Social determinants of health and surgery: An overview

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HIGHLIGHTS

- Discusses how the recent pandemic has brought to light the disparities in social issues relating to health care
- Describes the study of SDOH factors such as economics, environment, education, and access to care
- Examines SDOH within a surgical quality initiative framework
- Describes surgeon-led projects to address disparities

The last 18 months will be remembered as a defining moment for medicine and health care in the U.S. The coronavirus 2019 (COVID-19) pandemic swept across the nation, which experienced the most infections and deaths globally—more than 30 million and 550,000, respectively, at press time.[1] A primary concern of governments, health care workers, and the public was that the health system and its practitioners would be overwhelmed, and that the public would experience runaway health effects. But in the face of an initial lack of understanding of the novel virus, personal danger associated with limited personal protective equipment and other resources, and the mental health effects of being at the forefront of a pandemic, U.S. health care and its practitioners held strong. The system buckled, but it did not break.

However, the events of 2020 and into 2021 also revealed that health care in the U.S. is grappling with social issues in a way rarely seen. Though COVID-19 affects all segments of the population indiscriminately, racial minorities and individuals of low socioeconomic status suffered disproportionate infection and deaths.[2,3] The tragic deaths of George Floyd and Breonna Taylor, among other people of color, sparked a necessary reflection on the injustices that Black and brown Americans face because of racism and discrimination, and the field of medicine also began to reckon with its history of racism.[4] And issues of access to health care, insurance coverage, and quality continue to shape Americans' belief in health care equity.

These events reach beyond medicine into the social underpinnings of public health in the U.S.—into the social determinants of health (SDOH) themselves. According to the Centers for Disease Control and Prevention (CDC), SDOH are "the conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a range of health, functioning, and quality-of-life outcomes and risks," which includes economic stability, access to quality health care, and physical environment, among others.[5] These broad domains each cover myriad social and environmental characteristics—socioeconomic status (SES), educational attainment, race and discrimination, access to appropriate nutrition, health literacy, and so on (see Table 1 for a list of examples of SDOH). These determinants have an outsized and underrecognized effect on health, with SDOH shaping 80 to 90 percent of the modifiable contributors to the population's health outcomes versus the approximately 10 to 20 percent of health dictated by medical care.[6]

TABLE 1. EXAMPLES OF SDOH

• Access to education	• Early childhood education	• Literacy/health literacy
• Access to health care	• Educational attainment	• Neighborhood safety
• Access to nutritious food	• Food security	• Opportunities for higher education
• Availability of employment	• Health insurance status	• Social support
• Availability of health care providers	• Housing and housing security	• Stress
• Discrimination	• Income	• Transportation options

Does surgery have an SDOH problem?

But these factors may seem far upstream and removed from what occurs in an operating room (OR) between a surgeon and a patient. Should surgeons be concerned with SDOH, which mainly influence life outside the hospital?

"Unfortunately, many [surgeons] don't think this is an issue in surgery, as if it really relates more to primary care, and that is absolutely not true," said Tracey Dechert, MD, FACS, director, surgical intensive care, division of trauma and surgical critical care, Boston Medical Center, MA; and founder of Socially Responsible Surgery, a group dedicated to addressing SDOH as they relate to surgery (more on Socially Responsible Surgery later in this article). "Every patient is affected by SDOH. They're not something you can have or not have," Dr. Dechert said, and they affect surgical outcomes regardless of interest.

Adil Haider, MD, MPH, FACS, dean, medical school at Aga Khan University, Karachi, Pakistan; director, disparities and emerging trauma systems, Brigham and Women's Center for Surgery and Public Health, Boston; and Co-Chair, American College of Surgeons (ACS) Committee on Health Care Disparities, believes that it is critical for surgeons to understand and respond to their patients' SDOH.

"This is not just an extra area to consider. For surgeons to achieve the kinds of outcomes we want to see, we'll need to pay attention to the social determinants of health, what happens to patients when they go back home, and how they are taken care of, if we're going to really look at long-term outcomes," Dr. Haider said.

