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The Role of Unconscious Bias in Surgical Safety and Outcomes

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Racial, ethnic, and gender disparities in health outcomes are a major challenge for the US health care system, as highlighted in the landmark Institute of Medicine report, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care* and the Agency for Healthcare Research and Quality's *National Healthcare Disparities Report*.^{1,2} Epidemiologic data have demonstrated such disparities for several chronic and acute medical and surgical conditions.^{3–31} Although there is evidence that socioeconomic status, access to insurance, overall hospital/physician quality, hospital/ surgeon procedure volume, patient/family attitudes, and social networks may explain some of these disparities,^{15,32–51} there is no doubt that unequal outcomes are multifactorial in origin and human factors may play a role. One of the most difficult factors to consider is the possible role physicians themselves may play in contributing to these disparities. Most physicians believe that they are socially conscious people who chose a profession where they help people and would never allow prejudices to effect their patient care. In direct contradiction to this self-belief, the Institute of Medicine report identified provider bias and stereotyping as key determinants of “unequal treatment.”¹ Health disparities researcher John Ayanian stated, “with a long legacy of racism, segregation, and discrimination in the US society and health care system, overt or subconscious bias among physicians and other health care professionals remains a persistent concern as a potential contributor to racial disparities in care.”⁵² Disparities have been documented in many areas of surgery, including neurosurgical, orthopedic, cardiothoracic, and vascular, and in general surgical, gynecologic, colorectal, and oncologic outcomes.^{4,8,11–13,15,16,19–21,24,25,28,30,31,52–63} Most physicians believe that these disparities have more to do with the systems of care than their own decisions on when and how to provide that care.

According to cognitive psychology research by van Ryn that investigates physician decision making may help explain how well-intentioned physicians can “inadvertently and unintentionally create systematic inequities in health care.”⁶⁴ Unconscious bias occurs when an individual's subconscious prejudicial beliefs or unrecognized stereotypes about individual attributes, such as ethnicity, gender, socioeconomic status, age, and sexual

orientation, result in an automatic and unconscious reaction and/or behavior. Unconscious bias can be measured by the implicit association test (IAT), first described in 1998.⁶⁵ The IAT examines automatic associations in memory that are evoked by rapid reactions in response to certain presented features, such as race, gender, age, or sexual orientation.⁶⁶ Since originally introduced, the IAT has demonstrated unconscious bias in a multitude of settings.⁶⁷ Unconscious bias in the context of health care delivery may result in variable processes of care experienced by patients with similar conditions, resulting in possible disparate outcomes.⁶⁸ Surgical outcomes—where the key decision is often whether or not to perform a procedure and the success, failure, or complications from the procedure are the key outcome measures—are perhaps most vulnerable to the effects of unconscious bias.

This article explores the role of unconscious bias as a normative error in surgical performance. Normative error is defined as a situation in which a person fails to carry out his/her moral obligation.⁶⁹ Surgeons are obliged to treat patients equally while adhering to the ethical principles of autonomy, beneficence, nonmaleficence, and justice. If unequal treatment occurs as a result of overt or implicit bias, then a normative error has occurred. Understanding and addressing unconscious bias is thus paramount to improving the culture of surgical safety. Theories of social cognition that are at the root of unconscious bias are explored, evidence of unconscious bias in clinical decision making discussed, and recommendations provided to reduce the effects of unconscious bias on surgical outcomes.

WHAT IS UNCONSCIOUS BIAS IN MEDICINE?

Schulman and colleagues' landmark article in 1999⁷⁰ put the issue of unconscious bias in clinical decision making at the forefront of American medicine. The article concluded that race and gender influenced physicians' management of chest pain and referral for catheterization. Clinical decision making is a complex process that takes multiple data inputs and should result in similar outcomes if patients' biomedical factors are similar. According to Eisenberg, although physicians "tend to deny the effect of non-biomedical variables" on the care they provide,⁷¹ the clinical steps of physician assessment and initial recommendations are prone to influence by nonbiomedical variables.⁷¹ Einbinder's research has shown that, because clinical recommendations rely on "physician assessment of both tangible and intangible patient characteristics, it is consequently the stage in the referral process at which race-based perceptions and biases about a patient are most likely to enter."⁷²

