

## Review Article

# Student Perspectives on Public Health Education in Undergraduate Medical Education

Kevin Correll Keith\*, Bethany Carlos, Michele Friesinger, Kemp Anderson, Kelsey Wilson, Donna Kern, Debra Hazen-Martin and Chanita Hughes-Halbert

Department of Medicine, Medical University of South Carolina, USA

### ABSTRACT

**Background:** Incorporating population-based health into the medical curriculum is a challenge to US medical schools. A better understanding of student attitudes about the value of public health education and satisfaction can help guide the development and implementation of public health education into curricula.

**Aim:** To describe attitudes about public health education among medical students.

**Methods:** Attitudes about public health education, topics that should be taught in medical school, and perceptions about the adequacy of public health education were measured using items from the AAMC Graduation Questionnaire and questions that were based on the core competencies in public health for medical students.

**Results:** Seventy-eight percent of students agreed that physicians should be required to learn public health. But, M2, M3, and M4 students were significantly more likely than M1 students to report that public health information is common sense knowledge ( $p=0.03$ ). Most students agreed that it was

important to learn topics related to health promotion, maternal/child health, and nutrition and also agreed that the amount of instruction in public health topics was adequate.

**Conclusions:** Implementing a longitudinal curriculum in public health may help students see the value and importance of this field as they prepare to leave medical school for practice.

**Keywords:** Public health education; Undergraduate medical education; Medical training; Health disparities

#### Key points

- Medical students are likely to see the value of public health education.
- The value students perceive in public health education may diminish as they progress in their medical education.
- A longitudinal curriculum in public health may help students to see the value and importance of this field as they move through medical school and prepare to leave for practice.

### Introduction

Incorporating prevention- and population-based health into the undergraduate medical education curriculum is a long-standing priority [1]. Public health education in medical school is targeted at meeting the demand for increased attention to population health, disease prevention, and health disparities [1]. National and global health care systems face problems that require the full participation of physicians and allied health care providers to solve [2]. Thus, across all domains of health care, it is increasingly important that physicians have an understanding of basic public health issues and be equipped with the skills to address these challenges. In particular, the emergence of new infectious diseases, the threat of antibiotic resistant microbes, and the ever-present danger of a pandemic illness underscore the need for physicians to have a thorough understanding of epidemiology [1]. Further, physicians should understand social and environmental determinants of health to address chronic diseases that disproportionately affect minority populations [2]. Importantly, society expects that physicians will make prevention a larger priority and that they will be more knowledgeable about population health management [3]. As the US health care system transitions from fee-for-service into a value-based care system, physician stakeholders will need to have a keen understanding of health policy. Ultimately, the dominant issues in current and future health care settings will

only be effectively addressed if public health and medicine work together as better partners [4].

Yet, fostering more effective collaboration between public health and medicine will require changes in the teachings, practices, and cooperative organization in both of these fields. Historically, physician's involvement in the field of public health has been limited to assisting in response to epidemics and infectious disease control [5]. The recent Ebola crisis, the ongoing uncertainty surrounding Zika, and other emerging infectious diseases have further affirmed this role. It has become increasingly obvious that front-line clinical providers must be more engaged to help accomplish the larger aims of public health that include reducing the global burden of chronic disease, tackling problems of health system inefficiencies, and eliminating disparities in care. Thus, there is a rapidly growing acknowledgement that all physician trainees need better education in the broader principles of public health [6]. With this education, they can fully participate in health system redesign and practice evidence-based and accountable care [1,6,7]. A physician workforce with competency in the practice of public health will more effectively respond to the needs of their patients, their communities, and their public health colleagues, ultimately translating to improved population health outcomes [8]. Despite this, incorporating public health education into the medical school curriculum has proven to be problematic for US medical schools for decades [9].

The difficulty in integrating public health into medical education focuses on the fundamental philosophical and practical differences between these two fields. Public health focuses on the health of populations and emphasizes prevention and health promotion whereas clinical medicine focuses on the health of individuals with an emphasis on diagnosis and treatment. Academic institutions of medicine and public health have attempted to reconcile these differences by increasing the availability of dual Doctor of Medicine and Master of Public Health (MD/MPH) programs, and/or by incorporating one or more public health courses into the basic medical curriculum [10,11]. This approach, however, treats public health as an addendum to the medical curriculum and persists in presenting the two as entirely separate fields. In that context, public health will continue to struggle with other institutional priorities competing for finite curricular time. A curriculum that fully integrates public health education with the traditional medical coursework is much more likely to yield robust and sustainable educational outcomes [11].

