If You Can See It, You Can Be It: Perceptions of Diversity in Surgery Among Under-Represented Minority High School Students

Jaina C. Lane, BA,* Abra H. Shen, MD,† Robin Williams, MD,‡ Lianna Gefter, MD, MPH,§ Lindsay Friedman, MD, MS,║ Cheryl K. Zogg, PhD, MSPH, MHS,* and Elizabeth Shaughnessy, MD, PhD#

2020-2021 Association of Women Surgeons National Medical Student Committee**

PURPOSE: Increasing racial and ethnic diversity in the surgical workforce is essential to improving outcomes for marginalized communities. To address the persistent shortage of under-represented minority (URM) surgeons, this study assessed the impact of providing early exposure to the field of surgery on URM high school students’ perceptions of pursuing surgical careers.

METHODS: The Association of Women Surgeons organized a pilot 3-hour “Day in the Life” virtual event geared toward URM high school students involving suturing/knot-tying, case conferences, and mentoring activities.

RESULTS: Pre- and post-event survey results from 65 participants showed that students became more familiar with surgery ($p < 0.001$) and perceived the field as more diverse ($p = 0.017$). Over 70% felt capable of becoming surgeons themselves and over 80% were interested in learning more and gaining mentorship.

CONCLUSIONS: Our programming provides a model for future initiatives aimed at strengthening the pipeline of URM surgeons. (J Surg Ed 000:1–7. Published by Elsevier Inc. on behalf of Association of Program Directors in Surgery.)

KEY WORDS: diversity, surgery, representation, under-represented, mentorship, education

COMPETENCIES: Professionalism, Interpersonal and Communication Skills, Practice-Based Learning and Improvement

INTRODUCTION

Disparities in medical care and health outcomes persist among racial and ethnic minorities, especially within the realm of surgical care. Counties in the United States (US) with a greater than 75% African American population have an over 80% odds of not having an emergency general surgery hospital compared to counties with a less than 25% African American population.¹ Despite having higher rates of eligibility for bariatric surgery, racial and ethnic minorities have a decreased likelihood of undergoing bariatric surgical procedures.² African American women are about 10% less likely to receive immediate breast reconstruction after treatment for breast cancer than their white counterparts.³ Enhancing racial and ethnic diversity in the surgical workforce is essential to improving care for marginalized communities. Physicians from African American, Hispanic/Latino, and Native American backgrounds are more likely to serve patients from these backgrounds, along with other medically underserved communities.⁴–⁶ Minority patients are more willing to seek out medical care and participate in clinical trials when minority clinicians are part of their care team.⁷–⁹
Still, a shortage of under-represented minority (URM) surgeons persists. African Americans constitute approximately 12.4% of the US population; but only 5.7% of graduating medical students and 6.2% of general surgery trainees. Similarly, Hispanics constitute approximately 17.4% of the US population, but only 4.5% of graduating medical students and 8.5% of general surgery trainees. This shortage is due to many factors including a paucity of URM medical graduates to recruit into these positions. URM medical students possessing an interest in pursuing surgery report difficulty finding mentors invested in their success, and struggle to connect with non-URM attendings. Studies have shown that when controlling for USMLE Step 1 scores, research productivity, community service, leadership, and Gold Humanism membership, Black students are less likely to be inducted into the Alpha Omega Alpha honor society, a distinction highly considered by program directors for surgical residency programs.

Early exposure to the field of surgery as a career option and providing opportunities to connect with individuals in the field from diverse backgrounds are likely to be effective tools in strengthening the pipeline of URM surgeons. This study assessed the impact of early-exposure programming focused on the field of surgery on URM high school students’ interest in pursuing a career in surgery, perceptions of diversity within the field, and how equipped they feel to pursue this career path.

**METHODS**

In November of 2020, the Association of Women Surgeons (AWS) collaborated with the Health Career Collaborative, Inc (HCC), a national outreach program associated with the American College of Surgeons, to organize a "Day in the Surgery Life" virtual event for high school students from underrepresented racial and ethnic backgrounds. The Health Career Collaborative has active sites through 28 medical schools in 18 US cities. 110 high school students were recruited through HCC site coordinators in eight cities across the United States (Wilmington, DE; Houston, TX; Austin, TX; East Palo Alto, CA; Santa Ana, CA; Miami, FL; Stone Mountain, GA; Durham, NC). Consent and liability waivers were obtained from student participants and their parents.

