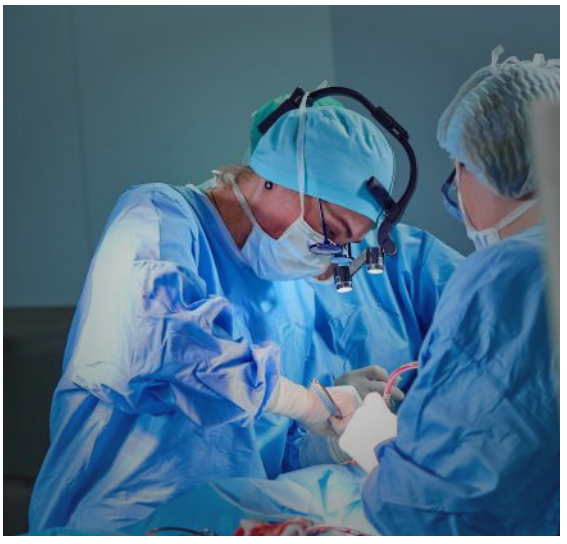
How did medical errors become the #3 cause of death in the US: A decision heuristics science analysis.

newristics

Ask any American what the leading causes of death in the United States are, and you will likely get answers that include cancer, heart disease, and car accidents. While heart disease and cancer are indeed the two leading causes of death in the United States, medical errors are thought to be the third most prevalent cause.[1,2]

I am careful in the usage of the word "thought" because as of today, there is no formal system in place to track deaths that result from medical errors. This finding first made waves in the public after a 1999 study by the Institute of Medicine claimed that up to 100,000 deaths in the US are a result of medical errors. Martin Makary and Michael Daniel revisited this topic in 2016 and estimated that 251,454 people die in the United States due to medical errors. Although this topic has been a source of contention, with some arguing that the figures are vastly overstated, Makary and Daniel provide compelling evidence that this figure is likely lower than the true range.

Currently, death certificates don't allow for an International Classification of Disease, which is used by the Center for Disease Control when compiling annual data.[3] In other words, certain causes of death, such as death due to human and factor systems, is not available. Despite the precise figure, even if Makary and Daniel's figure were halved, it would outrank Alzheimers and Diabetes, both of which garner major interest from the public and research communities through countless foundations, fundraising initiatives, and research.



(1) Makary, Martin A. & Daniel, Michael. "Medical Error- the third leading cause of death in the US." BMJ 2016, 353:i2139
(2) Deaths: final data for 2017. National vital statistics report. http://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm
(3) Moriyama IM, Loy RM, Robb-Smith AHT, et al. "History of the statistical classification of diseases and causes of death." National Center for Health Statistics, 2011.

So what is a medical error? Makary and Daniel define medical error as follows:

> *Medical error has been defined as an unintended act (either of omission or commission) or one that does not achieve its intended outcome,[4] the failure of a planned action to be completed as intended (an error of execution), the use of a wrong plan to achieve an aim (an error of planning),[5] or a deviation from the process of care that may or may not cause harm to the patient.[6] Patient harm from medical error can occur at the individual or system level.*

A medical error has several potential sources, and in a healthcare system as complicated as the United States', one can see how it is a complex issue that, without a formal classification system, can be overlooked. The United States lauds itself as the most advanced country in the world. Yet it is difficult to reconcile these two notions without acknowledging that perhaps our institutions aren't being proactive enough in combating this unsettling pattern. While the issue is multi-faceted and involves several stakeholders, mitigating medical errors requires a closer look at the behavioral drivers involved.

In this white paper, Newristics uses decision heuristic science to examine three areas contributing to the perpetuation of medical errors as they exist in the current system in the United States, and a fourth area that we should keep in mind as we seek to minimize this disturbing trend.

(4) Leape LL. "Error in medicine." JAMA 1994; 272:1851-7. doi:10.1001/jama.1994.03520230061039 pmid:7503827. CrossRefPubMedWeb of Science
(5) Reason J. "Human Error." Cambridge University Press, 1990.
(6) Reason JT. "Understanding adverse events: the human factor." In: Vincent C, ed. Clinical risk management: enhancing patient safety. BMJ, 2001:9-30.

The Current Environment

Part I. How did we get here?