Indeed, a growing body of evidence reveals that SDOH play a critical role in determining how a patient will access and recover from surgery. What follows is a look at some of the evidence showing the influence of SDOH on surgery outcomes and how they might intersect with a surgical quality initiative, as well as the actions that some surgeons are already taking to address SDOH and the role they can play going forward.

Growing evidence

The intersection of SDOH and surgery is a nascent field of study, but the last decade has added a significant amount of research showing that SDOH have a measurable effect on patient access to surgery and surgical outcomes. Using the domains identified by the CDC that comprise SDOH—economic stability, education access and quality, health care access and quality, neighborhood and the built environment, and social and community context—provides a useful framework to review the evidence.[5]

Economic stability

An individual's ability to afford health care, nutritious food, and housing are relevant to their overall health. Research has shown that low patient SES is an independent predictor of operative mortality, and, conversely, increases in patient SES decrease overall operative mortality.[7] Furthermore, low SES is associated with fewer days alive and outside of the hospital for patients undergoing elective noncardiac operations.[8]

Holding the financial means to have a home is similarly important for optimal recovery after surgery; research has shown that homeless individuals discharged to their respective communities experience significantly higher hospital readmission after surgery than their homed counterparts.[9] Access to surgery also is affected by SES; patients eligible for bariatric surgery largely had lower family incomes and were much less likely to be insured than their ineligible counterparts, meaning that the patients most severely in need of surgery often are unable to afford it.[10]

Education access and quality

Health and longevity have been shown to increase with higher levels of educational attainment, and a high education level is associated with higher incomes. Similarly, low education level and health literacy have been shown to affect surgical patients' health after surgery, which may affect their ability to follow a recovery regimen after receiving care. Long-term follow-up on traumatic injuries indicates that patients with low education level show significantly worse outcomes in terms of functional status, return to work, and chronic pain.[11]

But health literacy levels can have an impact within the hospital, as patients with low health literacy scores show an increased length of stay (LOS) after abdominal surgery. Some experts attribute this spike to patient anxiety about the "complex transition" in their lives that hospital discharge represents.[12]

Health care access and quality

A significant number of people in the U.S. continue to struggle with access to necessary health care, which is naturally tied to struggling with quality of health care received. As ACS Past-President and Chair, ACS Committee on Health Care Disparities, L.D. Britt, MD, MPH, DSc(Hon), FACS, FCCM, FRCSEng(Hon), FRCSEd(Hon), FWACS(Hon), FRCSI(Hon), FCS(SA)(Hon), FRCSGlasg(Hon), noted in reference to surgery, "There is no quality without access."[13]

Factors that influence access to surgery can take many forms. Lack of insurance remains a common barrier to surgical care, and patients who gain access to insurance, including through Medicaid expansion in many states, experience improved surgical care for conditions such as colon cancer.[14] Colon cancer is a useful example to demonstrate the interplay of access and quality in surgery. Insurance coverage through Medicaid allows patients to access primary and preventative care that helps to detect colon cancer early, which allows for earlier surgical intervention and leads to better surgical outcomes with fewer postoperative complications.

Access to surgery also is heavily dependent upon socio-geographic factors, such as how far a patient lives from a surgical center. Patients who live in rural areas in the U.S. often are located hundreds of miles from hospitals that provide necessary care, even for acute conditions that require emergency general surgery.[15] Moreover, rural areas and low-income urban areas alike often lack access to care for patients who suffer a traumatic injury, either because of distance from a surgery center or a catchment area that covers underserved areas, respectively.[16]

Neighborhood and the built environment

Low SES and resource deprivation are more commonly seen in communities of color for various historical and social reasons. The recent increase in gun violence across cities in the U.S. disproportionately affects minority communities.[17] Research has shown that minority trauma patients cluster at trauma centers that mainly treat minorities and experience relatively high rates of mortality,[18] which likely is affected by the volume of traumatic injuries suffered in the surrounding community and the other deprivations endemic to their environment.

Social and community context

The social function of a community itself—interactions among family, friends, and other members of the community—is a predictor of the health of its members. Though this domain reaches beyond race and ethnicity, it is here that the effects of racism and racial discrimination within a community become apparent.