Unconscious bias occurs as part of normal cognitive processing where people's implicit associations can influence their responses to certain tasks, scenarios, medical encounters, and so forth.⁶⁸ Thus, physicians are not aware that they are applying stereotypes and prejudices to their decision making. A framework developed by van Ryn⁶⁴ outlines 4 possible ways (3 unconscious and 1 conscious) in which providers contribute to racial and ethnic disparities in medical care. This framework could easily be extended to a conceptual model for gender disparities. First, although physicians are expected to make objective decisions based on biomedical data, physicians are no different from all humans who rely on adaptive cognitive processing for decision making. Thus, physicians harbor beliefs about patients that result in the unconscious and automatic projection of stereotype when they make clinical decisions. Second, physicians cognitively classify people and interpret their behaviors through that cognitive lens. Thus, physicians weigh the relative importance of the same reported symptoms and examination findings differently depending on patient history or appearance. Third is the concept of overt moral rationing, wherein physicians consciously make decisions based on their perception of patient qualities, such as likelihood of compliance, social support, and so forth. The fourth possibility arises from physician interpersonal behaviors, which can occur both consciously and unconsciously. Thus, how

much eye contact physicians make with a patient, the distance they maintain during the examination, or how forthcoming they are with medical information during discussion may in turn influence patient decisions, compliance, and satisfaction.⁶⁴ The majority of researchers exploring health outcome disparities have concluded overt prejudice is rarely a cause of health disparities; rather, unconscious bias is at play.^{26,38,64,70,72–75}

EVIDENCE OF UNCONSCIOUS BIAS IN NATURALISTIC STUDIES

It is difficult to deduce the impact of physician decision making on health disparities from so-called naturalistic studies that provide evidence based on observation of real patients, administrative data, or chart review.⁷⁶ These data necessarily include measured and unmeasured patient and process variables that may produce disparate outcomes even when no bias is taking effect. Furthermore, most of these studies do not include measures of physician cognitive performance. Nevertheless, many of these real-life research settings and analytic approaches shed some light on the potential role of physician decision making in health care outcomes and provide evidence of unconscious bias.

Although single-center studies may lack generalizability, the study setting is one in which the structure and process of health care delivery can be assumed to be relatively equal across patients. Thus, when these studies find evidence of racial, ethnic, or gender disparities, it is likely physician bias is playing a role. Racial and gender biases have been found in treatment of long bone fractures, HIV treatment, and hormonal replacement therapy at single centers.^{77–80} In the surgical domain, disparate outcomes have been demonstrated for varied procedures and diseases, such as transplantation for hepatocellular cancer, amputation versus limb salvage for peripheral vascular disease, and coronary artery bypass surgery for myocardial infarction and angina, each showing preferential care patterns for white patients even though care was delivered at the same center.^{56,59,60}

Bach's seminal article in 2002⁹ found that, across many cancer types, survival differences between blacks and whites dissipated when patients were comparably treated for similar stage cancers; thus, failure of physicians to treat patients equally after a cancer diagnosis may play a role in racial disparities in long-term cancer outcomes.^{9,56,59,60} The Surveillance, Epidemiology and End Results (SEER) program of the National Cancer Institute offers unique insight into the potential role of physician decision making in cancer disparities. In addition to typical epidemiologic, cancer-related, and outcomes data, SEER also records both "referral for treatment" and "treatment rendered," through which variability in type of care delivered may be detected. These outcomes can be measured while simultaneously controlling for sociodemographic factors as well as stage at time of diagnosis. Furthermore, the data can be paired with Medicare claims data for patients over age 65, thus eliminating potential insurance-based confounders on outcomes for older patients as well. SEER data have repeatedly shown that in surgically treatable cancers, such as low-grade gliomas and other brain tumors, squamous cell cancer and adenocarcinoma of the esophagus, and non-small cell lung cancers, blacks have lower rates of surgery compared with whites even when disease stage is equivalent.^{8,12,16,18,20,62} These disparities in treatment have also been seen in referral for adjuvant therapy and specific type of operation performed. Blacks with rectal cancer were less likely to receive adjuvant chemotherapy or undergo a sphincter-sparing procedure.^{15,19} For patients with locoregional pancreatic adenocarcinoma, blacks were less likely than whites to be referred to a medical, radiation, or surgical oncologist; even after referral they were still less likely to be treated with chemotherapy or surgical resection.⁸¹ Gender disparities have been shown in non-small cell lung cancer patients, where women were less likely than men to be treated with chemotherapy even when controlling for rates of oncologic referral.⁸² These SEER data may not explicitly reveal the effect of unconscious

bias on these cancer disparities; race, gender, and ethnicity play an important role in types of treatment offered or rendered for cancer treatment.

