

# Countering cognitive biases in minimising low value care

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**P**rofessionally led initiatives, such as the Choosing Wisely Australia campaign ([www.choosingwisely.org.au](http://www.choosingwisely.org.au)) and EVOLVE (Evaluating Evidence, Enhancing Efficiencies; <http://evolve.edu.au>), aim to raise awareness of, and reduce, low value care. This is care that confers little or no benefit, may instead cause patient harm, is not aligned with patient preferences, or yields marginal benefits at a disproportionately high cost. In this article, we discuss cognitive biases that predispose clinician decision making to low value care. We used PubMed listings of original articles from 1990 to 2015 related to cognitive bias in clinical decision making, including a recent systematic review,<sup>1</sup> files of relevant publications held by the authors and sentinel texts in cognitive psychology as applied to clinical practice (Appendix). We believe that these biases need to be understood and addressed if campaigns such as Choosing Wisely and EVOLVE are to achieve their full potential.

## Influence of cognitive biases on clinical decision making

Much of everyday clinical decision making is largely intuitive behaviour guided by mindlines (internalised tacit guidelines on how to manage common problems)<sup>2</sup> and heuristics (mental rules of thumb or shortcuts when dealing with uncertainty).<sup>3</sup> These cognitive processes derive not only from formal education and training (which impart scientific evidence), but from peer opinion, personal experience, professional socialisation and societal norms (which impart context or colloquial evidence).<sup>4</sup> While accurate and efficient for many decisions, this intuitive decision making is vulnerable to various cognitive biases — or systematic error driven by psychological factors — which can distort both probability estimation and information synthesis,<sup>5</sup> and steer clinicians towards continuing to believe in, and deliver, care that robust evidence has shown to be of low value.<sup>6</sup>

## Common forms of cognitive bias

There are multiple biases that may overlap according to the circumstances surrounding a decision, particularly in how benefits and harms, and their relative likelihood, are quantified and valued by different individuals. Some of the most influential and frequently encountered biases are discussed below.

### Commission bias

Clinicians are more strongly distressed by losses than they are gratified by similarly sized, or even larger, gains. They have a strong desire to avoid experiencing a sense of regret (or loss) at not administering an intervention that could have benefited at least a few recipients (omission regret). Errors of omission are a stronger driver for doctors than errors of commission, overpowering any regret for the adverse consequences to both patients and the health care system of giving an intervention unnecessarily to many who will never benefit from it or, in some cases, be harmed.<sup>7</sup> Omission regret is greatest for decisions involving critical losses. Emergency

## Summary

- Cognitive biases in decision making may make it difficult for clinicians to reconcile evidence of overuse with highly ingrained prior beliefs and intuition.
- Such biases can predispose clinicians towards low value care and may limit the impact of recently launched campaigns aimed at reducing such care.
- Commonly encountered biases comprise commission bias, illusion of control, impact bias, availability bias, ambiguity bias, extrapolation bias, endowment effects, sunken cost bias and groupthink.
- Various strategies may be used to counter such biases, including cognitive huddles, narratives of patient harm, value considerations in clinical assessments, defining acceptable levels of risk of adverse outcomes, substitution, reflective practice and role modelling, normalisation of deviance, nudge techniques and shared decision making.
- These debiasing strategies have considerable face validity and, for some, effectiveness in reducing low value care has been shown in randomised trials.

physicians, who are compelled to make life or death decisions on a regular basis, knowingly overorder diagnostic imaging because of the fear of missing a very unlikely but potentially lethal (and treatable) diagnosis.<sup>8</sup> Such commission bias exacerbates defensive medicine, even though communication and interpersonal failures evoke most law suits,<sup>9</sup> and drives overinvestigation and overtreatment. In cases of advanced or terminal illness, clinicians may continue to provide futile care due to a desire to act, coupled with a tendency to overestimate patients' survival,<sup>10</sup> and perceiving death as a treatment failure.<sup>11</sup>