One of the critical barriers to the successful integration of public health education into the medical school curriculum is medical students' attitudes and disinterest [12]. In the 2014 Association of American Medical Colleges (AAMC) Medical School Graduation Questionnaire (GQ), an increasing percentage of national graduating medical students found public health instruction to be inadequate (27%), and a lower percentage of medical school graduates believed that they received appropriate education in community health and social services (64.8%), and caring for diverse populations using culturally appropriate strategies (79.2%) [13]. The 2016 AAMC GQ reported a higher percentage of medical school graduates who participated in activities related to health disparities (75.2%), health education (61.5%), or an experience with a free clinic for the underserved (73%) [14]. However, the 2016 AAMC GQ did not report students' attitudes towards the previously mentioned activities, leaving the barrier unaddressed. The purpose of this study was to characterize attitudes about public health education, examine the importance of specific topics in public health, and evaluate satisfaction with public health education among students attending medical school located in the southeastern region of the US.

## Methods and Materials

### Study population

This study was reviewed and approved as exempt by the Institutional Review Board at the <institution removed for peer review>. A cross-sectional survey was conducted to examine attitudes about public health education, characterize the importance of specific topics in public health, and evaluate satisfaction with public health education among medical students. Survey data were collected between April 2016 to May 2016 among students enrolled in the undergraduate medical education program at <institution removed for peer review>. Students who were actively enrolled in each of the four academic phases of the medical school were invited to participate in the survey (n=709) and of these, 669 completed the survey data. Thus, the response rate for survey completion was 94%. None of the authors had a conflict of interest.

### Data collection

Study measures were obtained by self-report and included race, gender, age, prior training in public health, and medical school class (year). Specifically, students were asked to indicate if they were white, Hispanic/Latino, Black or African American, Native American, or Asian/Pacific Islander. Racial background was re-coded as white or under-represented minority (Hispanic/Latino, Black/African American, Native American, Asian/Pacific Islander, or Other). Age was recoded into a dichotomous variable based on the distribution of responses:  $\leq 26$  or  $\geq 27$ . Prior training in public health was measured by one item that asked students to indicate if they had any prior training in health education (yes or no). Information regarding students' undergraduate education in a science or non-science major was obtained from the MUSC enrollment management office.

Attitudes about public health were measured by Likert-style items that asked students to indicate how much they agreed (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree) that: (1) public health should be taught in medical school (e.g., physicians should be required to learn public health in medical school; public health education is relevant to their career as a physician), (2) the role that physicians play in public health (e.g., physicians play an important role in health education and prevention), and (3) the impact that public health education in medical school could have on patient care and outcomes (e.g., public health education in medical school will benefit clinical care; public health education in medical school is important for changing and enforcing health care policy). Students were also asked to indicate how much they agreed that specific topics in public health (e.g., health promotion, epidemiology, biostatistics, nutrition, health services administration) should be taught in medical school (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree). These items were based on the core competencies for public health for medical students [15]. Items from the GQ were also used to measure perceptions about the adequacy of current instruction in public health. Specifically, students were asked if the amount of instruction in topics such as health promotion, biostatistics/epidemiology, public health systems, and population health was inadequate, adequate, or excessive [13]. Lastly, students were asked how satisfied they were with the education in public health they have received in medical school (1=very dissatisfied, 2=dissatisfied, 3=neutral, 4=satisfied, 5=very satisfied).

### Statistical analysis

Descriptive statistics were generated to characterize the study sample in terms of sociodemographic characteristics and educational experiences. Frequencies were also generated to characterize attitudes about public health education and to describe attitudes about instruction in specific public health topics. Chi Square Tests of Association were then used to evaluate the bivariate relationships between attitudes about public health and sociodemographic characteristics and educational experiences.

## Results

Table 1 shows the characteristics of the study sample. Seventy-six percent of students were white and 24% were from

under-represented minority (URM) groups. Forty-three percent were women and 68% were age 26 or younger. Twenty-six percent of the sample was MS1 students, 25% were MS2 students, 25% were MS3 students, and 24% were MS4 students.