The Department of Veterans Affairs (VA) health care system provides a setting in which the role of physician bias in treatment can be examined.⁸³ Within the VA, all of a patient's care is covered through the system. Physicians are salaried and have no financial productivity incentives. Furthermore, all patients are English speaking. These factors should theoretically provide an equal access system for all patients independent of sociodemographic variables. Surprisingly, a review study on racial and ethnic disparities within the VA found several treatment disparities attributable to physician bias.⁶¹ Compared with white veterans, black veterans have been found undertreated for pain due to osteoarthritis, less likely to be offered laparoscopic chole-cystectomies well after the safety of the minimally invasive approach had been established, less frequently treated with surgical or interventional revascularization both electively for coronary artery disease (CAD) and for acute myocardial infarction, and less often treated with surgical resection for distal esophageal cancers with similar stage and histology.^{45,53,54,58,63,84,85} A large study of patients with peripheral vascular disease found that black race and Hispanic ethnicity were independent risk factors for amputation, even more so than a history of rest pain or gangrene.⁸⁶ Even a study that specifically focused on patient attitudes and beliefs determined that physician assessments rather than patient preferences determined rates of referral for coronary revascularization.⁸⁷ In studies of other large VA cohorts of colorectal cancer and cerebrovascular disease, however, patients did not reveal any racial disparities in processes of care.^{88,89} This suggests that unconscious bias may exist among VA providers but is not universal or the sole explaining factor for the observed disparities.

EVIDENCE OF UNCONSCIOUS BIAS IN EXPERIMENTAL STUDIES

The most compelling data that unconscious bias exists, however, is derived from controlled scientific experiments. Several studies have used survey and vignette data to determine whether or not unconscious bias exists in physician decision making. These methodologies force physician respondents to weigh multiple factors simultaneously and arrive at a clinical decision for a hypothetical patient or case scenario. When race, ethnicity, and/or gender are included in these designs, the results can often provide evidence of unconscious bias. There is ample evidence that vignettes correlate with actual physician practice.⁹⁰⁻⁹²

Schulman and colleagues⁷⁰ mixed media patient scenarios combining patient complaints of chest pain with various sociodemographic characteristics demonstrated that primary care physicians were equally likely to diagnosis CAD and angina across gender and race variables but they were more likely to refer men and white patients to cardiac catheterization than women or black patients.⁷⁰ Another study using videotaped hypothetical scenarios in patient encounters for breast cancer found that older black women needed to behave more aggressively to warrant a more complete staging work-up compared with older white women.⁹³ Several studies looking at prescribing choices have shown race and gender differences.^{74,94,95} Surgical referral for renal transplantation has been shown to be influenced in a similar manner. When the scenario looked at compliant patients, white patients were significantly more likely to be referred for transplantation than black patients. Although noncompliant patients of both races were less likely to be referred for transplantation, the negative effect was stronger among black, noncompliant patients who were least likely of all hypothetical patients to be referred.⁹⁶ A similar study of adult nephrologists found that women and Asians were less likely to be referred for kidney transplantation.⁹⁷ Some balanced vignette research studies, however, have not found race-based differences in physician decision making for surgical selection of bariatric cases; prescribing practices for hypercholesterolemia, hypertension, and diabetes in primary care;

or opioid prescribing practices in the emergency room.^{98–102} The reality is perhaps best described by the researchers of a vignette study examining high-risk referral patterns in obstetrics, who noted that, when the clinical evidence was strongly positive or negative in support of a decision, inherent biases had no effect. In this study, Richardson and colleagues found that cases were borderline and close to the high referral threshold, however, were the ones that were “disproportionately susceptible to the marginal influences of numerous personal, social, cultural, and financial considerations.”¹⁰² The inference is that unconscious bias may be subtle in obvious clinical situations but in gray areas unconscious bias may perpetuate health disparities.

Gender, race, and ethnicity are just a few potential stereotypes that may trigger unconscious bias in medical decisions. Although less often studied, stereotypical views on patients’ personal characteristics, such as reliability, honesty, and so forth, may also bias medical decisions. A multimethod study of interventions for CAD in New York State combining patient race and socioeconomic characteristics in hypothetical scenarios, a survey of both physicians and patients in the postangiogram setting, and data abstraction from actual patient encounters showed that physicians, even when faced with patients sharing the same gender, age, income, and education, were more likely to perceive black CAD patients as less intelligent and at greater risk than white CAD patients for noncompliance, substance abuse, and inadequate social support.⁷⁵ Applying similarly complicated analyses to the Medical Outcomes Study data, Safran and coworkers¹⁰³ determined that even with equivalent complaints and findings, women were 3.6 times more likely to be prescribed some form of activity limitation compared with men due to gender-based assumptions about baseline activity levels.

