

## DIVERSITY, EQUITY AND INCLUSION

### Racial and Ethnic Health Disparities in Pediatric Anesthesia: Towards Understanding the Problem and Charting the Path Forward

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People belonging to racial and ethnic minority groups in the US have poorer health outcomes. The disproportionate deaths from COVID-19 in the minority population have harshly highlighted this longstanding truth. The differences in health outcomes between non-Hispanic White/Caucasian and minority groups have been documented across many health conditions and healthcare settings in both adult and pediatric groups, including the perioperative areas of surgery and anesthesia care.<sup>1,2</sup> Health outcome inequities have been the target of research and interventions in the last few decades. Unfortunately, they are pervasive and strongly persist despite such efforts; that this problem is complex and challenging is an understatement. The Center for Disease Control (CDC) has now declared health outcome disparities a public health crisis.<sup>3</sup>

At initial glance, one might assume the key to minimizing disparities in health outcomes should rest on 2 main issues: ensuring equitable *access to care* and providing equitable *quality care*. Traditionally race-related biological and genetic characteristics have been touted as determinants of care, but this has been shown to be based on faulty and biased perspectives, with no sound basis for genetic based differences in the variations for medical outcomes between “races”. Healthcare professionals generally focus primarily on improving and maintaining quality of care, with minimal involvement in access of care issues. As anesthesiologists, we strive to ensure delivery of equitable, unbiased, high quality anesthesia care as part of a perioperative team. Anesthesiologists also engage in institutional initiatives for patient quality and safety, and other efforts to build equitable healthcare systems. So, how are anesthesiologists, more specifically pediatric anesthesiologists, faring in doing our part in the bigger picture of health outcome equity?

A comprehensive discussion of the root causes and historical development to present-day of this issue is beyond the scope of this article. However, we will highlight current published literature on racial disparities in pediatric anesthesia care and perioperative outcomes, how healthcare providers contribute to the larger context of health outcome disparities and

the proposed action steps for pediatric anesthesiologists to move forward to help close the gap.

#### Current published literature on racial disparities in pediatric anesthesia care and perioperative outcomes

This [table](#) provides a summary of 22 published pertinent articles.

##### Summary of Pertinent Articles

- Racial differences in perioperative complications and outcomes (2 studies)
- Parental factors, language and race in peri-anesthetic care (6 studies)
- Unconscious bias and racial differences in premedication and anesthesia induction (1 study)
- Racial differences in pain management (7 studies)
- Race and pharmacokinetics/ pharmacogenetics - morphine (1 study)
- Racial differences on perioperative respiratory adverse events (2 studies)
- Race and blood transfusions (2 studies)
- Provider bias (1 study)

Research on racial disparities in pediatric anesthesia care is scarce, although slowly increasing. Elucidating impact of anesthesiology-only factors on racial health disparity is challenging as anesthesia-specific outcomes are closely intertwined with multilevel factors.

Two important studies on perioperative pediatric outcomes are recent reports comparing African American (AA) and White (W) children:

The paper by Willer et al. found that AA children have a 2-fold higher rate of death after an unanticipated reoperation following a primary surgical procedure compared to W children (3.7% vs 1.6%).<sup>4</sup> This failure-to-rescue, defined as all-cause mortality after an unplanned reoperation within 30 days following a primary index surgery, is broadly used as a measure of surgical care quality. Moreover, AA children died within shorter time periods after reoperation when compared to their W peers. The authors used the National Surgical Quality Improvement Program for Pediatrics (NSQIP-P) which is managed by the American College of Surgeons and



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gathers data from over 100 community and academic centers across the country. In this large cohort, compared to the W children, the AA children had higher American Society of Anesthesiology Physical Status (ASA-PS) scores and comorbidities. The results suggest that the higher preoperative comorbidities in the AA children contributed to the poorer outcomes. Limitations include the database's lack of information about timeliness or delay in patient presentation for surgical intervention and the lack of identification of site of care. Many minority-serving hospitals are less equipped to recognize and deal with complications. Ultimately, these limitations could not fully account for the consistent racial disparity found related to failure-to-rescue.

Another study, by Nafiu et al, also analyzed the NSQIP-P database and questioned whether perioperative outcome differences persist between both groups when the burden of preoperative risk factors is minimized.<sup>5</sup> It reviewed 483,098 inpatient surgical records from 186 centers and identified 172,549 seemingly healthy patients by selecting only children with ASA-PS scores of 1 or 2 for analysis. It found that AA children had greater odds of postoperative complications and 3 times the odds of death within 30 days of surgery compared with their W peers. Even after accounting for the study's limitations, the worse postoperative outcomes in AA children are not explained by the racial variation in preoperative comorbidity burden.