Figure 1 shows the descriptive statistics for items that measured attitudes about public health education. Students were most likely to agree that physicians play an important role in health education and prevention, but other items were also highly endorsed. For instance, 94% of students agreed that it is important to learn about strategies for population health, 94% agreed that physicians are a part of the public health system, and 93% of students agreed that the medical and public health field working together will benefit patient care. A lower proportion

of students agreed that physicians should be required to learn public health (78% agreed). Students were least likely to agree that public health information is common sense knowledge; 31% of students agreed with this statement.

The results of the bivariate analysis of attitudes about public health education in medical school are provided in Table 2. There were significant gender differences in attitudes about public health education. Specifically, women were more likely than men to report that physicians should be required to learn public health (83% versus 74%, Chi Square=7.23, p=0.007). Consistent with this, women were less likely than men to report that public health is common sense knowledge (27% versus 34%, Chi Square=3.41, p=0.06). In addition, students who were age 26 and younger were significantly more likely to report that physicians should be required to learn public health compared to those who were age 27 and older (Chi Square=4.26, p=0.03). Lastly, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> year students were significantly more likely than 1<sup>st</sup> year students to agree that public health information is common sense knowledge. Twenty-three percent of first year students agreed that public health information is common sense knowledge compared to 34% of second year students, 36% of third year students, and 32% of fourth year students (Chi Square=8.66, p=0.03).

Figure 2 shows the descriptive statistics for items that measured attitudes about public topics that should be taught in medical school. Students were most likely to agree that it was important for topics such as health promotion, nutrition, and maternal and child health to be a part of education about public health in medical school (88%). Students were least likely to agree that biostatistics and epidemiology (68%) and health services administration (66%) should be taught in medical school. Since 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> year students were more likely than 1<sup>st</sup> year students to agree that public health is common sense knowledge, we completed additional analyses to characterize topics that these students believed should be taught in medical school. There were no differences in beliefs about public health topics that students believed should be taught in medical school.

**Table 1: Sample Characteristics (n=669)\*.**

Variable	Level	n	%
Race	White	490	76%
	URM	152	24%
Gender	Male	375	56%
	Female	288	44%
Age	≤ 26	458	68%
	≥ 27	211	32%
Undergraduate Major	Science	538	81%
	Non-Science	125	19%
Prior training in Public Health	Yes	83	13%
	No	578	87%
Medical School Class	MS1	175	26%
	MS2	169	25%
	MS3	167	25%
	MS4	158	24%

