

The role of cognitive biases in overdiagnosis and overtreatment

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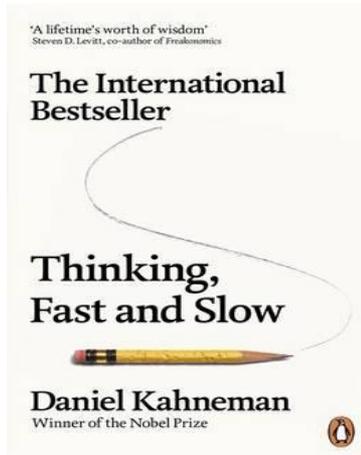
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Cognitive determinants of decision-making

- 2 systems of thinking
 - System 1: intuitive, fast, easy
 - Based on personal 'mindlines', heuristics, beliefs, judgments, preferences
 - Accurate for many decisions, but vulnerable to various cognitive biases (or systematic error driven by psychological factors)
 - System 2: analytic, slow, takes effort
 - Based on science, rational
- Data from a variety of environments demonstrates that human beings prefer to use System 1 processing whenever possible



Cognitive determinants of decision-making

Invited Commentary

Tipping the Balance Toward Fewer Antibiotics

Ateev Mehrotra, MD, MPH; Jeffrey A. Linder, MD, MPH

JAMA Internal Medicine Published online September 19, 2016

“Unfortunately, physician educational efforts have had little effect.....Almost all physicians already know that avoiding antibiotics for viral conditions is the right thing to do, and physicians’ knowledge of guidelines has no association with their likelihood of prescribing an antibiotic.

.....**The overuse of antibiotics is not a knowledge problem or a diagnostic problem; it is largely a psychological problem’**

Box. The Imbalance in Factors Related to Antibiotic Prescribing

Factors Driving Antibiotic Prescribing: Immediate and Emotionally Salient

- Belief that a patient wants antibiotics
- Perception that it is easier and quicker to prescribe antibiotics than explain why they are unnecessary
- Habit
- Worry about serious complications and “just to be safe” mentality

Factors Deterring Antibiotic Prescribing: More Remote and Less Emotionally Salient

- Risks of adverse reactions and drug interactions
- Recognizing the need for antibiotic stewardship
- Desire to deter low-value care and decrease unnecessary health care spending
- Prefer to follow guidelines

Cognitive determinants of decision-making

‘What is required is a behavioural change in healthcare that will not happen through education alone. When there are people who have been practicing medicine the same way for 30 years, they won’t suddenly want to change....There is a need for breakthroughs in implementation techniques to propel the Choosing Wisely movement along.’

Daniel Wolfson, executive vice president and chief operating officer, ABIM Foundation, 2016

Common forms of cognitive bias

Omission regret

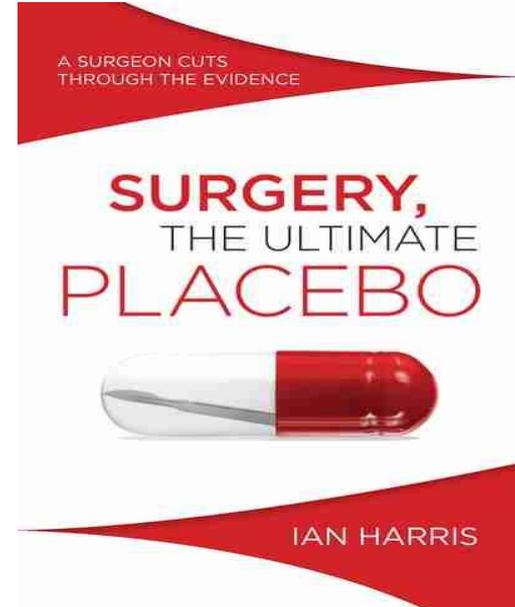
(commission bias, loss or risk aversion)

- Strong desire to avoid experiencing a sense of regret (or loss) at *not* administering an intervention which could have benefited at least a few recipients
 - Clinicians more strongly distressed by losses than they are gratified by similarly sized, or even larger, gains
 - Overpowers any regret for equally or more frequent adverse consequences of giving an intervention unnecessarily to many who will never benefit
(regret of commission)
 - Stronger reaction for critical losses
 - Defensive medicine, non-beneficial care at end of life
 - The need to be seen to be doing something
 - Must give the patient every chance
 - What have we got to lose?
 - More is better
 - All or nothing
- » Ayanian & Berwick *Med Decis Making* 1991; 11(3): 154-158.
» Kanzaria et al. *Acad Emerg Med* 2015; 22: 390-398.
» Alexander & Christakis *J Health Econom* 2008; 27: 1095–1108.
» Palda et al *J Crit Care* 2005; 20: 207-213.