The above studies add to the current body of evidence showing the association of the AA race to increased rates of death and postoperative complications compared to the W race. These results are highly disturbing and dig deep into our conscience as healers and humans, demanding our individual and collective attention.

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One significant limitation across racial disparity research is the issue of categorizing race and ethnicity. Currently, the racial categorizations are defined by the Office of Management and Budget and include “five minimum categories for data on race: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, and White. There will be two categories for data on ethnicity: ‘Hispanic or Latino’ and ‘Not Hispanic or Latino’.”<sup>6</sup> Reporting is done via self-identification. These racial and ethnic classifications are too restrictive for our current society and no longer reflect the diversity and heterogeneity of the United States (US) population. Despite this information being unlikely to capture the needed granularity for effective research, it is all surveys, databases and institutions have collected to date. In addition, some studies, to obtain statistical power, may lump several racial categories into one composite “minority” group to compare to the White race. Although some similarities may be shared amongst the racial categories in the composite “minority” population for research purposes, their composite result may have little applicability to its individual racial contributors. To increase homogeneity, studies have mostly focused on the Black race, with a smaller number on the Hispanic race for research. Currently, the US population racial distribution of children under 18 years old are non-Hispanic White 50%, Hispanic 26%, Black 14%, Asian or Pacific Islander 5%, Multiracial 4%, and 0.8% for American Indian or Alaskan Native.<sup>7,8</sup> This diversity requires improved research strategies and broader representation of children who are non-White and non-Black.

There are 6 studies focusing on pediatric anesthesia and parental factors. Overall, self-identified Hispanic parents held preoperative perceptions and beliefs regarding pain that could lead to undertreatment of their children’s postoperative pain.<sup>9,10</sup> In addition, language barriers, defined as the need for interpreter services, were also identified as obstacles to the provision of adequate postoperative pain control for these children.<sup>11,12</sup> One retrospective study showed that parents of Latino and Black children were less likely to consent for caudal blocks compared to parents of White children; associated factors included use of government insurance and low English language proficiency.<sup>13</sup> In general, despite limitations in all of the above studies, these findings

are not surprising. The reasons are multifactorial including fear of side effects, cultural expectations for pain behavior, and misconceptions or lack of knowledge regarding pain and pain interventions. However, provider factors during the consent process cannot be discounted, nor the hospital staff demographics as it relates to the population demographics the hospital serves.

Communication barriers related to English language proficiency also allow for missed opportunities in proper assessment and treatment of pain. Improving access to professional interpretation services may reduce the disparity in pain management.<sup>12</sup> Education for parents in their preferred language, targeting pain-related gaps in knowledge, could improve analgesic management.

One unique aspect of pediatric anesthetic care relates to techniques to decrease the child’s, and consequently the parent’s, anxiety during the peri-induction period. A retrospective review of over 33,000 cases at a single institution aimed to assess for unconscious racial bias by analyzing the utilization of inhaled vs intravenous induction, and other strategies for decreasing preoperative anxiety. The results showed that Black children, 10 to 14 years old, were more likely than Caucasian children to undergo inhalation induction. Black children were less likely to receive oral midazolam premedication or to have family members present at induction (PPI) compared to their Caucasian peers. The higher ASA-PS score of the Black children may have influenced these management decisions. As the perianesthetic decisions are mostly made at the discretion of the anesthesiologist, the authors suggest the possibility of the presence of provider unconscious bias with a perceived “adultification of Black children.”<sup>14</sup> It would have been insightful to know whether there were differences in preference for PPI between the caregivers of the Black and the Caucasian children in this study. An interesting study by Fortier et al found that Spanish-speaking and English-speaking Hispanic parents had higher preference for PPI compared to English-speaking White parents; it also highlighted differences in motivations for PPI between groups.<sup>15</sup> While the relationships of race to specific parental preferences are largely undefined, awareness of such potential racial associations would promote more customized patient-centered plans of care.