\*n may not equal 669 because of missing data

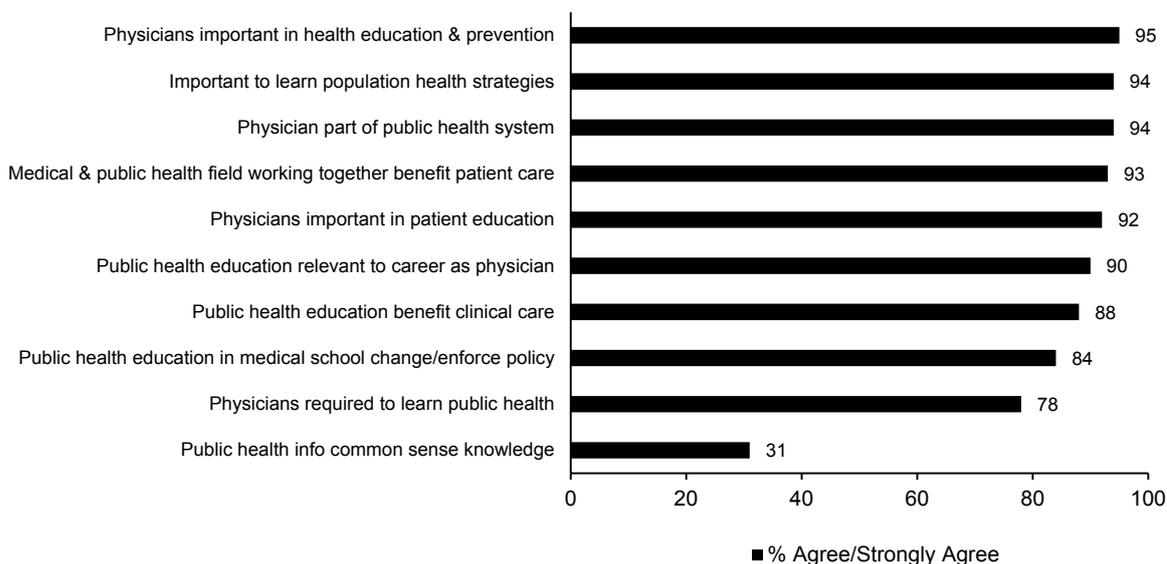
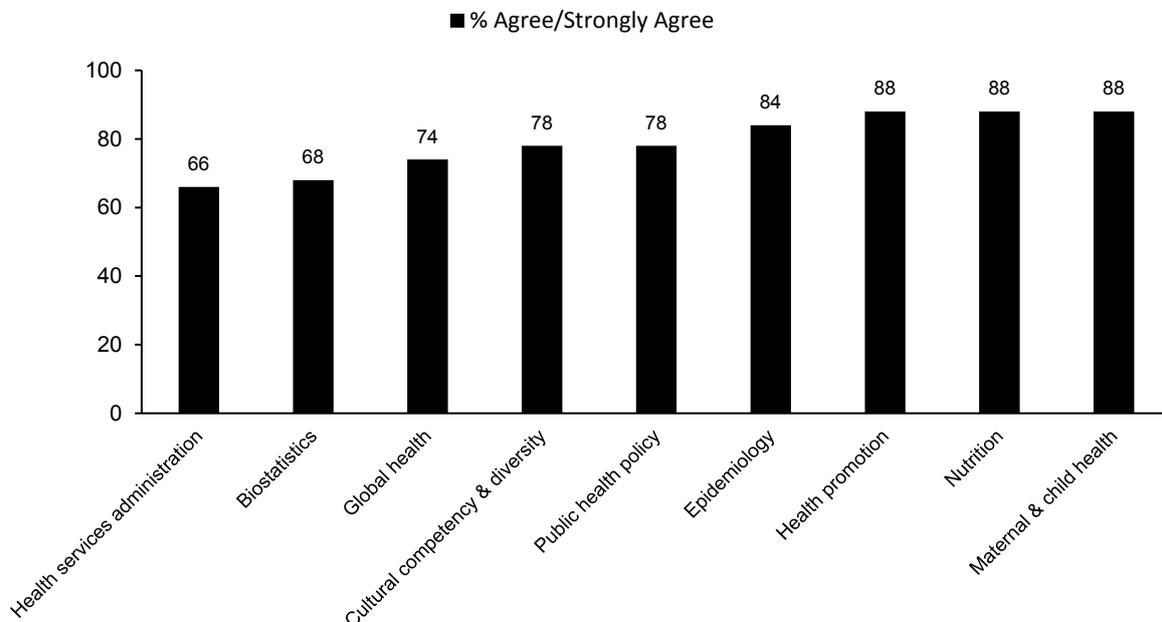


Figure 1: Attitudes about Public Health Education.

**Table 2: Bivariate Analysis of Public Health Attitudes.**

Variable	Level	Physicians Required to Learn Public Health		Public Health is Common Sense Knowledge	
		% Agree	Chi Square	% Agree	Chi Square
Race	White	81%	1.52	34%	0.61
	URM	76%		30%	
Gender	Male	74%	7.23**	34%	3.41‡
	Female	83%		27%	
Age	≤ 26	80%	4.26*	32%	0.12
	≥ 27	72%		30%	
Undergraduate Major	Science Non-Science	77% 78%	0.004	32% 28%	0.74
Prior training in Public Health	Yes No	82% 76%	1.01	35% 31%	0.53
Medical School Class	MS1	79%	1.24	23%	8.66*
	MS2	79%		34%	
	MS3	75%		36%	
	MS4	76%		32%	



**Figure 2: Attitudes about Education in Public Health Topics.**

Overall, more than two-thirds of students reported that the amount of instruction in public health topics was adequate; they were most likely to report that the amount of instruction in evidence-based medicine was adequate (82%) and were least likely to report that the amount of instruction in emergency preparedness and public health systems was adequate (66%). Consistent with this, a low proportion of students reported that the amount of instruction in public health topics was excessive. Only 2% to 3% of students reported that there was excessive amount of education in public health topics. With the exception of health disparities and evidence-based medicine, about one-fourth of students reported that the amount of instruction in public health topics was inadequate. For instance, 26% reported that the amount of instruction in occupational health was inadequate and 22% reported that the amount of instruction in infection control was inadequate. Only 6% of students reported that the amount of instruction in health disparities and evidence-based medicine was inadequate.