### Attribution bias (illusion of control)

Anecdotal and selective observations of favourable outcomes attributed to an intervention may lead to undue confidence in its effectiveness. Surgery for back pain<sup>12</sup> or chemotherapy for certain cancers<sup>13</sup> are examples. Attribution bias is accentuated when personal expertise and skill are perceived to be major determinants of effectiveness, particularly when patients experiencing poor outcomes never return for follow-up.<sup>14</sup> Also relevant is a lack of appreciation of regression to the mean (ie, over time, what were outlier readings, such as elevated blood pressure levels, will converge to a lower average in the absence of antihypertensive treatment) and placebo effects (ie, simply administering a treatment will make many patients feel better, despite no plausible mode of action). An innovation or novelty bias may also make clinicians assume that newer — and more costly — tests and treatments are necessarily more beneficial than existing ones.

### Impact bias, affect bias and framing effects

Patients<sup>15</sup> and clinicians<sup>16</sup> tend to overestimate the benefits and underestimate the harms of interventions (impact bias). Initially

favourable impressions of an intervention may evoke feelings of attachment and persisting judgements of high benefits (and low risks), despite clear evidence to the contrary (affect bias).<sup>17</sup> Benefits and harms are often framed (and expressed) as more appealing relative measures, rather than more temperate absolute measures (framing effects).<sup>18</sup> For example, having the 5-year risk of death reduced by 30% is perceived as having higher value than reducing the absolute risk by only 1 percentage point, or having one life saved for every 100 people treated over 5 years, while also causing one in every 200 treated people to be harmed.

### Availability bias

Emotionally charged and vivid case studies that come easily to mind (ie, are available) can unduly inflate estimates of the likelihood of the same scenario being repeated. For example, residents with recent negative experiences with unexpected bacteraemia were more likely to suspect and empirically treat patients with similar presentations, regardless of risk factors, clinical features or disease severity.<sup>19</sup>

### Ambiguity (uncertainty) bias

Estimating likelihood of disease or outcomes of care involves uncertainty which, if disclosed to patients or peers, may threaten clinicians' sense of authority and credibility. More investigations and treatments — the cascades of care<sup>20</sup> — reflect an elusive search for diagnostic or therapeutic certainty. Even when the evidence base that defines an intervention as being of low value is well known and accepted by most clinicians, interventions are still performed simply to provide added reassurance and assuage patient or peer expectations.<sup>21</sup> In patients with very low likelihood of serious disease, such overinvestigation does little to reduce their anxiety or desire for more testing.<sup>22</sup>

### Representativeness (extrapolation) bias

Evidence of intervention benefit in a circumscribed sample of patients may encourage clinicians to expect similar effects among a wider spectrum of patients who share (or represent) similar disease traits, but in whom evidence of benefit is lacking. Such indication creep, often manifesting as off-label prescribing, takes little account of effect modifiers (factors that may attenuate or reverse treatment effects) or competing risks (other concomitant diseases, unaffected by the intervention in question, that compete with the target disease in causing death or ill-health).<sup>23</sup> This is particularly pertinent to older patients with complex multimorbidity and frailty.

### Endowment effects and default (status quo) bias

Endowment effects are seen when patients and clinicians place a greater value than they may otherwise on a longstanding form of care that is about to be withdrawn.<sup>24</sup> Reluctance to discontinue longstanding but potentially inappropriate medications may represent endowment effects, combined with uncertainty bias and another form of omission bias — being more willing to risk harms arising from inaction than from action.<sup>25</sup> When formulating advance care plans, patients and clinicians are more likely to express a preference for wanting more treatment to be given if, in the absence of explicit statements to the contrary, most treatments will, by default, be withheld.<sup>26</sup> In other situations, having to consider the advantages and disadvantages of ceasing or declining certain interventions is often confronting, resulting in a preference to simply maintain the status quo.<sup>27</sup>

### Sunken cost (vested interest bias) bias

Clinicians may persist with low value care principally because considerable time, effort, resources and training have already been invested and cannot be forsaken. In one study, the one in ten clinicians who continued to recommend an ineffective intervention argued that, with more time, modification, expertise or research, it would eventually be shown to work.<sup>28</sup> Sunken costs relate not only to clinicians' training and expertise but also to capital expenditures (ie, equipment) requiring a return on investment.