Regarding pain management in children, studies in pediatric anesthesia do not

demonstrate racial disparities to the extent seen in studies from other medical specialties. A study on intraoperative regional anesthesia use analyzed 25,664 pediatric surgeries and 3,189 regional blocks and did not find an association with race and ethnicity.<sup>16</sup> Another paper on epidural use in major oncologic procedures also did not find a racial disparity.<sup>17</sup> Several studies on intraoperative and postoperative analgesic use did not find a correlation with racial categories.<sup>18-20</sup> In contrast, Jimenez found lower postoperative opioid analgesic administration in Latino children compared to Caucasian children undergoing ambulatory surgical procedures; however, the pain scores and opioid side effects were similar between groups.<sup>21</sup> A prospective study analyzed 1,134 children aged 4–17 years to determine risk factors for clinically significant pain in PACU (defined as PACU IV opioid requirement) after ambulatory surgical procedures. The study found that non-Caucasian ethnicity/race was an independent predictor for pain requiring IV opioid in PACU.<sup>22</sup> A prospective study found that AA children had a higher postoperative pain burden as evidenced by higher pain scores, opioid utilization and more interventions for pain compared to their W peers despite similar intraoperative morphine use during tonsillectomy cases.<sup>23</sup> The author went on to research the pharmacokinetics of morphine in tonsillectomies and found that morphine clearance was higher in AA children compared to W children. This correlated with the higher PACU morphine requirement found in this group.<sup>24</sup>

Research on pain management in different racial groups has been limited to comparisons of analgesic utilization, number of pain interventions and pain scores. Pain is a complex phenomenon with subjective and objective components. Cultural and personal experiences shape pain expressions, bias, fears and treatment expectations that influence its assessment, treatment and response. This applies to patients, caregivers and clinicians. External factors, such as healthcare systems, can greatly facilitate or hamper effective pain management. Despite all of this, it has been postulated that the lesser degree of racial disparities found in pediatric perioperative pain as compared to other areas, such as the emergency departments, may relate to the relative standardization of perioperative anesthesia and pain processes resulting in decreased treatment variability. This implies that degrees of provider unconscious

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bias, when diminished by protocolized care, could be contributing to these discrepancies in equitable care. It also gives one hope that with proper use of care pathways and protocols, inroads can be made to level the quality of care provided to all children.

Regarding perioperative respiratory outcomes, two studies show that after elective procedures, AA children have higher rates of perioperative respiratory adverse events (PRAEs), including bronchospasms and laryngospasms, than W children. AA race was an independent risk factor for PRAEs in both studies.<sup>25,26</sup> Tariq's study included children with only ASA-PS I and II scores for a variety of outpatient surgeries.<sup>25</sup> Nafiu's study included children with ASA-PS 1 to 3 scores undergoing non-otolaryngologic outpatient surgeries. The children of AA race had higher ASA-PS scores and had a higher burden of preoperative respiratory disease, each of which were independently associated to higher PRAEs. However, the addition of AA race to higher preoperative respiratory disease burden did not further increase the rate of PRAEs.<sup>26</sup>

Two studies analyzed race and the use of intraoperative blood transfusion. One study did not find race to be a factor associated with blood transfusions during open abdominal or pelvic surgery.<sup>17</sup> The other paper found that in children undergoing primary pediatric scoliosis surgery, AA race had higher odds of greater estimated blood loss, higher rate of blood transfusion, and an increased amount of blood transfused, even after accounting for confounding variables such as type of scoliosis, Cobb angle and number of levels of fused.<sup>27</sup>

Implicit provider bias has been demonstrated in healthcare workers. The study by Baetzel et al seemed to suggest that anesthesia provider bias was present during choice of premedication and utilization of child life services in AA children.<sup>14</sup> In a large national cohort of anesthesia cases (90% adults, 8% children 1-18 years, and 1% infants), Andreae et al found a strong and consistent correlation of lower antiemetic administration in patients with government insurance and low zip code-based median income, both of which are socioeconomic status indicators predominantly associated with minority races as compared to W race.<sup>28</sup> As the utilization of antiemetics and premedication are routine and primarily the purview of anesthesiologists, both studies propose the systematic discrimination in its utilization could be due to unconscious bias and

“challenge the notion that anesthesia providers do not contribute to health care disparities.” These pediatric anesthesia studies, although methodologically limited, raise awareness and demonstrate the existence of racial disparities within our own profession: quality of care is not provided equitably to all of our pediatric patients.