The past often anchors our thinking in the present, and inefficient practices developed in the industrial age continue to plague health care providers and patients alike.

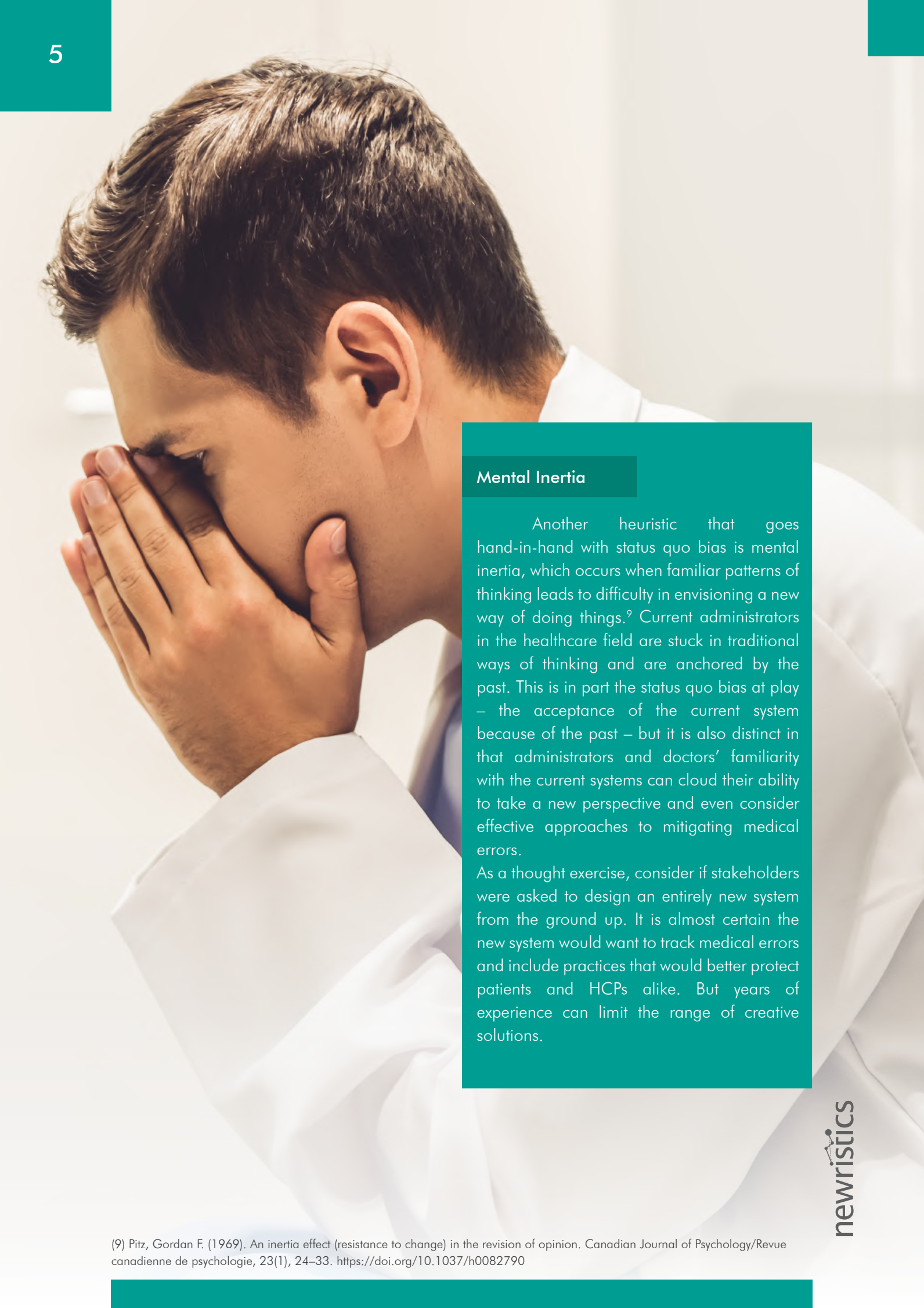
Status Quo Bias

Status quo bias is the concept that humans like things to stay relatively the same in decision-making, making us resistant to change despite remaining in a suboptimal experience.[7] The medical community is grounded in hierarchy and tradition, and we can trace the origins of the modern medical workplace culture back approximately 150 years to Dr. William Steward Halsted. He believed doctors and residents in training should have an unwavering commitment to mastering their practice. Hence, the long grueling hours common in today's hospitals can be traced back to the mentality Halsted and others embraced and practiced during the latter half of the nineteenth century.

