

# Understanding the Leaky Pipeline: Perceived Barriers to Pursuing a Career in Medicine or Dentistry Among Underrepresented-in-Medicine Undergraduate Students

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## Abstract

### Purpose

Representation of persons from diverse backgrounds remains a persistent challenge for medicine and dentistry workforces. Past research has focused on quantifying factors such as markers of educational achievement to explain the difficulty of increasing diversity within the professions. There has been less effort toward understanding the perspectives of undergraduate students on the threshold of applying to medical/dental school about distinct barriers to pursuing a medical or dental career and continuing through the training pipeline.

### Method

In 2012 and 2013, the authors conducted a qualitative study of

undergraduate students participating in the Tour for Diversity in Medicine, a program where minority physicians and dentists visit colleges with large fractions of minority students to encourage careers in the health professions. Focus groups were convened during the visits to examine perceived barriers to pursuing careers in medicine and dentistry and challenges identified through thematic content analysis.

### Results

Eighty-two students participated in discussions at 11 colleges visited between September 2012 and February 2013. Students described challenges including inadequate institutional resources (e.g., sparse

clinical opportunities), strained personal resources (e.g., conflict arising from familial pressure), inadequate guidance and mentoring to assist with key career decisions, and societal barriers. For participants, these challenges caused them to question the viability of persisting in the pipeline to a medical or dental career.

### Conclusions

Solving the issue of diversity in medicine and dentistry is multifaceted, but elucidated challenges from the undergraduate student perspective offer targeted areas where intervention may help remedy barriers and decrease pipeline leakiness.

Over the past two decades, professional leaders and scholars have issued numerous calls to increase the diversity of the U.S. physician workforce.<sup>1-3</sup> The argument has been that diversifying the workforce will lead to direct improvements in access to and quality of care for minority populations.<sup>4,5</sup> Beyond a public health perspective, others have argued that diversity in the health professional workforce can provide business advantages by making health services more responsive to diverse consumers.<sup>6</sup>

For 50 years, numerous initiatives have in fact been under way to increase the racial

and ethnic diversity of the U.S. physician workforce.<sup>7</sup> These initiatives include using specific admission quotas,<sup>8,9</sup> creating outreach and enrichment initiatives for undergraduate students,<sup>10,11</sup> and making admission and financial policy changes.<sup>12,13</sup> Despite these initiatives, the racial and ethnic composition of the medical profession has not changed substantially over the past 20 years.<sup>14</sup> In comparison with the overall enrollment medical student enrollment, underrepresented in medicine (URiM) students made up 12.3% (n = 8,056) of U.S. medical school attendees in 1991 and 15% (n = 12,930) of the total medical school enrollment in 2011.<sup>14</sup> This is contrasted with the 31% that would be expected if enrollment were proportional to the U.S. population.<sup>15</sup>

The reasons these diversity initiatives have failed to achieve their goals are not well understood. Studies suggest that undergraduate academic performance<sup>16</sup> and disparities in primary education and institutional culture<sup>6</sup> explain some of the persistent gap between majority

and minority graduates. Additionally, the inadequacy of evidence-based approaches to achieve diversity has been cited as stalling progress.<sup>17</sup> The “leakiness of the pipeline”—that is, the departure of students from the path to a medical or dental career who have previously declared this intention—has also been cited as an important factor decreasing the pool of diverse applicants for medical or dental school.<sup>18</sup> URiM students have a higher rate than do their majority peers of declining interest in medical careers.<sup>18</sup> One study at an elite institution concluded that “negative experiences” play a role in this “leakiness.”<sup>18</sup> Previous studies have retrospectively explored the perspective of URiM medical professional students and physicians on challenges within the pipeline.<sup>19,20</sup> However, few studies<sup>21,22</sup> have sought to examine an important proximal factor impacting the pipeline—the barriers perceived by students in the pipeline as they face applying to medical or dental school.