Systemic racism factors into events both outside of and within a health care system. Continued police violence against Black people in the U.S. is a topical example that affects all segments of health care, including surgical services. Outside of a hospital, police killings of Black community members have a deleterious effect on the mental health of local Black people and throughout the country, including increased emergency department visits for depression following these events.[19,20] Psychological distress, including anxiety and depression, has been shown to have a negative effect on a patient's recovery from surgery.[21]

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Racial discrimination within a community has proven to be a powerful SDOH and acts as a significant stressor for disadvantaged communities, including communities of color.[22] Discrimination can manifest in any number of ways: "redlining," which prevents a person of color from being able to purchase insurance, a government service, or housing; unequal hiring practices, which prevent a person of color from being offered employment; and so on. But the psychological stress has downstream effects on overall health. Discrimination is present within community hospitals, as well. Race-based medicine lingers as a concept in modern health care, which finds some practitioners offering reduced levels of pain control to patients of color because of biases rooted in the racist belief that people of color do not feel the same level of pain or are using the medicine illicitly.[23]

SDOH within a surgical quality initiative framework

The evidence that SDOH affect surgical access and outcomes continues to mount in the context of the CDC's identified domains, but would the impact of SDOH still be clear if examined through concepts topical to a surgical quality initiative? The ACS has many programs that are dedicated to analyzing and improving patient outcomes in specific content areas; one such initiative is Strong for Surgery, which uses checklists to screen patients for risk factors that "can lead to surgical complications, and to provide appropriate interventions to ensure better surgical outcomes."[24]

Strong for Surgery targets the following eight areas that have been shown to be reliable determinants of surgical outcomes:[24]

- Nutrition
- Glycemic control
- Medication management
- Smoking cessation
- Safe and effective postoperative pain management
- Delirium
- Prehabilitation
- Patient directives

The program provides evidence-based checklists for surgeons and surgical teams to use in determining a patient's readiness for surgery. As evidence has shown, though, a patient's life outside of a hospital, within their social contexts, can significantly affect surgical outcomes. Surgical readiness and recovery are influenced by understanding and managing these eight critical topics in a health care setting, but analyzing some of them through the lens of SDOH may reveal future directions for surgical research to pursue to account for a patient's life circumstances.

Nutrition

Good nutritional status before surgery is vital to help with wound healing and to fight potential postoperative infections, and the availability and quality of food is an important social determinant of health. Food insecurity is common in people with a low SES or who live in disadvantaged communities, which sometimes are "food deserts," where nutritious food is unavailable or prohibitively expensive.[25] Individuals with a low SES often are forced to subsist on cheap, heavily processed foods and often have diets lacking in vitamins critical to wound healing and a strong immune response,[26] which makes safely recovering from surgery less certain than for patients in better-resourced communities.

Glycemic control

Diabetics who have poor control over their blood sugar levels are at greater risk of infection and delayed wound healing after surgery, and diabetics with a low SES and who live in disadvantaged areas have been shown to have worse glycemic control.[27] Researchers hypothesized that this finding may be related to the stress response of a low SES and poor social support, and stress is known to lead to increased blood sugar levels and reduced response to medication and insulin therapy. This also holds true in type 1 diabetes patients, in whom social and economic deprivation and an associated lack of diabetes management resources has been shown to lead to higher long-term blood sugar levels.[28]

Medication management

Continuing to take, or being directed to stop taking, certain medications is important to ensure a safe outcome from surgery. However, managing medication also is connected to several SDOH. A patient's access to medication often is predicated on such SDOH as insurance coverage or access to transportation to a pharmacy; if either are lacking, an individual may be unable to receive a needed medication before surgery.[29] In addition, low education status and health literacy can affect an individual's ability to follow necessary dosage and preoperative medication instructions.[30]

