a doctor's beliefs also have an ideological component and are closely associated with their wider worldview, it is even less likely that their beliefs will change.

Conclusion

Doctors should neither overestimate their capacity to heal nor underestimate their capacity to cause harm. Safeguards and regulations have been introduced to protect the public from the (sometimes fatal) flaws in medical decision-making that underpin medical scandals, but patients continue to be at risk particularly in the realm of off-label prescribing where practices can become established, and 'routine' on very shaky evidential foundations. Once established, systematic cognitive biases come into play to blind clinicians to even obvious signs that an intervention may not be effective, or could even be harmful. If an individual is able to overcome these cognitive biases and identify a problem, group dynamics will typically come into play to dismiss or minimise concerns in an effort to preserve the status quo. Whilst there is a substantial literature on the ways in which cognitive biases can influence individual decision making, particularly with respect to diagnostics, the influence of these factors on shaping perceptions of the evidence base for clinical care has received less attention. Guidelines derived from systematic reviews represent the most solid evidence base for clinical practice. Guidelines derived from clinical consensus are highly susceptible to cognitive biases and group dynamics, particularly when objective evidence of efficacy is limited and comprehensive clinical feedback mechanisms are absent. Awareness of these biases and the way they may influence not just individual decision making, but perceptions of the evidence base upon which these decisions are made, may be the first step in reducing their negative impact on patient care.

Key Points

- Cognitive biases influence decision making in all spheres, but can have significant impacts on patient care in medicine.
- Although their role is clear in the analysis of historical medical scandals, these influences are by no means consigned to the past and continue to influence clinical practice today.
- Clinicians working in highly specialised settings are particularly vulnerable to some of these biases.
- Becoming aware of these biases and how they influence decision making on an individual level is the first step to reducing their impact in clinical decision making.
- Understanding the role of these influences on clinical consensus is critical when evaluating the strength of evidence for any intervention, particularly when working in specialties where the empirical evidence is contested or weak.

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Author Contributions

SB contributions to the conception of the work. SB drafted the manuscript. SB contributed to important editorial changes in the manuscript. The author read and approved the final manuscript. The author agreed to be accountable for all aspects of the work.

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