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The Integral Role of Anesthesia in Public Health: Ensuring Safe Surgical Care and Accessible Healthcare

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Abstract:
Anesthesiologists are uniquely positioned to advance public health by delivering safe, accessible, and equitable perioperative care across local, regional, and global contexts. However, access to such care is frequently limited by social determinants of health. In this study, we contextualize the Centers for Disease Control and Prevention's five domains of social determinants of health within the field of anesthesia. We also propose actionable strategies that anesthesiologists can implement immediately to help bridge gaps in access to essential anesthesia and surgical services. These strategies range from collaborating with patients and community stakeholders on targeted, small-scale initiatives to advocating for broad, systemic policy reforms. By identifying and addressing these social determinants, anesthesiologists can drive transformative improvements in healthcare delivery, promote equitable access to anesthesia and surgical services, and advance global public health.

Keywords: Public health, Anesthesiology, Social determinants of health, Perioperative care, Enhanced recovery after surgery, Healthcare disparities.

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1. INTRODUCTION

In 2015, the World Health Assembly (WHA) made the first-ever resolution acknowledging that surgical and anesthetic services are essential in addressing gaps in public health [1]. Although surgery was previously recognized as having "an important role to play in primary healthcare and in the services supporting it" by the Director General of the World Health Organization (WHO) in 1980, its importance in public health was deferred because addressing this need was perceived to be too expensive, too sophisticated, and "not appropriate for public health initiatives" at the time [1]. A recent estimate by the Lancet Commission on Global Surgery in its report *Global Surgery 2030*, however, offered a staggering contradiction to this precedent—stating that as many as five billion people lack access to safe, timely, and affordable surgical and anesthesia care when needed [2]. This is, fundamentally, a public health problem in need of a public health solution.

Lack of access to surgical care, including surgical anesthesia, constitutes a prevalent cause of morbidity and mortality worldwide. The 2015 WHA noted that many surgically treatable diseases were among the top 15 causes of physical disability worldwide [1]. Likewise, it is estimated that at least 77.2 million disability-adjusted life-years (DALYs) could be avoided each year by having equitable access to basic surgical care [3], while 16.9 million deaths (32.9% of all deaths worldwide, based on 2010 estimates) occurred as a result of conditions requiring surgical care [4]. This total exceeds the number of deaths resulting from HIV/AIDS (1.46 million), tuberculosis (1.20 million), and malaria (1.17 million) combined [5].

Despite global gaps in surgical and anesthesia care,

the specific factors causing these gaps in individual communities, health systems, or regions are not well described, and the specific role of anesthesia providers in addressing these gaps is not well defined. Here, we offer a perspective on this topic that is grounded in the principles of healthcare delivery, population health science, and health promotion. Drawing from our own experience working in rural and underserved areas in America, we highlight the vital role of anesthesia providers in public health and suggest practical steps to address critical public health needs in anesthesia care.

2. THE SOCIAL DETERMINANTS OF ANESTHESIA CARE

Access to surgical care often relies on access to anesthesia care, yet access to both can be disrupted by social and structural factors that impede care. Social determinants of health (SDOH) are the conditions in which people are born, grow, live, work, and age that have a proven negative impact on healthcare outcomes [6]. According to the WHO, numerous studies suggest that SDOH account for 30-55% of health outcomes and can even be more important than healthcare or lifestyle choices [6]. Here, we will provide definitions of social determinants as they apply to anesthesia, based on the Centers for Disease Control and Prevention's (CDC) five key domains [6].

2.1. Economic Stability

2.1.1. Socioeconomic Status

Healthcare costs for surgical and anesthesia care alone can be prohibitively high for some patients. This effect can further be compounded by the cost of time off from work for healthcare appointments, surgery, and recovery. For patients with limited socioeconomic resources or patients whose jobs may be at risk with extended time off, completing recommended perioperative care may be infeasible. Importantly, this can also affect the care of patients whose caregivers may be adversely affected by time off work (e.g., children of parents who may be unable to support the costs of living or may fear job loss when taking time off).

2.2. Education Access and Quality

2.2.1. Health Literacy

Perioperative instructions can be complicated to understand for all individuals. However, these can become even more challenging with decreased health literacy or reading abilities. Inability to understand and follow these instructions may make surgery and anesthesia dangerous or can also lead to poor outcomes during the recovery period. In addition, a meta-analysis that assessed 66 articles found that decreased health literacy is associated with unhealthy behaviors, including smoking [7]. This is significant because smoking is well known to greatly increase the risk of perioperative and postoperative complications [8-10].