Our objective was to identify perceived barriers among undergraduate URiM

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students to pursuing education and careers in medicine or dentistry in order to identify possible factors contributing to the leakiness of the pipeline. We were particularly interested in students attending colleges that historically serve a URiM population, as our overarching goal is to identify evidence-based strategies to improve diversity in medical and dental schools. We conducted this study in collaboration with the Tour for Diversity in Medicine (T4D),<sup>23</sup> a grassroots program to increase the number of undergraduate minority students pursuing health professional careers. The program targets students who traditionally do not have extensive access to institutional programs or resources and provides them an intensive educational experience through interactive workshops conducted by physicians and dentists from URiM backgrounds on college campuses.

## Method

### Setting and population

In September 2012 and February 2013, we recruited participants from 12 colleges visited by the T4D: Georgia State University, Fisk University, Kentucky State University, Indiana University Bloomington, Central State University, University of Michigan–Dearborn, University of Texas at El Paso, University of Texas at San Antonio, Texas A&M International University, Texas A&M–Corpus Christi, Prairie View A&M University, and Texas Southern University (Supplemental Digital Appendix 1, <http://links.lww.com/ACADMED/A318>). Sites were selected by the T4D leadership on the basis of geography, number of URiM students enrolled in each institution, and interest shown by the institution. All institutions except Fisk are public. Recruitment for the conference was through academic advising offices at the respective institutions, social media (Twitter, Facebook), and the T4D Web site. Students in all class years from these universities and surrounding universities were eligible for and participated in this program voluntarily. The institutional review board of the University of Pennsylvania approved this study.

### Focus groups

At each college visited, we invited students to participate in a focus group. We informed students about the study

when they arrived at the workshop through a verbal solicitation. We aimed to recruit seven students per site. We developed the focus group moderator guide based on a comprehensive review of the literature and discussions with experts in the field (Supplemental Digital Appendix 2, <http://links.lww.com/ACADMED/A318>), and refined it on the basis of feedback from experts in qualitative research. Focus groups lasted approximately 60 minutes and were scheduled concurrent with T4D programmatic activities. Focus group conversations were digitally recorded. All focus groups were conducted by two of us (B.K.F., R.T.) as investigators independent of T4D and who were unknown to the participants until the day of the study. Focus group participation was independent from T4D program participation and mentoring. Demographic characteristics of focus group participants including their age, race/ethnicity, year in school, major, family background, previous exposure to the health professions, and information about their current career plans were obtained from a baseline assessment survey we administered to T4D program participants. We obtained written consent from all focus group participants prior to the start of discussion, and each participant received a \$5 gift card as a token of appreciation for her or his participation.

### Data analysis

Audio recordings were transcribed, deidentified, cleaned, and imported into NVIVO10 software (QSR International Pty Ltd, Victoria, Australia). We used a thematic content analysis for iterative development of themes that emerged on the basis of responses to the open-ended questions. After initial review of the first three focus group transcripts by individual members of the research team in consultation with the Mixed Methods Research Lab at the University of Pennsylvania, we met and used electronic collaboration to develop consensus on codes and themes. Codes in this analysis were descriptions of and types of individual experiences and barriers that were amassed into themes through the team's discussion through the analytic process. Using the agreed-on codes, the original three transcripts were coded and the remaining transcripts were reviewed and coded line-by-line by

two members of the research team (not among the authors). When new codes were discovered, the coders returned to the previously coded transcripts to find instances of the new codes. We then completed iterative theme assignment with periodic discussions with the senior author (J.S.) and updates to the research team. Differences in coding and thematic assignment were reviewed together and resolved.