It has been over two decades since 1999, when Congress asked the Institute of Medicine to: 1. evaluate racial health outcome disparities stemming from *quality of healthcare* (to differentiate it from *access to healthcare*), 2. assess the causative factors including bias and discrimination at the provider and healthcare system level, and 3. recommend strategies to eliminate healthcare inequities.<sup>1</sup> Since then, much has been invested to close this disparity gap. Despite this investment in time, money and effort, two studies documenting higher rates of postoperative death, complications and failure-to-rescue in AA children compared to the W children are contemporary, from 2020 and 2021.<sup>4,5</sup> After 2 decades of research and interventions, this is tragic and sobering. Why are we still failing?

### Healthcare quality and access in the larger context of health outcome disparities

The pervasiveness and lack of progress on closing health disparities have led to a major paradigm shift for approaching this problem and identifying strategies to find effective solutions. Most research to-date has focused on the biological basis of race for the poorer outcomes. Many experts have deemed that biology-framed research focus is short-sighted.<sup>29-31</sup> For interventions to be effective, it is critical to include the upstream factors. The World Health Organization defines health inequities as avoidable differences in health status or in the distribution of health resources between different groups of people, arising from the conditions in which people are born, live, work and age. These factors are shaped by economic, social, cultural and political forces.<sup>32</sup> In the US, a root cause tied to health disparities is *racism*. Racism refers to the structures, policies, practice and socially imbedded norms that result in systematically disadvantaged conditions for specific groups of people. The CDC has explicitly stated “that racism is a serious public health threat that directly affects the well-being of millions of Americans... as a result, it affects the health of our entire nation...”<sup>33</sup> It highlights that social determinants of health—such as education,

housing, socioeconomic status, access to health care and employment—are the fundamental drivers of the health inequities, being far stronger causes of disparities than the genetics or individual behavior of the affected population.

Currently, most disparity interventions focus on the individual, with little attention to their social and physical contexts. Given that social context is the dominant driver of health disparities, what is known about the relative contribution of societal factors to health outcomes? A model studying the *modifiable* factors for population health, the County Health Rankings Model, proposes that clinical care (access to care and quality of care) has an approximately 20% contribution towards health outcomes.<sup>34</sup> Health behavior factors contribute to 30% of health outcomes while 50% is attributed to environmental (10%) and socioeconomic factors (40%). Although these percentages vary from county to county in the US, the relative contributions are consistently observed.<sup>35</sup> Biological traits associated with specific ethnic groups, such as sickle cell anemia with African ancestry and beta-thalassemia with Mediterranean ancestry, are not accounted for in this model, as those are currently non-modifiable.

The interactions of the main domains for determinants of health provide opportunities for prioritizing areas for research, assessment and interventions towards health outcome equity (Figure 1).

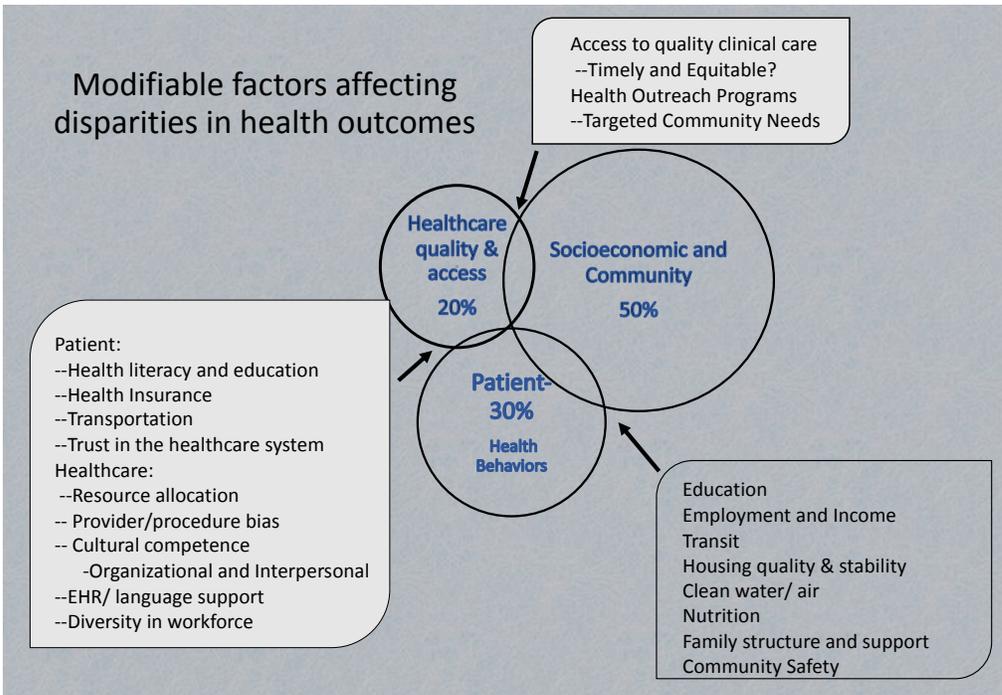
Optimization of healthcare quality and access is essential; however, it is insufficient by itself to close the gap in health outcome disparities. Only an approach targeting all fronts, with focus on *addressing the upstream social determinants of health* will advance our goals toward health-equity.