Common forms of cognitive bias



Professor Ian Harris



"The fear of having someone harmed from a missed opportunity is a strong and emotive driver of over-treatment. So is the belief that non-operative treatment equates with neglect, or no treatment."

Common forms of cognitive bias

Attribution bias

(over-confidence, illusion of control, positive outcome bias)

- Anecdotal and selective observations of favourable outcomes attributed to an intervention leading to undue confidence in its effectiveness
- Confirmation bias – selective information that confirms prior beliefs
 - as occurs when only patients experiencing good outcomes return for follow-up
- Lack of appreciation of:
 - regression to the mean
 - placebo effects
- Innovation or novelty bias - newer (and more costly) tests and treatments necessarily of greater impact on patient outcomes than existing ones.

Common forms of cognitive bias

Impact bias, affect bias, framing effects, surrogate effects

- **Impact bias:** over-estimation of benefits and under-estimation of harms of interventions
- **Affect bias:** initially favourable impressions of an intervention engender persisting judgments of high benefits (and low risks) despite clear evidence to the contrary
- **Framing effects:** benefits often framed (and expressed) using more appealing relative measures compared to more temperate absolute measures
 - RRR vs ARR or NNT/NNH
- **Surrogate effects:** overreliance on pathophysiological or anatomical reasoning, or surrogate outcomes, that do not necessarily translate into patient-important benefits

Common forms of cognitive bias

Availability bias

- Emotionally charged and vivid case studies that come easily to mind (but are rare) unduly inflate estimates of the likelihood of same scenario being repeated
 - ‘the patient who surprised us all and did well with treatment despite the odds’

Extrapolation bias

(or representativeness bias)

- Evidence of intervention benefit in a circumscribed sample of patients extrapolated to similar effects among a wider spectrum of patients who share (or ‘represent’) similar disease traits
 - ‘indication creep’
 - takes no account of effect modifiers or competing risks

Common forms of cognitive bias

Endowment effects

- Greater value placed on long-standing form of care when it is about to be withdrawn
- Examples
 - Reluctance to discontinue long-standing but potentially inappropriate medications
 - When formulating advance care plans, patients and clinicians 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
 - Having to consider the pros and cons of ceasing or declining certain interventions is often confronting, resulting in a preference to simply maintain the status quo.

Morewedge & Giblin Trends Cogn Sci 2015;19(6):339-48.

Anderson et al. BMJ Open 2014; 4:e006544.

Kressel et al. J Gen Intern Med 2007;22(7):1007-10.

Sunken cost bias

- Compulsion to persist with low value care principally because considerable time, effort, resources and training have already been invested which cannot be forsaken

Common forms of cognitive bias

Uncertainty bias

(ambiguity, reassurance bias)

- Estimating likelihood of disease or outcomes of care involves uncertainty which, if disclosed to patients or peers, can threaten clinicians' sense of authority and credibility
- 'Cascades of care'* – reflect an elusive search for diagnostic or therapeutic certainty
- Even when 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
- In patients with very low likelihood of serious disease, such over-investigation does little to reduce their anxiety or desire for more testing**

*Mold & Stein N Engl J Med 1986; 314(8): 512-514.

**Kachalia et al. Ann Intern Med 2015; 162(2): 100-108.

Common forms of cognitive bias

Uncertainty bias

(ambiguity, reassurance bias)

BECOMING A PHYSICIAN

Tolerating Uncertainty — The Next Medical Revolution?

Arabella L. Simpkin, B.M., B.Ch., M.M.Sc, and Richard M. Schwartzstein, M.D.

N ENGL J MED 375;18 NEJM.ORG NOVEMBER 3, 2016

- ‘We believe that cultivating a tolerance of uncertainty, and addressing the barriers to this goal for physicians, patients, and the health care system, will require a revolutionary change in medicine’s cultural attitude and approach to uncertainty. Our curricula (formal, informal, and hidden), assessments, and evaluations will need to be modified to emphasize reasoning, the possibility of more than one right answer, and consideration of our patients’ values.’