## Results

Focus groups were conducted at 11 of the 12 T4D site visits. Across the 11 colleges, 82 students participated in the focus group portion of the study, with 4 to 9 students participating per focus group session. At the 12th institution, recruitment was insufficient to yield a viable discussion. The median age of focus group participants was 21.4 years. The self-identified racial background of participants was predominantly URiM, with 61% (50/82) black/African American, 31% (25/82) Latino/Hispanic, 3% (3/82) African, 2% (2/82) Caucasian, 1% (1/82) Asian, and 1% (1/82) other. The educational level of focus group participants was fairly evenly split: 21% (17/82) freshmen, 23% (19/82) sophomore, 25% (21/82) junior, 24% (20/82) senior, and 7% (5) postbaccalaureate. There was a preponderance of biology majors (56/82; 69%), as well as a substantial number of students who had a family member in the health professions (36/82; 44%), 50% of which had a family member in nursing (18). Thirty-eight percent (31/82) of the focus group participants were the first in their family to attend college. More than half of the participants had “always” been interested in a career in medicine (52%; 43/82), and an additional 16% (13/82) had made the decision in high school. The majority of the students were interested in careers in medicine (61/82; 74%). Seven percent (4/82) of the focus group participants had participated in the Summer Medical Dental Education Program (SMDEP), a program funded by the Robert Wood Johnson Foundation that provides an intensive academic preparation experience to URiM students interested in careers in medicine and dentistry.

We identified four major themes from the focus group discussions (Table 1)

Table 1

**Illustrative Quotes From Focus Group Participants at the Tour for Diversity in Medicine, From a Study of Underrepresented in Medicine Undergraduate Students' Barriers to Medical and Dental Careers, 2012–2013<sup>a</sup>**

Theme	Illustrative quote
<b>Inadequate institutional support and resources</b>	
Academic success	"So my GPA is lower because I had other things. And maybe my A– on paper, and A is an A. But my A– to me is a little bit more because I was running on two hours of sleep. And somebody else who never worked—had to work for anything and their parents paid for all their college, it's their GPA is obviously going to be higher because all they had to focus on was school."
Educational opportunity	"... I mean I feel like in a way it's kind of a disadvantage almost if you don't have family that—or someone that will let you come into their workplace and follow them around and be that little person that's always there.... But it's just for people who don't have that as an option, it makes us look bad. I mean we want the same opportunity at least. If we don't choose to take that, then you can discredit us but we want the same opportunity as all."
Connecting to physicians/shadowing	"Oh you get turned down so much. To just try to shadow. I'm not asking for a job. I'm not asking you to pay. I'm not asking you to do anything but just open your coat and let me follow underneath you."
<b>Limited personal resources and social/family conflict</b>	
Financial resources	"Paying for the test too. It's just everything you have to pay for it. Everything. You have to pay to take the test, pay to apply, pay for books. You pay to go there. It's just money, money, money. Pay for clothes for interview. It's just money. Like I'm trying to make money. I got to spend money to make money."
Fear of nonacceptance	"And, not only that, but you look at the statistic of those who do get into med school, you see that we're the minorities. You see the numbers and it makes you think, okay, I know from the whole school only like 15% or 10% are Hispanic or African American. But, when you think about it, when I see it, the first time I saw it, I think I was a sophomore in college, that me think like, okay, of all the applications they take, they only take 15% Hispanics."
Individual skill sets	"So it's just more of like finding a balance and time management, you know, and having good study skills because I think that's something we need to work on now before we even get into that area."
Competition	"But at this level, it's not really team based. It's so competitive and that's just in people's heads. It's either competitive or anyone's who's not in the competition is just not worried about. So it's always hard to find a support system."
Family pressure	"There a lot of pressure on my family—on my side of the family because I'm the first generation to go to school. And so my parents are from Mexico and they didn't get them an education. And so, they really do push me to succeed and sometimes, really nerve-wracking." "... but I'm like the person in my family to go to college. My family, my parents are really like—don't believe in a higher education, I guess. So in their eyes, it's like a waste of time. And for me, it's really important, you know. Yeah."
<b>Lack of access to information, mentoring, and advising</b>	
Mentoring and advising	"I think that just more guidance, as in here in the—in this campus. Just more guidance as of what to do, from freshman to senior, undergrad, MCAT and everything because I feel kind of lost. I know I want to be there, but I just don't know how to get there. I know I have to get good grades. I know—but, basically what I'm doing now is just studying my butt off a lot and I mean. Just something concerns me is just guidance."
<b>Societal barriers</b>	
Work–life balance (gender specific)	"Like I know what I want to do, but I don't want to not have my fulfillment out of what I want out of life. Like I do want to travel and I do want to have children and I do want to be able to do things outside of just being a medical doctor. So that's scary because right now you don't really see."
Uncertain job market	"... but there are students every year who don't get matched. And they try the next year and they still don't get matched. And then where do you go? What happens if you never get matched, I guess? Because that's a possibility and you don't go through residency, so you're stuck with an MD who can't practice medicine."