However, Dr. Halsted was also a cocaine addict. This enabled him to work for prolonged periods of time without showing signs of fatigue, relying on cocaine to power his multi-day stints without sleep. While some changes have been made, the system largely resembles the mentality he promoted— 24+ hours shifts and 80+ hour weeks. And doctors have inherited this culture that contributes to overworked doctors, more likely to make errors.[8]

Cultures are self-perpetuating and the doctor work experience is no different. Many experienced doctors believe that working 24+ hours straight instilled a sense of grit that was useful in their career, making them more likely to accept the grueling process for training healthcare providers. In other words, while many would argue against the process as being the best it can possibly be, they feel that the inherent risk of change is more painful than the current system.

(7) Samuelson, W., & Zeckhauser, R. J. (1988). Status quo bias in decision making. Journal of Risk and Uncertainty, 1, 7-59.
(8) Walker, Matthew. Why We Sleep: Unlocking the Power of Sleep and Dreams. Scribner. 2017



Mental Inertia

Another heuristic that goes hand-in-hand with status quo bias is mental inertia, which occurs when familiar patterns of thinking leads to difficulty in envisioning a new way of doing things.[9] Current administrators in the healthcare field are stuck in traditional ways of thinking and are anchored by the past. This is in part the status quo bias at play – the acceptance of the current system because of the past – but it is also distinct in that administrators and doctors' familiarity with the current systems can cloud their ability to take a new perspective and even consider effective approaches to mitigating medical errors.

As a thought exercise, consider if stakeholders were asked to design an entirely new system from the ground up. It is almost certain the new system would want to track medical errors and include practices that would better protect patients and HCPs alike. But years of experience can limit the range of creative solutions.

(9) Pitz, Gordan F. (1969). An inertia effect (resistance to change) in the revision of opinion. Canadian Journal of Psychology/Revue canadienne de psychologie, 23(1), 24–33. https://doi.org/10.1037/h0082790

Decision Fatigue

A doctor's grueling schedule is no secret. The modern work schedule that emerged out of Dr. Halsted's mentality doesn't sit well with medical decision-making research.

When healthcare providers are working a 24 hour shift with no sleep, their glycogen stores become drained. Residents working a 30 a thirty hour shift will commit 36 percent more serious medical errors compared to those working 16 hours or less. After 22 hours, human performance declines to a level of someone who is legally drunk. It is no wonder that a doctor or nurse can easily administer the wrong dose or the incorrect medication. These are just a few of the examples of how our decision-making capacity can change over the course of a shift. Truck drivers are limited to a maximum number of hours they can drive in a shift, and while HCPs are technically provided a break for a 24-hour shift, it isn't regularly enforced. And from an HCP's perspective, it is difficult to take a nap when there a patients suffering. Ultimately, this can ultimately bring harm to both the HCP and the patients.

The fact that the system doesn't currently allow for medical errors to be comprehensively reported and tracked opens a grey area to decision makers.