Common forms of cognitive bias

Biases peculiar to groups

- 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)
 - group norms can predispose to self-deception and rationalisation of actions
 - often fuelled by influential individuals with authority or charisma
- "The problem is that doctors often (unknowingly) rely on biased evidence: what others have taught them, what is common practice, what fits with their beliefs"

» Ian Harris 2015

Countering cognitive biases

System 2 solutions

‘Knowledge translation’ or ‘implementation science’

- Dissemination and implementation of factual, explicit knowledge
 - Managed processes for supporting rationally thinking practitioners (as individuals)
 - Educational or awareness-raising strategies
 - Clinical decision support systems
 - Academic detailing
 - Clinical audits and feedback
 - Best practice guidelines and care pathways
 - Patient mediated interventions
 - Decision aids, patient reminders
 - Financial incentives
 - Regulatory and administrative mandates
- 10% to 15% absolute increase in evidence-based practice

Countering cognitive biases

System 1 solutions

- Imprinting countervailing heuristics using meta-cognitive approach

Cognitive bias	Heuristic towards low value care	Debiasing heuristic against low value care
Commission bias	'If I do not do this, how might my patient suffer?'	'If I do this, how might my patient suffer?'
Attribution bias	'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, 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 I see 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?' '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?'

Debiasing strategies

Cognitive huddles and autopsies

- Case studies of low value care, as identified through quality and safety audits or mortality and morbidity meetings, presented within a closed group (or ‘huddle’) of collegiate clinicians by the individual in charge of the case, with comments invited from participants
- Cognitive missteps in decision-making related to both clinical and non-clinical contexts are disclosed while acknowledging uncertainty, omission regret and extrapolation bias
- Group comes to appreciate, in a constructive tone that prevents demoralising individuals, that even experienced clinicians can fall prey to bias.

Katz & Detsky J Hosp Med 2016; 11 (2): 120–122.

Debiasing strategies

Narratives of patient harm

- 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 expose of wrong reasoning according to best available evidence and expert opinion.
- **Example:** Less is More ‘Teachable moment’ series of real-life case studies published in *JAMA Internal Medicine*

Debiasing strategies

Reflective practice and role modelling

- On ward rounds or in educational meetings, peers and experts can ask reflective questions such as:
 - ‘how would the test result change the management?’
 - ‘what alternative forms of care were available and what were their pros and cons?’
 - Old adage - ‘we are a teaching hospital’ – can be appended with ‘..and therefore we are not undertaking this unnecessary intervention.’
- Role modelling restraint in use of interventions, demonstrating the wisdom of watchful waiting, and questioning the potential benefits and harms of planned interventions are means for instantiating low value care.

Stammen et al JAMA 2015; 314(22): 2384-2400.

Korenstein & Smith JAMA Intern Med 2014; 174(10): 1649-1650.

Debiasing strategies

Normalisation of deviance

- What is initially regarded as 'deviant' behaviour can come to be viewed collectively as the accepted norm.
- **Example:** Many hospitals require all intravenous cannulae to be routinely resited every 72 to 96 hours with the aim of reducing catheter-associated bacteraemias (CABs).

However, compliance with this rule, which is time-consuming for staff and uncomfortable for patients, has gradually dissipated as more clinicians come to accept that the practice was no better in reducing CABs than resiting cannulae only when clinically indicated*

Debiasing strategies

Nudge strategies and default options

- Change in decision making through subtle cognitive forces which preserve individual choice but gently push subjects away from low value care.
- **Examples:**
 - 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*
 - Accountable justification (prompts for clinicians to enter free-text justifications for prescribing antibiotics into patients' EHR combined with peer comparisons (as emails comparing their antibiotic prescribing rates with those of best performers) also reduced inappropriate prescribing

Meeker et al. JAMA Intern Med 2014;174(3):425-31.

Meeker et al. JAMA 2016;315(6):562-70.