<sup>a</sup>The Tour for Diversity in Medicine is a program where minority physicians and dentists visit colleges with large fractions of minority students to encourage careers in the health professions. Focus groups were convened during the visits to examine students' perceived barriers to pursuing careers in medicine and dentistry. See Method section of the text for details.

that students described as potentially contributing to declining interest in a medical or dental career during the undergraduate college experience. First, institutional resources were perceived to be inadequate at the colleges these

students were attending. Second, their own limited personal resources and family/social conflict often stood in the way of pursuing medical or dental education. Third, students struggled to access adequate information, mentoring,

and advising either from within or outside their own college. Fourth, societal barriers such as an uncertain job market or concerns about work–life balance also created uncertainty about pursuing medical or dental training.

### Inadequate institutional support and resources

Students identified several areas where they perceived their own institution's resources as inadequate to support their career goal. They expressed concerns that their college did not offer adequate course work to help them be a highly competitive applicant to medical or dental schools. One participant noted:

We're pretty good with the basics like gen chem, physics, your basic biologies, but when it comes to upper level, we're extremely limited ... another university, they may take immunology, toxicology, medical-related classes. And here, we don't have that.

Some traced their academic concerns back to their own high school, reporting that it inadequately prepared them for a college curriculum or a medical or dental career. Finally, many felt that their colleges were not able to connect them with physicians and clinical opportunities. This lack of access was perceived to create a disadvantage for gaining experience and knowledge and putting them on equal footing with other applicants. Some students had independently attempted to find a physician to shadow through multiple avenues (e.g., Internet, phone book) and reported frequent rejection. Even students who were able to shadow were concerned that they had spent insufficient time in this activity, with one participant noting, "I haven't had enough ... easy access to professionals—that, we're not in contact with them."

### Limited personal resources and family and social conflict

Many participants described limited personal resources to pursue their desired career path. Students were concerned about their ability to pay for not just tuition but also other key steps toward medical or dental school, including standardized test preparation courses, the costs of exams, and other costs such as applications and travel. The demands of premedical or predental education at the undergraduate level created further challenges by forcing students to balance education and employment.

So I guess it's kind of figuring out what my best options are financially and how I can support myself and still have a life without it being so stressful, because I know I'm not going to be able to work so....

Students talked about their own fears of insurmountable debt—specifically, whether they would be able to repay educational loans through their chosen career.

Students feared nonacceptance to medical or dental professions school after making significant financial, emotional, and temporal investment. For example, some struggled to think about an alternative plan if they did not get accepted. One participant commented:

If you get denied, it's almost a part of you is gone because that's what your whole existence in undergrad is trying to become a doctor and you get scared. I'm scared that if they don't accept me, what am I going to do.

Students also recognized that a very small number of students from their college were accepted to medical or dental school and felt that their chances were lower because of their starting point. Additionally, students spoke about the disparity in acceptance rates for minority students and how that influenced their personal worries. Students voiced specific concerns such as their personal abilities to be prepared for clinical situations in the future, knowledge retention, and being able to put what was learned in the classroom into real practice. They specifically noted that improvement in time management and study skills were needed for success. One participant noted that "time management is a very hard thing for me to do ... I find myself studying for one class and neglecting another class."