2.3. Health Care Access and Quality

2.3.1. Access to Anesthesia Providers and Facilities

According to the World Federation of Societies of Anesthesiologists (WFSA), a global disparity exists in anesthesia providers [11]. After surveying 153 of 197 countries in 2016, the range was from 0 to 20 physician anesthesia providers (PAPs) per 100,000 population. Seventy-seven of the surveyed countries reported <5 PAP per 100,000 population, with the greatest disparities seen in Africa and Eastern Asia. The WFSA estimated that over 136,000 additional PAPs would be required to achieve a minimum density of 5 PAPs per 100,000 population in all countries worldwide. Additionally, there have been studies that assessed the access to proper anesthesia equipment and medications in certain developing countries and found compelling results about gaps in anesthesia care. In two separate studies conducted in Madagascar and Liberia, none of the 19 regional hospitals in Madagascar or the 27 hospitals in Liberia surveyed were able to meet the WFSA's standards for patient monitoring [12, 13]. Even within regions or countries with a higher number of anesthesia providers, anesthesia care may still be concentrated in larger cities or academic settings, leaving gaps in anesthesia access in rural and medically underserved areas.

2.3.2. Insurance Barriers

Medical insurance in the United States ultimately determines where and when you can receive healthcare services. These disparities are most frequently observed in insurance programs for patients with low incomes (e.g., Medicaid), as fewer providers are accepting these forms of insurance over time [14]. The impact of insurance disparities on surgical outcomes is remarkable. After controlling for surgical complexity and patient comorbidity, the odds of post-operative death for patients undergoing noncardiac surgery were 29% higher for patients insured by Medicaid and 75% higher for patients with no insurance compared to patients with commercial insurance [15].

2.4. Neighborhood and Built Environment

2.4.1. Transportation Barriers

For patients in rural and medically underserved areas, getting transportation to or from a surgical procedure may also prove to be extremely difficult or impossible. To compound this, rideshare and taxi services are not recommended after a patient receives anesthesia. Transportation barriers may affect patients' ability to attend pre-operative appointments, arrive at planned surgical procedures, or participate in ambulatory surgical programs. Indeed, some insurers (such as Medicaid) recognize this barrier and reimburse for some transportation to healthcare appointments. However, access to these services may still be unreliable in areas where transportation infrastructure is limited (e.g., rural and medically underserved areas).

2.5. Social and Community Context

2.5.1. Language Barriers

Reports consistently show worse healthcare outcomes, decreased satisfaction, and lower adherence among U.S.-based patients with limited English proficiency [16], largely due to a lack of access to language-concordant health information and healthcare communication. Within anesthesia, the preoperative patient education and informed consent processes are vital for patient satisfaction, knowledge, and overall comfort [17]. However, these components heavily rely on communication and may be severely limited when there is a language discrepancy.

2.5.2. Social Support

In the perioperative period, patients' safety, well-being, and recovery rely heavily on the ability to adhere to anesthesia recommendations (e.g., pre-operative food and medication intake and post-operative monitoring). For many patients, this process involves the support of friends, family members, and other caregivers who can assist patients with completing the recommendations, including those post-operative recommendations that patients may be less able to achieve independently. Patients who have limited social support resources or whose loved ones are unable to provide immediate social support due to other obligations (e.g., work, childcare, illness) may face barriers to achieving these recommendations. Similarly, for ambulatory procedures, poor social support may intersect with transportation barriers (as mentioned above), making it difficult or impossible to arrange for safe transportation and post-operative monitoring.

2.5.3. Racial or Ethnic Inequalities

Prior research has demonstrated that patients from minoritized racial or ethnic groups have higher rates of anesthetic and surgical morbidity compared to white patients across surgical specialties and environments [18]. Such disparities may represent a combination of underlying inequities in other social determinants of health, as well as practice inequalities that have been documented. For instance, disparities have been reported in the preoperative setting with discrepancies in preoperative anxiolytic administration and postoperatively with pain management [18].

2.5.4. Unhealthy Behaviors

Various unhealthy behaviors, such as smoking and poor eating habits, can be transferred between generations. For example, a meta-analysis found that the odds of smoking uptake by children and young adults were significantly higher if a parent or sibling was a smoker [19]. Another study found that parental obesity more than doubles the risk of adult obesity among children less than 10 years old [20]. As such, the exposure to unhealthy behaviors in a child's social context can result in similar behaviors as an adult. This is significant because these transferred behaviors are associated with increased complications and mortality if anesthesia is required.

2.6. How Anesthesiologists Can Help?

Anesthesiologists and healthcare organizations can help to recognize and address the social determinants of anesthesia care by taking concrete steps to reduce gaps in access to needed anesthesia and surgical services. We offer several examples here:

2.6.1. Addressing Social and Structural Support Needs During the Perioperative Period

Pre-operative evaluations related to the social determinants of anesthesia care may help to reduce delays in care (e.g., avoidable postponements of procedures), improve patient outcomes, and enhance both patients' and providers' interactions with the healthcare process. Such evaluations might emphasize common barriers to care related to insurance, transportation, post-operative assistance, and other essential social support. These evaluations could be undertaken by trained social workers, care coordinators, or patient navigators whose primary role is to build rapport, trust, and communication with patients and caregivers. Through the established relationship, they can then assist patients with navigating social and structural needs throughout the care process. Healthcare institutions might also consider engaging or employing trained community health workers to facilitate this process.