Debiasing strategies

Shared decision-making (SDM)

- Most informed patients unlikely to consent to low value care
- SDM involves familiarising patients with the various options available, together with their pros and cons, and helping them to explore preferences which inform final decisions
- Both parties come to share uncertainties around explicit benefit-harm trade-offs and thus share the risks around future outcomes which mitigates uncertainty bias
- Expressing concerns for patients' well-being by referencing the harms of interventions lowers expectations for low value care
 - Use of decision aids which present individualised estimates of absolute benefit and harm reduces need for elective procedures by 21%
 - Patients with 1 of 6 chronic diseases: SDM associated with total care costs 5% lower total care costs and 12% fewer hospital admissions
 - Provides a means for declining patients' requests for low value interventions without loss of trust or goodwill

Adding Value by Talking More

Robert S. Kaplan, Ph.D., Derek A. Haas, M.B.A., and Jonathan Warsh, Ph.D.

Warner et al. JAMA Intern Med 2016;176(8):1219-1221.
Stacey et al. Cochrane Database Syst Rev 2014;1:CD001431.
Brett & McCullough JAMA 2012;307(2):149-50.
James Health Affairs 2013.

Debiasing strategies

- Patients overestimate benefits and underestimate harms of screening tests, treatments
 - » Hoffman & Del Mar JAMA Intern Med 2015
- Majority of law suits, even in cases of missed diagnosis, relate to poor communication and interpersonal failures
 - » Vincent et al Lancet 1994

Vignette	Patients (n = 203) ^b		
	No. (%)	95%	CI _s
Headache: patient A has a headache and is worried about brain cancer, asks PCP for CT scan			
Part 1: PCP does not recommend or order a CT	72 (36.2)	29.5-43.3	
Part 2: PCP explains potential harms of CT radiation exposure	103 (51.2)	44.1-58.3	
Part 3: patient A seeks a second opinion from a different doctor who orders a CT scan	60 (30.0)	23.6-36.7	
Upper respiratory infection: patient B has a runny nose, headaches, no fever and asks PCP for antibiotics			
Part 1: PCP does not prescribe antibiotics	132 (65.7)	58.7-72.2	
Part 2: PCP explains American Academy of Family Physician guidelines, which do not recommend antibiotics for sinus infections	161 (80.5)	74.3-85.8	

Patients who rated care as very good to excellent

Warner et al
JAMA Intern Med
2016

Conclusion

- Cognitive biases predispose to low value care and may limit the impact of campaigns such as CW on reducing such care
- Need for a better understanding of cognitive biases and more research into debiasing strategies which can complement traditional forms of knowledge translation
- Debiasing strategies 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

Debiasing strategies

Defining acceptable levels of risk of adverse outcomes

- Across a range of clinical scenarios, clinicians could define, in collaboration with patients, the minimum mutually acceptable probability of an adverse disease-related outcome if care was to be withheld
- **Example:** Emergency physicians happy to not admit patients with acute chest pain for further investigation if the absolute risk of major adverse cardiac events at 30 days is estimated to be less than 1%.*

Patients in a randomised trial of an acute chest pain decision aid also accepted a similar threshold**

*Than et al. Int J Cardiol 2013; 166(3):752-4.

**Hess et al. Circ Cardiovasc Qual Outcomes 2012;5(3):251-9.

Debiasing strategies

Providing alternatives

- Offering alternative care of higher value as a substitute for low value care can mitigate endowment effects and sunken cost bias while also providing a means for channelling clinicians' action bias
- **Examples:** While refraining from undertaking low value annual health checks in asymptomatic patients, GPs can provide more chronic disease management consultations to those with advanced multi-morbidity

Just empathising with a patient and providing education and reassurance may avoid unnecessary intervention in acute care settings.

Krogsbøll et al. Cochrane Database Syst Rev 2012;10:CD009009.

Smith et al. Cochrane Database Syst Rev 2012;18: CD006560.

Melnick et al. Acad Emerg Med 2015; 22(12):1474-83

Debiasing strategies

Immersions in high value care settings

- In reversing group biases, immersing clinicians in collaborative quality improvement projects or low intensity care environments associated with equal if not better outcomes than those of high intensity care all help to recalibrate group norms away from low value care
- Settings where resources are more constrained (due to capitated budgets or accountable care alliances) encourage clinicians to be more judicious in avoiding low value care

Sirovich et al JAMA Intern Med 2014;174(10):1640-8.

Schwartz et al. JAMA Intern Med 2015; 175 (11):1815-25

Bias in evidence synthesis