They also worried that their acceptance would isolate them from their friends who were not accepted into medical or dental school and that the level of competition in the premedical or predental curriculum created an environment that did not allow for them to explain extenuating circumstances that impacted and decreased their level of competitiveness. Specific examples were provided about the MCAT and the stress surrounding it. One student remarked:

One of the main concerns that is really freaking me out is the MCAT. Having to get the right score so you can reach your goals.

Students also described their fear that this competitive environment extended into the practice environment for a medical or dental professional.

One of the more surprising areas discussed related to students' descriptions of pressures from their family in their pursuit of a medical or dental career. On one hand, students described pressure from their families to succeed. But other students described being discouraged by friends and family from pursuing a medical or dental career. Some noted that if they did not have friends or family in medicine, they were missing a large support system for success. Obligations such as caring for family members presented challenges in their pursuit of a medical or dental career, particularly obligations that competed with schoolwork. Families were also described as lacking knowledge with regard to the cost of a medical or dental career and the processes and pathways to becoming a physician or dentist. One participant observed:

They don't understand why I'm not in law school. Why am I not in med school.... So, for me, that's one of the other barriers I'm trying to get over because every time I try to explain to them, they never seem to understand.

### Lack of access to adequate information, mentoring, and advising

The lack of access to information, mentoring, and advising was interwoven into many of the challenges identified by students, and obtaining this access was often cited as a solution to identified challenges. Specifically, students cited an absence of mentoring opportunities as well as difficulties with advising. They thought a helpful mentor would be someone who had been through a similar process. They reported minimal meetings and feeling like mentors did not know them. Overall, many students felt that they did not have mentors who really helped and supported them. This lack of access was reported by students as going back to as early as high school. An illustrative comment is,

I'm just saying if people knew at a younger age instead of some ways in high school.... They're not telling us the different stuff we can do in college.

This disparity was accentuated throughout college and the process of applying to medical or dental school. Students described feeling lost and wanting to know how to navigate their undergraduate experience to get the most out of it. Students reported

circumventing this challenge by attending prehealth conferences, although they thought the availability of more conferences would be helpful, and by forming support groups. However, some students said that even once they got information, it was too late and they remained at a disadvantage.

### Societal barriers

While much of the discussion was focused on a student's progression through the pipeline, students also reported challenges related to their individual social roles outside of medicine or dentistry, such as work–life balance, and recognized that there were forces beyond their control, such as an uncertain job market, that could impact their successful attainment of a career in medicine or dentistry. Students were specifically concerned about whether they could enjoy life outside of their career, with one student noting,

The medical profession itself is time-consuming and that takes away from family, friends, and interests and one of the concerns I have is will I be able to pursue other things that I'm interested in.

Delaying significant relationships and families was also a concern. Female students voiced concerns related to the cultural expectation that women are expected to do more in the home, and some were skeptical that they could balance being a wife, mother, and physician.

Although medicine and dentistry are typically recognized for job security, students reported concerns about the job market including finding a job and the location of jobs. One participant specifically cited the fear that

I'm scared that once I do all this, I make it, I have my, you know, MD–PhD or whatever, and I won't have a job.

The uniqueness of the medical and dental job markets and the multiple training steps (e.g., residency, fellowship) involved were the subject of much confusion for students. They also addressed the increasing difficulty in matching into a graduate medical education position.