Smoking cessation

Smokers have markedly increased risks of surgical complications, ranging from pulmonary issues after anesthesia, to delayed wound healing, to heart attack. Individuals with a low SES, however, are much less likely to have access to social support resources that lead to lasting smoking cessation.[31] Furthermore, the inequities in resources and lower use of anti-smoking messaging in minority communities may lead to difficulties in smoking cessation for people of color, which may further complicate their recovery.[32]

Safe and effective pain control

Pain is a necessary result of surgery, and properly controlling a patient's pain through medication is important to their recovery. But the effectiveness of pain control also is affected by patient SDOH. In one study, the most severely disadvantaged patients who underwent shoulder arthroplasty had low SES and associated high rates of obesity and preoperative opioid use, which makes managing postoperative pain more complex.[33] Although postoperative pain management is progressing to be less reliant on opioids and more multimodal in nature, opioids remain a primary source of pain control, and patients with low SES are more prone to opioid overdose and fatality.[34] A patient's personal SDOH, therefore, have an significant effect on safe, effective use of pain medication after surgery.

Responding to SDOH: Role of surgeons and the health system

It seems clear that SDOH have a significant impact in the field of surgery, and while many of the individual elements of SDOH are predetermined outside of the health care setting, surgeons can play a role in addressing SDOH in their hospitals and in their communities.

Socially responsible surgery

As the evidence of the effects of SDOH in surgery has grown, so too has surgeon interest in responding to them. A mutual desire to help among practicing surgeons, residents, and medical students at Boston Medical Center (BMC) led to the creation of **Socially Responsible Surgery**, which Dr. Dechert started and which is dedicated to addressing SDOH to provide equal access to surgical care, eliminate disparities, and serve the community.

The group was founded in 2014 by Dr. Dechert and a group of young surgeons to provide a home for surgeons and trainees with an interest in SDOH and health disparities. "Students came into training with an interest in social issues and public health, but they thought that meant they couldn't be surgeons," Dr. Dechert said. She felt a need to explain to medical students that "you can be a surgeon and care about these things."

"Someone just needed to open that door," said Megan Janeway, MD, general surgery resident, BMC, one of the young surgeons who showed interest in the field and cofounded the group. "My generation as a whole is more attuned to the idea of how people's social circumstances, their socioeconomic status, affects public health. This topic is taught much more in medical school now, and more medical students enter into training with an interest in a holistic view of medicine."

Dr. Dechert explained that Socially Responsible Surgery was formed to act as a home for social projects that surgeons and trainees could take on and connect with peers, colleagues, and mentors in a previously undefined space. The group has the following four pillars:

- *Education:* to teach residents and students about SDOH and surgery
- *Research:* to identify SDOH-based health disparities involving access to care or underserved populations
- *Advocacy:* to teach participants how to advocate for policy change at the local, state, and federal levels
- *Service:* to actively engage with and serve the community through both medical and nonmedical methods

BMC has undertaken a variety of service projects in the community that show the practical application of Socially Responsible Surgery, including the Community Violence Response Team, led by a faculty member in the department of surgery and staffed by a mental health professional to counsel and provide resources to victims of violence; the BMC Preventive Food Pantry, which provides access to nutritious food for patients referred by physicians, including surgeons and trainees; among several other community projects.[35]

The framework provided by Socially Responsible Surgery in Boston was designed to serve as a template for other areas of the country where surgeons want to address SDOH, and two chapters recently have started—one at the University of California Davis in 2018 and another at the University of Kansas Medical Center, Kansas City, in 2020.

Other surgeon-led efforts

Within the hospital setting, gathering SDOH data during a patient's history can be crucial in understanding the social factors that influence their health and can lead to better patient care. Clinicians, clinical leaders, and hospital executives from across the U.S. agree that using SDOH data in patient care can improve clinical outcomes and the patient experience.[36]

Dr. Janeway thinks the connection is clear. Though it is not a surgeon's responsibility to completely change a patient's social circumstances, understanding their SDOH "can help us tailor care to social circumstances and try to address them as best as possible, alongside their surgery," she said. And care that takes a patient's social context into account, as well as the needs that their social context creates in their lives (need to return to work, alleviate symptoms, not burden their families, and so on) can be considered patient-centered.[37]