As clinicians, we must strive towards providing unbiased, high quality care while identifying our own internal sources for disparity, and engaging in opportunities to change those upstream factors within our clinical reach. Examples include interventions in the perioperative period in addressing individual behavioral risk factors, patient advocacy in access to healthcare services, incorporating social determinants of health into the electronic health records, increasing granularity on racial and ethnic descriptors. Maintaining curiosity about patient circumstances and individual challenges and barriers to appropriate perioperative and follow-on care is important to provide extra health system support when needed

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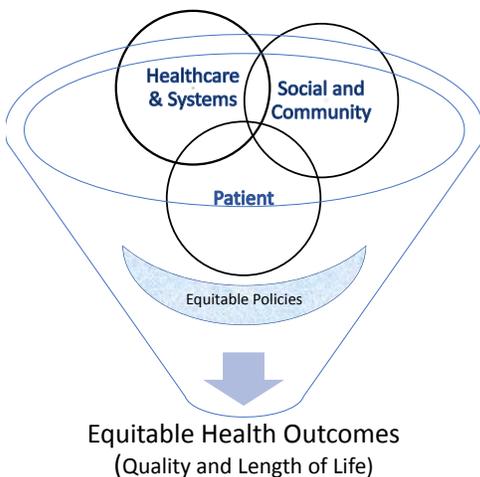
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**Figure 1:** Relative contributions of modifiable individual and structural factors to disparities in health outcomes. Note that healthcare may provide about 20% contribution to ultimate health outcomes. Specific opportunities are presented at the intersection of domains for evaluation and research towards health equity. EHR, electronic health record. (Credit: Destiny F. Chau)

to ensure improved patient outcomes. Medical systems can be powerful allies to partner with the community to address local educational and socioeconomic inequalities. However, these strategies *must* be supported by policies that are equitable at the local, state and national governmental level for sustainable and long-term change (Figure 2).



**Figure 2:** Multidimensional approach to achieving equitable health outcomes by targeting the structural and individual factors aided by strong equitable policies. (Credit: Destiny F. Chau)

### Research and strategies for pediatric anesthesiologists to move towards health equity

The determinants of health disparities are neither easy to research nor easy to solve. It will take a sustained broad, concerted, multiapproach effort to dismantle and reverse the factors that have led to the current state. The first step is recognition that racial health disparities exist and is a pervasive problem. And that each of us have some degree of implicit and explicit bias that contributes to the problem. Implicit bias is subconscious, it negatively influences our assessment of others and it adds to disparities in healthcare outcomes. Implicit bias in healthcare professionals towards dark-skinned individuals has been found to occur as commonly as in the general population and may lead to poorer patient outcomes.<sup>36-38</sup> Most studies used the Implicit Association Test, which is the most widely used online assessment tool for implicit bias. There is a dearth of implicit bias research in pediatric anesthesia. The studies from Baetzel and Andreae suggests that implicit bias is systematically present in anesthesia providers.<sup>14,28</sup>

Interestingly, the implementation of protocol-driven care pathways, such as enhanced recovery after surgery (ERAS) and decision support tools, have been

linked to lower healthcare disparities.<sup>39-42</sup> A proposed mechanism has been the fewer opportunities for decisions influenced by the practitioner’s personal implicit or explicit bias. This is thought secondary to the systematic standardization of processes in each perioperative phase for all patients under such protocol. ERAS includes patient education and setting of expectations, provider training for adherence to evidence-based best practices and management pathways. Overall, ERAS protocols are associated to improved surgical outcomes. The improvement in outcomes seem to occur across all racial categories, thus, reducing the racial gap in outcomes. This adult data is encouraging; thus, this an open area of research for the pediatric sector. Note that the ERAS protocols are patient-centered, multilevel interventions starting at the preoperative stage following through the postoperative stage; with multidisciplinary stakeholders and active patient engagement; and comprehensive support processes to achieve clinical milestones towards improvement of outcomes (i.e., education, auditing, reassessment of strategies). The ERAS characteristics are similar to the recommended strategies for effective interventions in closing the inequity gap: multi-pronged and cross-disciplinary approach, broad stakeholder engagement including the patient and the patient’s community, relationship-centered communications, and ongoing rigorous re-evaluations.<sup>30</sup>

Researching effectiveness of interventions require methodologically sound study designs and research strategies. For results that are applicable to the study population, disparity researchers are clamoring for racial classification categories that reflect the current heterogeneity of this country. Different racial groups have different social and cultural needs.