There were several public health topics where MS1 students differed from MS2, MS3, and MS4 students in terms of their beliefs about the adequacy of instruction. For example, 30% of MS1 students reported that the amount of instruction in public health systems was inadequate compared to 40% of students in upper classes (Chi Square=7.16, p=0.01). Thirty-six percent of MS1 students reported that the amount of instruction in disease surveillance was inadequate compared to 17% of upper class students (Chi Square=27.20, p=0.0001). Further, 66% of MS1 students reported that education in emergency preparedness was inadequate compared to 18% of students in upper classes (Chi Square=135.62, p=0.0001). With respect to occupational health, 39% of MS1 students reported that the amount of instruction was inadequate compared to 21% of students in upper classes (Chi Square=22.18, p=0.0001). Lastly, 40% of MS1 students reported that the amount of instruction in infection control was adequate whereas 88% of MS2, MS3, and MS4 students reported that the amount of instruction in this topic

was adequate ( $p < 0.0001$ ). There were no differences between students in terms of their beliefs about the amount of education in population health (27% of MS1 students compared to 23% of upper class students, Chi Square=0.80,  $p=0.37$ ).

Overall, students were satisfied with public health education ( $n=667$ ). Sixty-nine percent of students reported they were very satisfied or satisfied with the education in public health, 24% were neutral, and 6% were very dissatisfied or dissatisfied. As shown in Tables 3 and 4, there were no significant differences in satisfaction with public health education based on student's sociodemographic or educational background. However, URM students (64%) were less likely than white (72%) students to report that they were satisfied with public health education in the medical education curriculum (Chi Square=3.44,  $p=0.06$ ).

### Discussion

Despite the priority placed on integrating public health into medical education, the best strategies for achieving meaningful integration are unknown. Medical schools have piloted interventions that aimed to increase medical students' exposure to public health topics, and these programs received positive feedback from the students [16]. When a Canadian medical school polled pre-clinical students about public health education, they reported negative attitudes about topics in public health [17]. These attitudes were attributed to inadequate lecture material, limited exposure, overemphasis on biostatistics and

epidemiology, and lack of positive public health role models. Schools may teach medical students public health by delivering lectures on topics that are relevant to the clinical context or biological system/process that is being covered in the clinical and preclinical curriculum, but may not develop a specific course for public health that has its own educational objectives, assigned readings, or course activities. These strategies could further exaggerate students' negative perceptions about public health [13]. Therefore, developing more effective strategies for integrating public health into medical education should begin with empirical data on student's attitudes about public health education. But, limited data have been collected on medical students' attitudes about public health education. To our knowledge, the present study is the first to report quantitative data on attitudes about public health education among medical students.

We found that students recognize the roles that physicians play in public health and also acknowledged the impact that health care providers have on public health functions. More than 90% of students agreed with items that measured attitudes about the role and impact of physicians in public health. However, a lower proportion of students agreed (78%) that physicians should be required to learn public health in medical school and a sizeable minority of students agreed (31%) that public health is common sense knowledge. This may be because students understand the ways in which clinical care that is delivered individually to patients ultimately impacts public health, but

**Table 3: Perceptions about the Adequacy of Instruction in Public Health.**

Public Health Topic	% Inadequate	% Adequate	% Excessive
Disease surveillance	22%	76%	2%
Public health system	32%	66%	2%
Emergency preparedness	31%	66%	3%
Population health	24%	73%	3%
Health disparities	6%	71%	23%
Environmental health	24%	74%	2%
Occupational health	26%	72%	2%
Infection control	22%	75%	2%
Evidence-based medicine	6%	82%	11%

**Table 4: Satisfaction with Public Health Education.**

Variable	Level	% Satisfied	Chi Square	p-value
Race	White	72%	3.44	0.06
	URM	64%		
Gender	Male	72%	1.60	0.20
	Female	67%		
Age	≤ 26	71%	2.34	0.13
	≥ 27	65%		
Undergraduate Major	Science Non-Science	70% 67%	0.45	0.50
Prior training in Public Health	Yes No	70% 69%	0.01	0.92
Medical School Class	MS1	69%	0.59	0.90
	MS2	71%		
	MS3	68%		
	MS4	69%		