2.6.2. Engaging or Employing Community Health Workers

According to the American Public Health Association, a community health worker (CHW) is "a frontline public health worker who is a trusted member of and/or has an unusually close understanding of the community served. This trusting relationship enables the worker to serve as a liaison/link/intermediary between health/social services and the community to facilitate access to services and improve the quality and cultural competence of service delivery [21]." This definition outlines a very broad role, which has increasingly been applied within healthcare settings. For example, CHWs can "offer interpretation and translation services, provide culturally appropriate health education and information, help people get the care they need, give informal counseling and guidance on health behaviors, advocate for individual and community health needs, and provide some direct services such as first aid and blood pressure screening [22]." In other words, CHWs engaged or employed by healthcare systems can help to navigate most or all of the social determinants of anesthesia care in collaboration with healthcare teams and may serve a crucial, practical role in addressing the public health gaps affecting anesthesia care.

CHW-based programs have been shown to improve health outcomes. For example, one study found that using CHWs as patient navigators resulted in greater timely cancer care among low-income and minority populations [23]. In another study, Hispanic patients at urban clinics were randomly assigned to receive CHW assistance versus no CHW assistance; those offered CHW assistance had improved health status and lower emergency department use [24]. As of January 2024, at least 24 U.S. states offer

Medicaid funding for CHW services [25], nearly doubling from 13 states in 2023 [26]. This number is expected to increase in response to growing needs in both the public health and healthcare workforces.

2.6.3. Ensuring Language Inclusion Throughout the Anesthesia Care Process

Language inclusion is essential to ensuring safe and effective anesthesia care. This includes full communication of pre-operative and post-operative recommendations to both patients receiving anesthesia care and any caregivers who may be responsible for carrying out such recommendations after patients have received anesthesia. Healthcare centers and anesthesia care programs should work closely with qualified language interpretation and translation services to ensure that language-concordant patient/caregiver counseling and education are provided, that information is effectively communicated, and that patients' and caregivers' questions or concerns are fully addressed. Although patients may choose to have bilingual or multilingual family members or friends present during healthcare encounters or after surgery, anesthesia providers should not rely upon or expect family or friends to provide interpretation/translation services themselves. Patients and their caregivers may also wish to receive written and/or audio-video resources in their primary spoken language to review during or after a healthcare encounter or before or after surgery [27].

2.7. An Applied Example of Addressing the Social Determinants of Anesthesia

Recently, our team had an opportunity to partner with community stakeholders in a medically underserved rural community in Iowa, which is home to a racially, ethnically, and linguistically diverse population. The rural community served encompasses approximately 30 distinct cultural and linguistic groups and reflects a wide array of racial and ethnic identities, including White, Latino/a, Asian, Pacific Islander, and Black/African American populations. In collaboration with community partners, including a team of CHWs in the area, we identified several key social determinants of anesthesia care impacting access to selected surgical procedures. In response, we developed language-concordant, culturally responsive health education materials (e.g., audio-visual materials, written materials) in accordance with CHW recommendations and supported the CHW team's mission to help community members navigate access to care (e.g., transportation). CHW services have been delivered in multiple languages, such as English, Spanish, Pohnpeian, Chuukese, Burmese, Creole, and Lao, among others. This collaborative approach has helped to directly address public health needs and facilitate patient, family, and community trust. Such trust-building is essential for promoting good health outcomes and collaboratively addressing the social determinants of anesthesia care.

CONCLUSION

The field of anesthesia holds a vital role in promoting public health. Anesthesia providers and anesthesia care programs can directly impact public health in their own communities, regions, and institutions and, ultimately, help address the global health needs related to anesthesia care. By partnering with patient and community stakeholders to implement small-scale improvements at one's own institution or advocating for larger-scale policy efforts to disseminate similar practices across the field, anesthesiologists can help to promote health equity, eliminate disparities in the social determinants of anesthesia care, and advance public health.

AUTHORS' CONTRIBUTIONS

M.N.B.G.: Contributed to writing the original draft, and M.L.C participated in writing the paper.

LIST OF ABBREVIATIONS

CDC	=	Centers for Disease Control and Prevention
CHW	=	Community Health Worker
DALYs	=	Disability-Adjusted Life-Years
HIV/AIDS	=	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
PAP	=	Physician Anesthesia Provider
SDOH	=	Social Determinants of Health
WFSA	=	World Federation of Societies of Anesthesiologists
WHA	=	World Health Assembly
WHO	=	World Health Organization

CONSENT FOR PUBLICATION

Consent for publication is not required as there are no animals\human data involved in the study.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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