Students were each mailed suturing and knot tying kits at no cost to them, along with guidelines for safe use. In seven regions of the United States (Midwest, Mid-Atlantic, New England, South, Southeast, Southwest, West), groups of medical students, residents, and attending surgeons were recruited by AWS event leaders for each region. The medical students, residents, and surgeons engaged with high school students from their region through virtual conferences consisting of a series of sessions exposing students to the field of surgery. High school students practiced suturing and knot tying with medical students in small group breakout rooms as a part of the surgical skills workshop. Residents described the academic path to becoming a surgeon (Supplementary Fig. 1), shared details of their personal experiences while addressing unique challenges and barriers they faced, as well as the motivations that inspired them. Finally, students were led through an interactive "Think Like a Surgeon: Practice Case" with an attending surgeon. Using a PowerPoint presentation, the surgeon guided students through a series of questions outlining the diagnosis and surgical management of appendicitis (Supplementary Fig. 2). The virtual event was concluded by a question and answer session where students had the opportunity to ask attendings about their lives as surgeons and gain their perspectives on advice for students, strategies to succeed, and unique experiences they encountered on their own journey to becoming a surgeon. A handbook detailing instructions for organizing these sessions was provided to event leaders (Supplementary Fig. 3). After the event, students were provided with contact information for a local medical student willing to provide mentorship and guidance should students desire to follow up about an interest in pursuing a surgical career.

Before and after the event, an anonymous pre- and post-event survey was sent to the high school participants for voluntary completion. Questions based on five-point Likert scales ranging from “Not at all” to “Extremely” assessed participants’ interest in pursuing a career in surgery, perceptions of diversity within the field, and how equipped they felt to pursue this career path. Differences in responses before and after the event were compared using chi-square tests, with p-values < 0.05 considered significant. The study was approved by the University of Cincinnati Institutional Review Board.

**RESULTS**

Sixty-five high school students participated in the "Day in the Surgery Life" virtual event. There was a 100% response rate for the pre-event survey (n = 65/65) and a 94% (n = 61/65) response rate for the post-event survey. Most pre-event and post-event respondents identified as female (89% and 80%, respectively). 81% (pre-event) and 87% (post-event) identified as racial/ethnic minorities. 18% (pre-event) and 18% (post-event) had an annual household income less than $25,000. Additional demographics are listed in Table 1.

There were no significant differences in demographics between the pre- and post-event survey respondents.
Survey results did, however, show that students reported feeling significantly more familiar with what the field of surgery entails after the event (before: 11% very/extremely versus after: 61% very/extremely; \( p < 0.001 \)). They also perceived the field of surgery to be more diverse (before: 42% very/extremely versus after: 66% very/extremely; \( p = 0.017 \)). Complete results are presented in Figure 1. A larger percentage of students reported feeling more equipped to pursue surgery as a potential career after the event (before: 37% very/extremely versus after: 52% very/extremely); though, this response did not reach statistical significance (\( p = 0.214 \)). Over 70% of students felt capable of gaining the skills and knowledge necessary to become a surgeon both before and after the event (before: 74% very/extremely versus after: 75% very/extremely; \( p = 0.619 \)). Students had a strong interest in learning more about the field of surgery with over 80% endorsing a desire to learn more about surgery both before (88%) and after (84%) the event (\( p = 0.309 \)). 85% (before) and 84% (after) were interested in being paired with a surgical mentor (\( p = 0.988 \)).

**DISCUSSION**

The "Day in the Surgery Life" virtual event was effective in helping URM high school students gain an understanding of what the field of surgery entails. Within a group of predominantly female students from various income levels, survey results showed that the event improved students’ familiarity with the field of surgery and their perceptions of diversity within it. It also revealed students’ interest and confidence in pursuing a surgical career. This study is one of the first to describe the utility of early programming on perceptions of achievability and representation in surgery among URM high school students.

Numerous barriers are responsible for the current lack of URM representation in medicine, especially in surgery and surgical subspecialties. Socioeconomic factors including lack of financial and social support, academic challenges with standardized tests, experiences with racial stereotyping and discrimination and implicit bias all have been shown to negatively impact the trajectory of URM students.\(^{14-17}\) Among these, the most relevant to this study include a lack of diversity within fields of interest, positive surgeon role models, and mentors. Being male and having at least one family member as a physician are qualities associated with an early interest in surgery.\(^{18}\) Among medical students, spending an hour with surgeons has been shown to positively impact a student’s view of a surgical career.\(^{19}\) Exposure to the field earlier in education, at the high school level, could be even more effective in mitigating the barriers previously described.

Based on our study, students were given the opportunity to explore an interest in surgery and gain more familiarity with the field. These students were provided with pertinent information that many at the high school level are not given, which included describing in detail each of the academic steps.