they have not had sufficient exposure to the complexity and diversity of the field allowing them to realize the impact on populations. Public health is a diverse field in which providers perform services that are critical for optimal individual and population health. For instance, services such as monitoring the health status of communities, diagnosing and investigating community health issues and hazards, and developing policies, plans, and strategies to solve health problems and support individual and community health are essential for preventing and controlling infectious diseases, ensuring maternal and infant health outcomes, and chronic disease prevention and control [15]. Only 12% of students reporting having training in health education prior to medical school. Importantly, our findings demonstrate that as students' progress in their medical education, the value they perceive in public health education may diminish. Second, third, and fourth year students in the present study were significantly more likely than first year students to agree that public health information is common sense knowledge. There were also significant differences between first year students and those in upper classes in terms of their beliefs about the adequacy of education about infection control, occupational health, public health systems, disease surveillance, and emergency preparedness. This may be because students have reduced exposure to public health topics as they prepare to take national standardized examinations and during their clinical clerkships. In particular, first year students may have less exposure to these topics, and subsequently be more likely than students in upper classes to view the amount of instruction in these topics as being inadequate, because they are given less or no coverage as part of the preclinical curriculum. An alternative explanation is that while public health topics are integrated into all years of the medical education program by teaching one or more courses in this area, this topical approach may not emphasize the breadth, significance, and impact of the field. Previous research has shown that Canadian medical students were dissatisfied with the public health curriculum because of lack of exposure to public health expertise, too much emphasis on selected topics, and negative attitudes about public health at the institution.<sup>17</sup> Core competencies for public health have been developed by the AAMC, but medical education programs may not develop a core curriculum in public health that covers these competencies [15].

We found that the majority of students (69%) were satisfied with education in public health; however, there is room for improvement. Twenty-one percent of students in this study were not satisfied or were neither satisfied nor dissatisfied with public health education. Our findings provide some insight into where public health education could be enhanced from the perspective of students. Overall, first year students were least likely than those from other classes to agree that the amount of instruction in public health systems, emergency preparedness, occupational health, infection control, and disease surveillance was inadequate. These may be areas where public health education could be enhanced, especially in the preclinical years. An important consideration, however, is that critical basic science concepts also have to be taught during the preclinical years; therefore, efforts are needed to determine how to increase public health education through a core curriculum while also teaching topics that are required for student's medical training

during both the preclinical and clinical years of medical school. Students may value alternative learning experiences that include research projects, community service work, internships, and shadowing public health physicians as well as lectures that are given by faculty with specific expertise in public health [17]. These strategies may be easier to integrate into the medical education curriculum and provide real world connections and outcomes.

## Conclusion

In considering the results of this study, some limitations should be considered. First, attitudes about public health education were measured among students in one medical school. The high response rates for completing the survey is strength of our study, but future research is needed to characterize these attitudes in national samples of medical students. The cross-sectional nature of the study design is an additional limitation; additional research is needed to examine longitudinal changes in attitudes about public health education as student progress through their undergraduate medical education. It is also important to note that some of the items we used to measure perceptions about public health education were newly developed. These items had acceptable face validity and a subset of the items that we used have been administered as part of the Graduation Questionnaire.

Despite these potential limitations, this study provides novel empirical data that quantifies attitudes about public health education among medical students in all four years of training. Previous research has shown that students' perceptions of public health-integrated curriculum have been shown to influence their future area of specialty and intent to engage in future public health initiatives.<sup>18</sup> Graduating medical students in Sri Lanka who believed that public health was an important field were more likely to choose public health-related careers after completing an integrated curriculum [16]. These students also felt more comfortable working in the community. Additionally, medical students' perceptions about public health education could be associated with a likelihood to practice in Health Professional Shortage Areas (HPSA). Students who rated their public health exposure as "adequate" were more likely to practice in HPSA, even after accounting for previous intentions to practice in HPSA; thus, continuous exposure to public health could lead to reducing HPSA [18]. Our findings demonstrate that students are receptive to public health education during their medical education training. Based on input from students, several areas of education in public health could be enhanced; therefore, it is important to develop and evaluate innovative strategies for integrating public health education into the medical education undergraduate curriculum. Involving medical students in the development of curricula in public health education by understanding their attitudes and perceptions, and using this data to engage faculty and students in the development of the core curricula and learning experiences in public health, may be one way to improve training in this area during medical school.

## Notes on Contributors

The authors of this manuscript are educational leaders in the College of Medicine (Hughes-Halbert, Kern, Hazen-Martin, Friesinger) and previous (Wilson) and current (Keith, Carlos,

Anderson) medical students who serve as AAMC Organization of Student Representatives for their class.

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**ADDRESS OF CORRESPONDENCE:** Kevin Correll Keith, Department of Medicine, Medical University of South Carolina, 96 Jonathan Lucas Street, Suite 601, Charleston, SC 29403, United States, Tel: +1 803-609-5549; E-mail: keithk@musc.edu

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