This heterogeneity is made clearly apparent by the Health Opportunity and Equity Initiative, which maps inequities found for each of the racial groups across 10 different disparity domains per state ([https://www.nejm.org/doi/full/10.1056/NEJMp2029139?query=race\\_and\\_medicine](https://www.nejm.org/doi/full/10.1056/NEJMp2029139?query=race_and_medicine)): access to primary care, adult health status, affordable health care, affordable housing, food security, health insurance coverage, infant mortality, livable income, low poverty concentration and premature mortality.<sup>43</sup> The US Census Bureau is currently researching for improved ways to document the

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population's racial diversity. It found that the "Some Other Race" category was the third largest race group in both 2000 and 2010.<sup>44</sup>

We also must recognize the current limitations in our research methodology which fails to capture social determinants of health. For example, although ASA-PS scores are frequently used for risk stratification, this system was not designed nor validated as a predictive tool for outcomes, nor a predictive tool for outcome disparities. An ASA-PS score of 1 or 2 does not speak to upstream determinants of health. Upstream factors of chronic exposure to environmental pollutants, poor quality nutrition, adverse childhood events and presence of maladaptive behavior may not be obvious in an asymptomatic child. During the preoperative evaluation, a child without concerning signs and symptoms elicited by medical history and physical exam would be presumed healthy and assigned an ASA-PS score of 1 or 2. Occult undiagnosed respiratory disease may not manifest until the intra- or post-operative period in the form of perioperative respiratory adverse events. As obesity is prevalent, the child may not appear malnourished. Anemia may be present but not be noted. All these are preoperative unsuspected factors which can undermine postoperative outcomes.

Ultimately, racial and health disparities research must be reframed from its biological focus to an antiracist framework which includes: inclusion of race, ethnicity and contextual health determinant factors; use of validated tools for the specific population to be studied; inclusion of a community member of the race under study to engage in the research; and investigators and study reviewers who have racial disparity research expertise.<sup>31</sup>

As healthcare protectors of children now and for future generations, we must look internally to provide health equity and advance practices towards an antiracist culture. Actionable interventions include: increase minority representation in our field, incorporate systematic training for medical students, support residents and attendings with global focus in cultural and racial competency, recognition of and strategies for reduction of implicit bias, standardization of evidence-based best practices and clinical pathways, utilization of EHR systems for enhancing compliance, optimization of language services, implementation of proven effective interventions, and promotion of advocacy and policy training. Additional modifiable

areas for interventions are depicted in Figure 1.

It is challenging to fit the aforementioned actions into busy day-to-day clinical practices, but doing so is imperative to change the health system's culture. Starting early in training, with incorporation of health disparity education into the medical curriculum will bring ongoing change into anesthesia departments with each new residency class. The commitment for health outcome equity must come from top down, from our leaders, as the efforts require substantial sustained administrative and financial investment for systematic implementation of needed interventions. This is a moral imperative we owe to our society and one we must undertake and sustain. We must not grow weary. For the results are deeply impactful and enduring.

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## Call for Newsletter Articles Related to Diversity, Equity, & Inclusion

This edition of our newsletter launches what we hope will be a series of articles focused on diversity, equity, and inclusion issues in our field. Thanks to Dr. Destiny Chau and Arundathi Reddy for starting us off this fall! We are now looking for an individual or team to propose article #2 in our series. Do you have a topic, personal story, or perspective related to diversity, equity, and inclusion that you would like to see featured in our next newsletter? Please let us know! Email Jen Riefe, Section Manager, at [jriefe@aap.org](mailto:jriefe@aap.org) and/or Anita Honkanen, Section Chairperson and Newsletter Editor, at [honkanen@stanford.edu](mailto:honkanen@stanford.edu) with proposals.

We look forward to hearing your ideas!