### Discussion

Through guided discussions, this study elucidates challenges that a sample of

URiM undergraduate students perceived in their pursuit of a medical or dental career. Previous studies have focused primarily on quantitative data (e.g., markers of academic achievement, graduation questionnaires) to attempt to explain the relative disparity that exists in the number of minority compared with majority medical or dental students<sup>24,25</sup>; have been focused on a single institution to describe the experiences students face<sup>18,26</sup> or the evaluation of a specific program<sup>27</sup>; or have retrospectively examined the perspective of those who attained the goal.<sup>19,20</sup> Scholars have argued that the educational pipeline, institutional culture, and political environment also significantly contribute to this disparity.<sup>6</sup> Our focus was to describe the perceived challenges of URiM students at a broad spectrum of institutions that historically have had higher proportions of URiM students than comparable public universities. Understanding the perceived barriers for these students in particular is key to identifying strategies to decrease leaks in the pipeline to a medical or dental career. Study participants identified several perceived challenges that we classified according to the overarching themes of inadequate institutional resources, limited personal resources and conflicts, lack of access to mentoring and advising, and societal barriers. Similar challenges have been described at different points in the health professional pipeline<sup>19,28,29</sup> and the pipeline to STEM (science, technology, engineering, and math)-related degrees.<sup>30</sup> Common challenges further underscore areas where intervention can be effective and signal the potential opportunity to positively impact diversity across a broader set of careers by intervening.

First, for students attending institutions where premedical or pre dental professions resources are limited, outside organizations, programs, and individuals can play an important role in supplementing available resources. In this study cohort, only 7% of the students had participated in what is considered one of the best-designed and influential programs for URiM students, SMDEP (formerly SMEP—Summer Medical Education Program and MMEP—Minority Medical Education Program).<sup>31,32</sup> SMDEP and other similar programs have shown significant impact on improving the likelihood of URiM

students' matriculation into medical school.<sup>32,33</sup> The reach of these programs could be extended to more colleges, and national medical organizations could support mentoring at colleges not connected to medical schools.

Second, the family conflict that students described likely comes from families wanting them to succeed but also not understanding the training process. This finding underscores the importance of involving families in the “pipeline” early on as a way to support a student's progression through it. This could be accomplished through outreach efforts to parents as early as the high school level via Web sites or supplemental conferences to premedical or pre dental student activities, which has been a part of successful URiM pipeline programs.<sup>34</sup>

Third, the lack of access to information, mentoring, and advising emphasizes the importance for improved dissemination and resources to schools without direct connections to medical or dental professional schools as well as the importance of programs like T4D that seek not only to provide role models but also to establish mentoring connections. Previous studies have identified lack of connections to physicians as mentors as having a negative impact on the leaky pipeline,<sup>18</sup> and our study affirms that this is a pervasive problem. Finally, individual barriers should be addressed through discussions to rectify student and family misconceptions about the field. Societal barriers, which have previously been shown to have positive and negative impacts on the diversity of the medical and dental workforce, can be best addressed through advocacy and policy interventions. For example current graduate medical education work hours regulation has improved perceptions regarding quality of life, but the negative political environment around affirmative action in the late 1990s may have served to discourage URiM applicants from medicine.<sup>6,35</sup>

There are multiple limitations to this study. We were constrained to one hour for discussion with students because of the T4D conference agenda. Although every effort was made to fully explore specific areas, there could be other areas that were missed. Additionally, our sample size of 11 focus groups, although robust, may not be representative of all URiM

students. We selected the schools for the T4D program for certain criteria (serving a disadvantaged student body or area); thus, it is possible that their perspective is not universal. However, it is very possible that students of other demographics may have the same concerns given the similarity between our findings and previously reported experiences.<sup>18</sup>

This study identifies several challenges that have been previously elucidated in the literature in other parts of the health professional pipeline, such as pressures placed on students by their families, the role of limited personal resources, and the impact of limited institutional resources on a student's pursuit of a medical or dental career. Our findings highlight several targets for intervention to increase retention of undergraduate minority students in the pipeline for medical or dental education. Although past efforts have yielded disappointing results, the goal of increasing the diversity of the medical or dental professions workforce remains important and will require new approaches.

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