**TABLE 1. Demographic Information**

<table>
<thead>
<tr>
<th></th>
<th>Pre-Event Group (n = 65)</th>
<th>Post-Event Group (n = 61)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>89%</td>
<td>80%</td>
<td>0.163</td>
</tr>
<tr>
<td>Male</td>
<td>9%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
<td>0.360</td>
</tr>
<tr>
<td>American Indian or Alaskan Native</td>
<td>1%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Black or African American</td>
<td>24%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>East Asian or Pacific Islander</td>
<td>3%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>39%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>South Asian or Southeast Asian</td>
<td>14%</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>White or Caucasian</td>
<td>19%</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td><strong>Family Income</strong></td>
<td></td>
<td></td>
<td>0.793</td>
</tr>
<tr>
<td>$0 - $24,999</td>
<td>18%</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>$25,000 - $49,999</td>
<td>32%</td>
<td>43%</td>
<td></td>
</tr>
<tr>
<td>$50,000 - $74,999</td>
<td>28%</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>$75,000 - $99,999</td>
<td>1%</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>$100,000+</td>
<td>21%</td>
<td>16%</td>
<td></td>
</tr>
</tbody>
</table>

Gender, race/ethnicity and family incomes reported by pre-event and post-event respondents. Race and ethnicity options were "Choose all that apply". Statistical significance was calculated using \( x^2 \) tests. \( p \)-values were calculated based on comparison of number of female and non-female respondents for gender, number of white/Caucasian and racial/ethnic minorities for race/ethnicity, and number that selected \( $0 - $24,999 \), \( $25,000 - $99,999 \), and \( $100,000 \) for family income.
required to become a surgeon, practicing surgical skills and techniques, and understanding the clinical reasoning used by a surgeon. By demystifying the field of surgery and the practical components it entails, students seeking to learn more were given the opportunity to pursue the appropriate academic

FIGURE 1. Survey results. Participants rated their level of agreement with statements about their perceptions of the field of surgery using a Likert scale. Statistically significant differences in categorical responses were calculated using \( x^2 \) tests.
path based on the information and mentorship network shared through the event.

One of the key aims of this study was to assess the impact of the event on students’ perceptions of diversity within the field of surgery. The “Day in the Surgery Life” event was an effective tool for helping high school students realizing their own racial and ethnic representation among surgeons. URM high school students from underserved communities have limited access to the medical system and, therefore, limited interaction with minority physicians and surgeons. This is compounded by a deficit of representation of women and minorities in STEM and medicine. This event gave URM students an opportunity to realistically envision themselves in the role of a surgeon by interacting and engaging with surgeons who looked like them. Further, our study not only showed that students desired mentorship, but it provided students with an opportunity to follow up with a potential mentor. Studies have shown that when mentors reflect the demographics of a predominantly underrepresented group of students, students are more motivated and strengthened in their identity to persevere in those fields and find academic success.

The “If you can see it, you can be it” phenomenon has been described in multiple contexts, ages, and racial groups. Affinity organizations, like the AWS, composed of surgeons with diverse backgrounds in gender, race and ethnicity, offer an impression of the field which is not often recognized. Over 80% of high school student participants identified as female, and this is likely the result of the event being sponsored by the AWS. The strive to achieve gender equity in the field of surgery continues, as women make up only 24% of surgeons. And while representation of black women surgeons in academic surgery lags even further, black males are unfortunately trailing behind in medical school acceptance rates as well. In order to reach URM male students, we encourage other affinity organizations like AWS to use their unique platforms and demographic of surgeons they represent to help broaden the perceived scope of career options for all URM students. As our study supports, even at the high school level, the “If you can see it, you can be it” principle can be applied to students interested in surgery. More programming exposing students to the field early on is encouraged.

Our study is limited in that high school students were recruited through the HCC, a national outreach program which exposes students from city public schools to healthcare careers, which may have affected their initial familiarity with the field of surgery. Because HCC sites are based in cities where there are medical schools, students from rural areas were not well represented. Another limitation of the study is a potentially self-selected pool of students with a pre-existing interest in surgery. While 65 students ultimately participated in the “Day in the Surgery Life” virtual event, over 100 were initially invited to attend. And since over 80% of participants were interested in learning more about the field of surgery before the event, the study may not provide as much insight into the impact of such programming on cohorts of students without pre-existing interest. Other barriers, such as occupation with academic and extra-curricular activities, and lack of autonomy in scheduling while living at home, may also pose as barriers to high school students who could not participate in the event.

In previous years, AWS has invited 10 to 15 local high school students to attend the AWS annual conference and participate in a suturing and knot tying workshop. As a direct response to the results of this study, AWS has pioneered a mentorship program for high school students. The Rebecca Lee Crumpler High School Outreach Award consists of funding and support for high school students to attend the annual AWS conference, a suturing and knot tying kit for a workshop during the conference, and connecting with a medical student who will provide longitudinal mentorship as students pursue an academic path towards medicine and surgery. While this study does not include long-term follow-up data, surveys evaluating longitudinal exposure and mentorship for high school students are the focus of future studies.

CONCLUSIONS

In conclusion, The "Day in the Surgery Life" virtual event was effective in improving URM high school students’ familiarity with the surgical field and perceptions of diversity within it. The AWS and other affinity surgical organizations are in a unique position to enact the, “If you can see it, you can be it,” phenomenon, building upon the interest and empowerment that already exists among URM students. This data provides a model for and encourages the support of future initiatives related to strengthening the pipeline of underrepresented minorities in medicine and surgery.

REFERENCES


SUPPLEMENTARY INFORMATION

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jsurg.2022.03.003.