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Furthermore, surgeons who gather SDOH data from their patients can use the data to help their hospitals analyze and measure the outcomes of patients within different social contexts. "Hospitals could begin publishing their outcomes data based on different groups of patients. Consider insurance status—if people are uninsured, a hospital could look at their data and say, 'This is how they looked 30 days after surgery; people with private insurance looked like this, people with Medicaid looked like

that,'" Dr. Haider said. "Only when we begin to measure ourselves and hold ourselves accountable will we be able to make progress" in improving surgical outcomes and reducing disparities in care by addressing the fundamental differences in patients' backgrounds.

And according to Dr. Haider, paying attention to the totality of a patient's history—particularly their culture—requires more than the cultural competency training paradigm that has taken hold at some health care institutions. "Cultural competency training is inherently limited, in that it suggests that if a person is from *this* background, they'll act *this* way; if they're from *that* background, they'll act *that* way," Dr. Haider said. But it can become overly burdensome to expect a surgeon to perfectly understand the myriad cultures, and their respective SDOH, that can come through an OR. Instead, Dr. Haider emphasizes "the concept of cultural dexterity, borrowed from the business world, which focuses on building the capability within our surgeons to respond to patients and work through their preconceptions so that they truly come to understand a patient's circumstances and can provide the best possible care to anyone."

In addition, SDOH and their effects on surgery are beginning to be built into the actions of professional surgical organizations. The ACS Committee on Trauma's work in recent years to address gun violence is, in part, built on addressing the social determinants that lead to violence. The ACS Improving Social Determinants to Attenuate Violence (iSAVE) task force, which Dr. Dechert works on, is aimed at having trauma surgeons work with a multidisciplinary team of experts and members of the community to change the community mindset on gun violence.[38] "[iSAVE] is a perfect example of getting together a group of people to address structural racism, gun violence, and interpersonal and community violence. It's not just trauma surgeons. All kinds of people are involved in this work," Dr. Dechert said, explaining that it could serve as a model for getting surgeons involved in SDOH work in other areas.

Moving surgeons' efforts upstream

The 80–90 percent of modifiable contributors that shape public health also inevitably shape surgical access, outcomes, and recovery. While individual surgeons and surgeons working together in a group can address these factors for patients at varying scales, the most effective solutions to addressing SDOH will occur at the policy level. Health care organizations are beginning to create and advocate for policy recommendations to educate legislators on the power they wield to shape health. For example, the American Academy of Family Physicians released a position paper outlining specific policies that will address these upstream health determinants, ranging from guaranteeing population-level access to health care, anti-poverty programs, civil rights and anti-discrimination, and so on.[39]

And although the intersection of SDOH and surgery has only relatively recently become an area of focus, surgeons need to have a presence on the policy level. According to Dr. Janeway, research has gotten to a point where disparities related to SDOH and surgery are clear. "The next step is to ask why the disparities exist and then to ask, 'What do we do about it?'" she said, explaining that Socially Responsible Surgery has turned to the idea of pursuing translational research—not from translating lab data into a new medication, but from identifying a health disparity and translating it into advocacy.

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She noted an example in process. Victims of gun violence, who in Boston often are young men of color, have significantly improved long-term outcomes with inpatient or intensive rehabilitation. However, many rehabilitation centers ask the source of the patient's injury, and if they are told that it is a gunshot wound, the patient is turned away. "So now, we've identified a disparity, and we're writing a policy piece and taking it to the statehouse in the hopes of creating a law that says a rehab center cannot ask how a patient received an injury, so they can't cherry-pick who goes to a rehab center," Dr. Janeway said.

Taking knowledge of a SDOH and how it affects trauma patients, and advocating to policymakers to change the policies that affect access to rehabilitation "is the kind of work I think we need—direct advocacy work. Gather data, show your hypothesis is true, and work to make a solution into law," Dr. Janeway said, suggesting that surgeons should start to take action at this level. "You can and you should take this next step. You need to make actionable changes to improve these social circumstances. It's hard to do, but it can be done."

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