### Biases peculiar to groups

Like all humans, clinicians seek to belong to, and receive affirmation from, groups who share similar values and outlook. Groupthink and herd effects (or bandwagon or lemming effects), often fuelled by influential individuals with authority or charisma, may discourage or dismiss dissenting views about the value of an intervention.<sup>29</sup> Internal reward systems reflecting wider group norms may predispose to self-deception and rationalisation of actions. These group biases may easily override remuneration incentives or administrative or policy mandates.

### Mitigating the influence of cognitive biases

Cognitive biases may be mitigated or even reversed through countervailing heuristics (Box) applied using meta-cognitive strategies (ie, thinking about one's thinking).

### Cognitive huddles and autopsies

Case studies of low value care, as identified through quality and safety audits or mortality and morbidity meetings, could be presented within a closed group (or huddle) of collegiate clinicians by the individual in charge of the case, with comments invited from participants. This cognitive autopsy helps to disclose missteps in decision making induced by biases related to both clinical and non-clinical factors.<sup>30</sup> The group comes to appreciate, in a constructive tone that prevents demoralising individuals, that even experienced clinicians may fall prey to bias.

### Narratives of patient harm

The availability heuristic can be used in reverse in the form of sobering case narratives of significant patient harm resulting from ill-advised actions, coupled with an exposé of wrong reasoning according to best available evidence and expert opinion. The teachable moment series of real-life case studies published in *JAMA Internal Medicine* are good examples of this approach.

### Value of care considerations in clinical assessments

When formulating diagnostic impressions and management plans, conscious consideration should be given to adding a value statement detailing the perceived benefits, harms and costs of what is being planned.<sup>31</sup> Focused attention on the consequences of decisions may reframe any negative connotations of not doing certain things to a positive stance of configuring care to bestow the highest value for that patient. Any potential for omission regret felt by the clinician may be reframed as offsetting patient regret from their consenting to a management plan that results in undesired outcomes.<sup>32</sup>

### Defining acceptable levels of risk of adverse outcomes

Across a range of clinical scenarios, clinicians may define, in collaboration with patients, the minimum mutually acceptable probability of an adverse disease-related outcome if an

**Debiasing heuristics**

Cognitive bias	Heuristic towards low value care	Debiasing heuristic against low value care
Commission bias	If I do not do this, how may my patient suffer?	If I do this, how may my patient suffer? I may suffer (medico-legally or in other ways) if I do not do this — so am I treating myself or the patient?
Attribution bias (illusion of control)	I conclude that this treatment is very effective on the basis of my experience of giving it in the manner I regard as optimal.	Before I conclude this treatment is effective, should I look for other explanations, or look for evidence of failure, or at least compare my experience with that of others?
Impact bias, affect bias and framing effects	This treatment appears to work very well as all the patients who attend for follow-up seem quite satisfied with the outcome. I feel I have administered this treatment very well and the outcomes speak for themselves. I am impressed with the relative reduction in deaths that this treatment confers.	Do I know what has happened to the patients who did not return for follow-up?  Can I be sure the patient could not have improved even if I had done nothing? Is this apparent improvement a true treatment effect or is it a placebo effect or part of the natural history of this condition? How many patients do I have to give this treatment to in order to save one extra life and, of all those who receive it, how many will be harmed by this treatment?
Availability bias	I well remember the case of Mr X, who did very well with this treatment despite all the odds.  I recall a case where a patient had a serious condition I least expected and would have suffered a very poor outcome if I had not treated him empirically with treatment X.	Was the experience of Mr X, something I would expect to see on the law of averages or was it really a one-off? If I was to treat all future cases such as this one in a similar manner, am I likely to save more patients from a bad outcome or could I actually cause more problems (such as drug reactions or complications) related to the treatment?
Ambiguity (uncertainty) bias	I am uncertain as to what to do here so I will stick with standard procedure and do what I think everyone else seems to do, or what I think the patient wants me to do.	As I am uncertain, should I carefully consider the different options and make a judgement on what I, as the responsible clinician, think is in the patient's best interests?
Representativeness (extrapolation) bias	This treatment worked well in my 45-year-old patient with moderate hypertension so I cannot see why it should not work in my 70-year-old patient with severe hypertension and chronic renal failure.	The 70-year-old patient could well have a different physiology and less reserve than the 45-year-old; so should I tread carefully and consider other options that have been tested in this sort of patient?
Endowment effects and default (status quo) bias	I have never been a big user of this intervention but I do not like the idea that it is being taken off the public subsidy list.  I believe this patient needs all these medications and I am not going to court disaster by trying to stop any of them.	Should I question the value of this intervention when there are so few indications for it and what indications there are have never been properly evaluated? Is this patient at risk of drug interactions and side effects from taking all these medications, and if so, could he be better off if I was to try taking him off a few?
Sunken cost (vested interest) bias	I have practised and invested a lot in this type of medicine for a long time, I believe in its worth and I am not easily swayed.	Can I afford not to reconsider my practice when this new evidence suggests pretty strongly I may not be doing the right thing?