Part II. The Tracking System

Egocentric Attribution and Diffusion of Responsibility

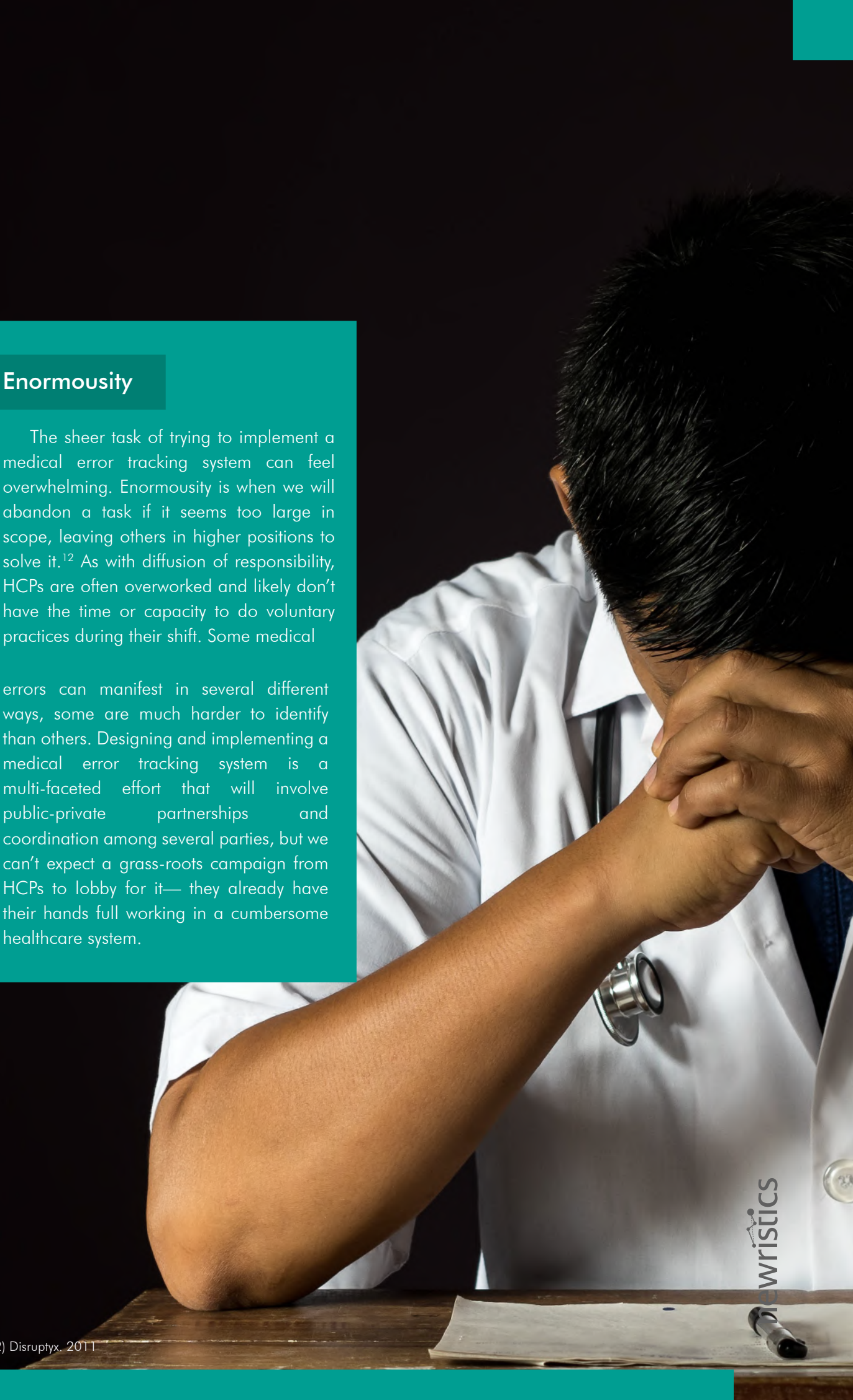
Egocentric attribution occurs when a person attributes successes to him or herself and failures to others.[10] The process needn't be conscious, and in this case, the "other" is an abstract system, which makes assigning blame all the easier. If a nurse or doctor doesn't have clear feedback, it creates an environment where mistakes become lost in the constant commotion that a hospital incurs daily. Since there are several stakeholders that are involved in the medical field, it has grown to become a problem that each are in favor of solving, but none feel they can do it alone.

This also feeds into diffusion of responsibility, which, as the name implies, is when humans take increasingly less personal responsibility as the number of people in the group increases.[11] We can all relate to this—school projects are ripe for diffusion of responsibility, where each member can try to do the minimum possible, usually leaving one member to step up and do the work. In this case, it is amplified on a national scale. Dynamics such as this are examples of where public policy can be best applied, so that all practitioners are involved in a system of accountability.