The first study using the IAT in medical decision making was published in 2007.¹⁰⁴ The investigators’ stated rationale for the study was that “given questions about the source of observed disparities in health service use, the IAT might provide insight into the contribution of implicit biases among physicians.” Given the abundant data on disparities in cardiovascular resource use and outcomes, they chose to measure physician decisions on whether or not to give thrombolysis for acute myocardial infarction using a previously validated race-preference IAT and 2 new IATs on general cooperativeness and cooperativeness specifically to medical procedures. The measures of explicit bias showed no differences of physician preference between black and white patients and no variation in attribution of cooperativeness to black and white patients. The measures of implicit bias, however, showed marked differences. Blacks were more strongly associated with negative attributes for all 3 measures. Among patients suspected of having an acute myocardial infarction, black patients were proportionally less likely to be offered thrombolytic therapy. These treatment recommendations correlated with the participants degree of unconscious bias with respondents harboring implicit bias against blacks being more likely to recommend thrombolytic therapy to whites and less likely to do so for blacks.¹⁰⁴ The IAT may serve as an important methodologic tool for the study of unconscious bias in medical decision making.

THE EFFECT OF UNCONSCIOUS BIAS ON THE PHYSICIAN-PATIENT ENCOUNTER

Another manifestation of physician bias can be found when physicians use different communication styles and share different content depending on the race, ethnicity, or gender of a patient. One study of VA patients meeting physicians to discuss findings of coronary angiograms found that physicians were less likely to initiate “information giving” to black patients than to white patients.¹⁰⁵ A multi-institution study exploring hematology malignancy consultations found that “quantitative prognostic discussions without hedging

are more likely to occur if the patients are nonwhite.”¹⁰⁶ The effect of bias perceived through physician communication style was marked in a study of lung cancer patients treated at a large single VA hospital. Although measured empiric trust in providers was equal between whites and blacks before the encounters, there was notable distrust among blacks compared with whites after they had met with their providers.¹⁰⁷ These same researchers found racially discordant physician-patient relationships to result in more passivity among patients and less information sharing by physicians.¹⁰⁸ Further studies examining physicians’ verbal style and body language have shown different approaches used with blacks with whom physicians were observed to be more verbally dominant, less patient centered, and more negative in affect compared with white patients even after controlling for patient-provider racial concordance.^{46,109} Peek and colleagues¹¹⁰ explored black patients’ responses to the process of shared decision making (SDM) with their physicians regarding diabetes care. The 3 domains of SDM are information sharing, deliberation and physician recommendation, and decision making. They found that physicians toward blacks compared whites were less likely to actively listen to information sharing, to review treatment options, and to share in the decision-making process.¹¹⁰ Although sociocultural conditioning may influence how one patient’s response to physician communication and behavior differs from another’s, these data provide evidence that when observed, physicians themselves, whether or not consciously, communicate and/or behave differently depending on patient race.

REDUCING UNCONSCIOUS BIAS AND IMPROVING SURGICAL SAFETY

Unconscious bias is rarely discussed in the context of surgical safety. Unconscious bias has been well established as an influence in behavior but the question then becomes, Can something be done to ameliorate its effect? Several sociologic and health services researchers have proposed techniques to address this. First there must be conscious acknowledgment that we as physicians and surgeons are all subject to unconscious bias that affects our interactions with patients and our clinical decision making. The Web site, <https://implicit.harvard.edu/implicit/>, offers a computer-based IAT that individuals can take to explore their unconscious stereotypes and preferences.

Burgess and colleagues⁶⁸ provide a conceptual model for reducing unconscious bias by presenting physicians with evidence that bias exists and motivating them to compare what they would do and what they should do when faced with a clinical decision. This works as a self-induced internal motivation instead of external pressure to avoid bias. In reality, physicians and surgeons all already pressure ourselves to avoid socially abhorrent thoughts wherein our stereotypes and prejudices might be apparent. Suppressing these thoughts requires a great deal of cognitive effort and is counter to effectively reducing unconscious bias. Physicians should be educated on the processes of stereotype and prejudice in normal cognition just as they are on the possibilities that human error can occur in an operating room no matter how smart or technically talented they are. One practical approach is use of the IAT for medical student, resident, and faculty training. Post-test debriefing serves as a method of informing providers of their unconscious biases; data show that this alone can result in effective self-regulation of prejudice.^{104,111} Acknowledging the existence of stereotype and prejudice on the processing of clinical information is the first step in empowering ourselves to overcome them. The educational approach should be one of promoting equal treatment rather than eliminating bias because this is not likely possible within the developed human psyche.^{104,112}