intervention was to be withheld. For example, emergency physicians are happy to not admit patients with acute chest pain and withhold further investigations if the absolute risk of major adverse cardiac events at 30 days is estimated to be less than 1%.<sup>33</sup> Patients in a randomised trial of an acute chest pain decision aid also accepted a similar threshold.<sup>34</sup>

**Providing alternatives**

Offering alternative care of higher value as a substitute for low value care may mitigate endowment effects and sunken cost bias, while also providing a means for channelling clinicians' bias towards action. For example, while refraining from performing low value annual health checks in asymptomatic patients,<sup>35</sup> general practitioners may undertake more actions directed to chronic disease management among those with advanced multimorbidity.<sup>36</sup> Just empathising with patients and providing education and reassurance may avoid unnecessary intervention in acute care settings.<sup>37</sup>

**Reflective practice and role modelling**

On ward rounds or in educational meetings, peers and experts may ask reflective questions such as "how would the test result change the management?" and "what alternative forms of care were available and what were their advantages and disadvantages?"<sup>38</sup> The old adage — "we are a teaching hospital" — can be appended with "and therefore we are not undertaking this unnecessary intervention". Role modelling restraint in the use of interventions, showing the wisdom of watchful waiting, and questioning the potential benefits and harms of planned interventions are means for instantiating low value care.<sup>39</sup>

**Normalisation of deviance**

What is initially regarded as "deviant" behaviour may come to be viewed collectively as the accepted norm. Many hospitals require all intravenous cannulas to be routinely resited every 72 hours with the aim of reducing catheter-related bacteraemias. However,

compliance with this rule, which is time-consuming for staff and uncomfortable for patients, is dissipating as more clinicians accept that the practice is no better in reducing catheter-related bacteraemias than monitoring and resiting cannulas only when clinically indicated (eg, signs of inflammation, infiltration or leakage).<sup>40</sup>

### Nudge strategies and default options

These strategies influence decision making through subtle cognitive forces, which preserve individual choice but gently push (or nudge) subjects away from low value care. They differ from the aforementioned strategies in that they shape behaviour without deliberately asking clinicians to identify and reflect on the role of bias. They can combine peer comparisons with norm-based messages that emphasise which forms of care are appropriate (high value and aligned with medical evidence) or inappropriate.<sup>41</sup> Public commitment of clinicians towards judicious use of antibiotics in treating upper respiratory tract infections (using poster-sized commitment letters hung in examination rooms) greatly decreased inappropriate prescribing in one randomised trial.<sup>42</sup> In another study targeting the same behaviour, accountable justification (prompts for clinicians to enter free-text justifications for prescribing antibiotics into patients' electronic health records) combined with peer comparisons (such as emails comparing their antibiotic prescribing rates with those of best performers) also reduced inappropriate prescribing.<sup>43</sup> Similar effects were seen in response to subtle changes to menu design and setting defaults and reminders in order sets in electronic health records.<sup>44</sup> A default policy to remove indwelling urinary catheters after 72 hours, unless physicians or nurses document a reason for maintaining them, reduced the incidence of nosocomial infections.<sup>45</sup>