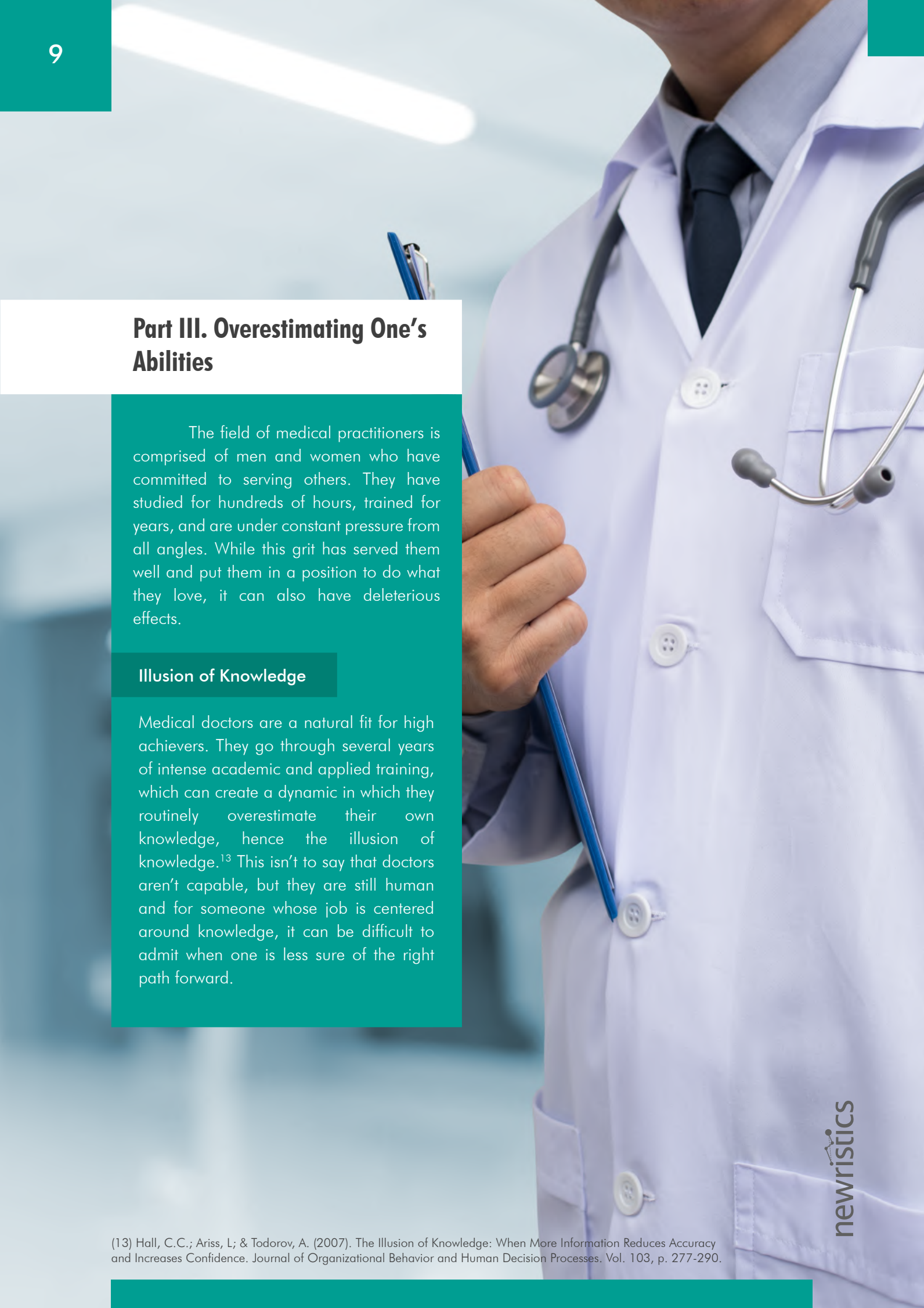
(10) Ross, Michael. & Fiore, Sicoly. "Egocentric Biases in Availability and Attribution. Journal of Personality and Social Psychology." vol. 37, no. 3, 1979. p. 322-336.
(11) Wallach, M. A., Kogan, N., & Bem, D. J. (1964). Diffusion of responsibility and level of risk taking in groups. The Journal of Abnormal and Social Psychology, 68(3), 263–274. https://doi.org/10.1037/h0042190

Enormousity

The sheer task of trying to implement a medical error tracking system can feel overwhelming. Enormousity is when we will abandon a task if it seems too large in scope, leaving others in higher positions to solve it.[12] As with diffusion of responsibility, HCPs are often overworked and likely don't have the time or capacity to do voluntary practices during their shift. Some medical errors can manifest in several different ways, some are much harder to identify than others. Designing and implementing a medical error tracking system is a multi-faceted effort that will involve public-private partnerships and coordination among several parties, but we can't expect a grass-roots campaign from HCPs to lobby for it— they already have their hands full working in a cumbersome healthcare system.



