Physicians' flawed heuristics in the delivery room: Delivery complications can influence later decision-making

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Main Text:

Clinical decisions require physicians to integrate a complex and changing set of stimuli to determine the best course of action for the patient, often under time pressure. While physicians are highly trained experts, they are also human. In the past few decades, we have learned that humans frequently rely on heuristics or decision rules when making complex decisions. Although efficient and sometimes adaptive given our limited cognitive capacity (*1*), heuristics can also lead to suboptimal decisions (*2, 3*). This new understanding of bounded human rationality has led to effective interventions in government policy(*4*), health behavior(*5*), environmental choice(*6*), and many other domains, but has not yet been widely accepted by medical professionals(*7*). This may be partially because of limited evidence of physicians' cognitive biases in real-world clinical settings. Indeed, physician decision research has mostly relied on hypothetical scenarios (*8, 9*), perhaps due to the difficulty of detecting decision biases post hoc from medical records. On page XXX of this volume, however, Singh overcomes this hurdle and uses over 86,000 patient health records, from both a rural and an urban hospital, to demonstrate that physicians delivering babies tend to switch to the alternative delivery modality for the next patient if their last delivery had complications, and this leads to negative patient outcomes.

Delivery decision making is an especially astute context for studying medical decision biases not only because it has a serious impact on both a mother and a newborn, but also because it provides an unusually circumscribed set of decision options – the delivery can only occur via a vaginal birth or a cesarean section. Singh finds that complications in the prior delivery made physicians more likely to switch delivery modalities for the next patient. If a physician performs a vaginal delivery that had complications, the physician is more likely to perform the next delivery via cesarean compared to after a vaginal delivery without complications. Similarly, if a physician performs a cesarean delivery that had complications the physician is more likely to choose vaginal delivery for the next patient compared to after a cesarean-section with no complications. This switching behavior is specific to complications in the patient immediately before the current delivery, is more pronounced with greater numbers and more severe complications in the prior patient, and is larger for complicated vaginal than caesarian deliveries..

Singh's results are of more than just theoretical interest. Delivery modality switching leads to concrete, albeit small negative patient outcomes for both mother and newborn. Switching following complications leads to increased probability of death for mother or baby, decreased probability of patient being discharged home, and increased number of outpatient visits after delivery. Singh's results are also impressively robust, showing that the switching effect stands after accounting for physician fatigue, patient volume, similarity between patients, death in prior delivery, time between the two deliveries, and scheduled cesareans. It is also robust across 2,560 different statistical specifications of the model.

This "win-stay-lose-shift" heuristic has been identified in other contexts as a learning strategy, but it only performs well in certain situations(*10, 11*). In the medical context, this heuristic would be rational if the specifics of the prior patient matched the specifics of the current patient and thus provided a useful learning experience. In that case if one patient's delivery went wrong, it can tell the physician that the same delivery plan may not work well with another patient with very similar characteristics and indications. However, two patients who happen to have consecutive deliveries by the same physician are not expected to be so highly similar, and thus, using the outcome from the immediately prior patient to determine delivery modality for the next patient is a misapplication of an otherwise intuitive and perhaps useful heuristic.

Note that physicians' use of the "win-stay-lose-shift" heuristic does not mean they lack medical expertise or training. In fact, Singh finds that more experienced physicians use this decision rule more often, even though physicians who rely more on this rule have worse patient outcomes over time. The result merely demonstrates that the use of heuristic or simple decision rules is a common human tendency even among smart, well-intentioned, highly trained doctors.

What cognitive processes underlie the maladaptive switching of deliver modes? Three well-established cognitive biases stand out as potential causes of this effect, whether individually or in concert: recency, availability bias, and confirmation bias. First, the most recent events are the most prominent in memory (*12*), and this makes complications that occur in the most recent delivery exert an outsized influence on physicians' delivery modality choice in the next patient. The finding that the switching behavior is only present based on outcome of the very last delivery but not deliveries 2, 3, or 4 patients prior supports this explanation. Second, events or stimuli that are highly emotionally valanced tend to more easily available to retrieve from memory(*2*). Complications can be more emotional and thus, more available in the physician's memory, and thus prompt them to switch to a different delivery mode to avoid such risk. A third potential mechanism is confirmation bias, the tendency of decision makers to seek out information that provides support for their current opinion or position(*13*). Physicians who are uncomfortable with the current modality because they just had a negative experience with it may inadvertently seek evidence consistent with such fears: they could order tests or check for symptoms that would indicate modality switching was appropriate for the current patient.

How can we help physicians overcome the reliance on maladaptive heuristics or decision rules? The first step is to acknowledge the phenomenon without condemning physicians. While understanding decision biases usually does not entirely ameliorate them(*14*), teaching doctors about cognitive biases may promote the acceptance of potential interventions. Second, more research and clinical efforts need to focus on designing and implementing decision aids that physicians will actually adopt. For example, instead of complicated algorithms that doctors may not understand or trust(*7*), easy to follow decision trees that offer clear guidance on delivery modality may be more welcome (*15*). Third, there is a slightly larger delivery-mode shifting effect for consecutive deliveries within 20 hours, and the effect evaporates for deliveries more than 72 hours apart. This suggests that the influence of a delivery with complications fades with time. Further research should explore interventions to help physicians clear their minds between deliveries in a way that is similar to the natural effect of time.

It is time to acknowledge the prevalence of heuristics and decision biases in clinical practice, and to view these patterns as predictably human instead of blaming on individual doctors. Only then can we start helping doctors improve clinical decisions and as a result, the health of the public.

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