### Exposure to high value care

In reversing group biases, involving clinicians in collaborative quality improvement projects or having them practice in settings where lower intensity care is shown to be associated with equal, if not better, outcomes than those of high intensity care,<sup>46</sup> all help to recalibrate group norms away from low value care. Clinical environments where resources are more constrained (due to capitated budgets or accountable care alliances) encourage clinicians to be more judicious in avoiding low value care.<sup>47</sup>

### Shared decision making

Most informed patients are unlikely to consent to low value care. It involves familiarising patients with the various options available to manage their condition, together with their advantages and disadvantages, and helping them to explore preferences that inform final decisions. Both patient and clinician share uncertainties around explicitly stated benefit–harm trade-offs and thus share the risks around future outcomes, which mitigates uncertainty bias. Expressing concerns for patients' wellbeing by referencing the harms of interventions lowers expectations for low value care.<sup>48</sup> The use of decision aids, which present individualised estimates of absolute benefit and harm, reduces the need for elective procedures by 21%.<sup>49</sup> In addition, shared decision making provides a means for declining patients' requests for low value interventions without loss of trust or goodwill.<sup>50</sup>

### Fitting cognitive debiasing with traditional knowledge translation

Many of the tools of knowledge translation aimed at optimising clinician decision making — such as clinical decision support,

audits and feedback, guidelines and quality incentives — use factual data which, it is assumed, are impartially considered and consistently incorporated into clinician decision making. While not seeking to underemphasise their importance, such tools only optimise decisions in about 10–20% of instances.<sup>51</sup> Their success is heavily dependent on the manner and context in which they are implemented, and their effects often wane over time in the absence of continual reinforcement.<sup>52</sup> The fact that less than a quarter of knowledge translation strategies are grounded in cognitive theories of behaviour change may, in part, explain their limited effectiveness.<sup>53</sup> As a case in point, almost all clinicians know that avoiding antibiotics for viral conditions is appropriate practice, but despite intense educational efforts, numerous guidelines and repeated audits with feedback, many clinicians continue to prescribe antibiotics.<sup>54</sup> Immediate and cognitively salient factors (eg, worry about serious complications and “just in case” mentality, habit, desire to appease patient expectations, and time and effort to counter patient beliefs perceived as a not-worth-it proposition) trump more distant and rational factors (such as risk of adverse drug reactions, need for antimicrobial stewardship and desire to reduce unnecessary health care costs).<sup>55</sup>

This example of overuse of antibiotics is not a knowledge or diagnostic problem, it is a psychological one.<sup>55</sup> The same message comes from studies of the inappropriateness of prescribing in older patients,<sup>25</sup> imaging for low back pain,<sup>56</sup> ordering of diagnostic tests,<sup>57</sup> and use of percutaneous coronary intervention in stable coronary artery disease.<sup>58</sup> This cognitive challenge is born out in survey data, which suggest that clinicians see the key requirements of Choosing Wisely initiatives as being not just an information source but as a means for helping them deal with decisional uncertainty, patient expectations, drives for efficiency and throughput, malpractice concerns and many other contextual drivers of overuse.<sup>59</sup> These observations support the need for a better understanding of cognitive biases and more research into debiasing strategies, which can complement traditional forms of knowledge translation in repelling the forces that promote unnecessary care.

### Conclusion

Cognitive biases predispose to low value care and may limit the impact of campaigns such as Choosing Wisely on reducing such care. Some of the more commonly encountered biases have been presented, together with debiasing strategies that have strong face validity, although relatively few have been subject to randomised effectiveness trials. More research within the field of behavioural economics is needed to fill this evidence gap. In the meantime, clinicians and their patients may benefit from more deliberate attention to the prevalence and effects of cognitive biases on everyday decision making.

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