(12) Disruptyx. 2011



Part III. Overestimating One's Abilities

The field of medical practitioners is comprised of men and women who have committed to serving others. They have studied for hundreds of hours, trained for years, and are under constant pressure from all angles. While this grit has served them well and put them in a position to do what they love, it can also have deleterious effects.

Illusion of Knowledge

Medical doctors are a natural fit for high achievers. They go through several years of intense academic and applied training, which can create a dynamic in which they routinely overestimate their own knowledge, hence the illusion of knowledge.[13] This isn't to say that doctors aren't capable, but they are still human and for someone whose job is centered around knowledge, it can be difficult to admit when one is less sure of the right path forward.

(13) Hall, C.C.; Ariss, L; & Todorov, A. (2007). The Illusion of Knowledge: When More Information Reduces Accuracy and Increases Confidence. Journal of Organizational Behavior and Human Decision Processes. Vol. 103, p. 277-290.

Overconfidence & Illusion of Control

Overconfidence is self-explanatory and is a natural partner to illusion of control, which is the concept that humans overestimate our control in situations, and we take actions that make us feel more in control.[14] Think of the superstitious rituals individuals fans and players will invent in order to "help" their team win.

While illusion of control in a sports context is harmless, in a medical context, when doctors are overconfident in their ability to control situations, it can result in detriment to the patients. Previous research has shown that doctors think their performance is consistent throughout their shift, but in reality their decision-making diminishes, even to the point that their performance will eventually reach that of a legally drunk person, as mentioned earlier. However, being in the moment can make it difficult to recognize one's state of mind.

Moreover, if taking a break is seen as a sign of weakness, suddenly the new goal for a doctor is working the longest without a break, not providing the highest level of care, which may require taking a step back momentarily.

No person is immune to overconfidence in one arena or another. But in the medical care context, this can be the difference between knowing when to take a 15-minute break, and a potentially fatal mistake.

(14) Langer, E. J. (1975). The illusion of control. Journal of Personality and Social Psychology, 32, 311-328.

Part IV Hindsight Bias

In the pursuit to establish and improve medical errors in the healthcare system, hindsight bias can plague non-practitioners. Hindsight bias occurs when people look at an event after the fact and make sense of it by thinking the outcome was more predictable than it was at the time.[15] This is then followed by people gathering facts after the outcome is known and construct a neat narrative to make sense of it all.

Applying this concept to healthcare, there are certainly times where an outcome seems more predictable after the fact than it was at the time. And evaluating processes and new initiatives will be crucial to distinguish what was known at the time versus later for medical decisions.

But practitioners and policy-makers alike should recognize that HCPs are working under tremendous pressure with limited time and information. A decision that is obvious at the time of analysis is often not as clear as it was the time a decision was made—this could be due to unknown information, potentially unreliable information, or conflicting information. Ultimately, recognizing hindsight bias can help stakeholders avoid post-hoc explanations that don't properly recognize the uncertainty in many medical decisions, while still supporting a system that focuses on diminishing medical errors through analysis.

Harley, E.M. (2007). Hindsight bias in legal decision making. Social Cognition, 25(1), 48-63.

Conclusion

Healthcare is still largely a human-oriented operation, and medical errors can't be eliminated entirely, but they can be drastically reduced. Unfortunately, at this point in time, medical error is still a topic of conjecture. An opaque healthcare system obfuscates the prevalence of medical errors, their subtypes, and the context they tend to arise in. Therefore, the first step forward involves implementing a tracking system. By implementing a tracking system, stakeholders will have access to reliable data, from which new initiatives can be generated and later assessed.

The second step will involve designing systems based on the data gathered. The aviation industry serves as an excellent model for how training and protocol can significantly reduce decision errors, benefitting all stakeholders. This requires embracing an iterative approach that prioritizes clarity, consistency, and accountability. Recognizing the heuristics discussed here will facilitate stakeholders to better design an environment where patient welfare stays at the center while simultaneously benefitting all parties.