Illness and healing do not occur in a vacuum. Patients’ health experiences are shaped by their sociocultural context; stereotypical reactions to a patient’s social or cultural milieu can thus perpetuate unconscious bias in health care. Cultural competence is considered an

expected skill of modern physicians and has been described as a requirement for physicians who wish to deliver high-quality care to all patients.¹¹³ Even though many physicians may be able to provide the definition of this concept—a professional trait that allows physicians to give empathic, patient-centered care to all patients, including those who are culturally diverse compared with themselves—many practicing physicians have not been educated on how to achieve this in a meaningful way.^{113,114} Betancourt¹¹⁵ has suggested that cultural competence training needs to be more than simple education on attitudes, beliefs, and behaviors typically associated with people sharing particular demographic characteristics. Rather, it should train physicians to explore, on a patient-by-patient basis, the effect of social, cultural, and economic forces on a patient's health-related thoughts and actions.¹¹⁵ Training in delivering culturally competent care has been shown to improve physician preparedness to treat diverse patient populations.¹¹⁶ Improved cultural competence among physicians is expected to markedly improve health outcomes across diverse populations.¹¹⁷ Knowledge of sociocultural context enables surgeons to more broadly measure success after surgery and to develop socioculturally sensitive mechanisms for patient education, selection, and informed consent.

Embracing a patient's sociocultural context requires empathy. Empathy is a powerful tool against unconscious bias. Empathy has been described as a multidimensional tool that incorporates perspective taking, compassion, and a sense of what it is like to be in the patient's position.^{68,109,118} Unfortunately, surgeons are not at the top of the scale when compared with other specialists on a validated empathy scale, which may be influenced by the rigors of their training and job.^{118,119} Depression, anger, and fatigue have been shown to impair medical trainees' ability to share empathy.^{120–122} Burgess suggests that physicians should be mindful of their emotional state; active amelioration of negative emotions has been shown to facilitate empathy and improve patient satisfaction.⁶⁸ Higher levels of empathy among medical students have been associated with greater clinical competence.¹²³ It is reasonable to expect the same effect on the practice of surgery when surgeons embrace an empathic approach to the care of their patients.⁶⁸

As discussed previously, physician communication style is deeply rooted in unconscious bias. Thus, overtly addressing communication is another way to reduce the affects of unconscious bias on medical outcomes. Physicians should be mindful of their use of verbal cues and body language in their patient encounters, in particular with racially, ethnically, or gender-discordant patients. Burgess suggests improving physician confidence in these settings through direct contact with race-discordant colleagues, for example.⁶⁸ Physicians who are confident in their spoken and physical approach to patients are less likely to invoke anxiety and mistrust and more likely to engender comprehension of the medical details being provided during the encounter. Johnson proposes a communication curriculum for medical students, residents, and practicing physicians focusing on patient-centeredness and affective dimensions of care.¹⁰⁹ One communication model that has been suggested is SDM.^{110,124} In SDM, surgeons empower their patients to tell their story (information sharing), fully disclose the risks and benefits of possible treatment plans, elicit patient preferences for treatment (deliberation and physician recommendation), and finally arrive at a joint decision (decision making).^{94,110,111} Irrespective of the exact style, it is likely that a collaborative, patient-centered approach will engender trust. When physicians show concern and put patients at ease while thoughtfully explaining biomedical details, they minimize the distrust that is hypothesized to be at the root of many observed health disparities.¹²⁵ Systematic efforts at delivering patient-centered care have been shown to improve outcomes in surgical diseases.^{126,127}

There is another type of communication in which unconscious bias may influence surgical safety, namely provider-to-provider communication. To the authors' knowledge no study

has examined the role that unconscious bias may play in information transfer between diverse members of a health care team. There have been many studies in the business literature that conclude that gender greatly influences perception of leadership and managerial qualities. It could be speculated that this may translate to implicit discounting of information passed from women to men or women to women. Many female surgeons believe that nurses question their orders more than those of their male colleagues—Could this be an example of unconscious bias? Until the studies are done though there are no data to support or refute the role implicit bias may play in surgical team communications but this is an area that must be explored further to improve the culture of surgical safety.

SUMMARY

Improving surgical safety rests on the reduction of various forms of surgical error. In this article, approaches to the reduction of technical and judgment errors have been addressed. This article shows that surgical and clinical decisions are subject to implicit stereotypes and bias. These subconscious and, therefore, unrecognized errors, although challenging to prove and perhaps even more challenging to ameliorate, present a great risk to surgical safety that must be addressed by the surgical profession in the clinical, teaching, and research settings. Acknowledging unconscious bias, encouraging empathy, and understanding patients' sociocultural context promotes just, equitable, and compassionate care to all patients, both individually and in the aggregate, irrespective of their race, ethnicity, gender, or other personal characteristics.

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