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INSTRUCTIONAL DESIGN AND ASSESSMENT

An Educational Program for Underserved Middle School Students to Encourage Pursuit of Pharmacy and Other Health Science Careers

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Objective. To develop and implement an active, hands-on program for underrepresented minority (URM) seventh grade students and to determine if participation in the program increased interest in health care careers and understanding of pharmacy and physician assistant (PA) professions.

Design. A hands-on educational program was developed in conjunction with local middle school administrators and staff for URM 7th grade students. The program was designed to be hands-on and focus on pharmacy and PA laboratory skills. A discussion component was included, allowing participants to interact personally with pharmacy and PA students and faculty members.

Assessment. Students' responses to survey questions about interest in health care careers and knowledge about health professions were compared before and after 2 separate offerings of the program. After the program, significant increases were seen in participants' understanding of the pharmacy and PA professions. An increased percentage of participants reported interest in health care careers after the program than before the program.

Conclusion. Introducing middle school-aged URM students to the pharmacy and PA professions through a hands-on educational program increased interest in, and knowledge of, these professions.

Keywords: diversity; minority recruitment; youth education; community service; health disparities

INTRODUCTION

The US Census Bureau has predicted the US population will be more racially and ethnically diverse by 2060.[1] Despite a more diverse US general population, the number of minority health care providers has not kept pace and this lack of diversity in the health professions workforce is believed to contribute to health care disparities among racial and ethnic groups. For example, US minorities encounter unequal access to comprehensive, high-quality health care, inadequate exposure to health promotion and disease prevention, and communication barriers with providers leading to patient distrust.[2-9]

Diversity and cultural competency in the health professions workforce are imperative in shaping the skills and attitudes that allow these professionals to work with culturally and ethnically diverse patient populations.[3,5,10-16] Moreover, achieving diversity in the workforce is not only fair, it is pragmatic, and will improve minority populations' access to, and receipt of, health care.[8,10,11,15,17-20] Further, it has been proposed that improved diversity and cultural competency in the health professions workforce will improve medical research and management of the health care system.[2,10,15,20]

Ambitious goals for increasing diversity in medicine have been set in the past, such as Project 3000 by 2000, a campaign launched by the Association of American Medical Colleges in 1991 to matriculate at least 3000 underrepresented minority students annually in medical schools by the year 2000.[5,11,21] Despite this effort, the goal was not achieved; in fact, increasing percentages of minority groups in the US general population has outpaced increases in minority enrollment in medical schools and has resulted in a greater degree of minority underrepresentation in medical schools in the year 2000 than was seen in the 1970s.[5,10,11,22,23] The call for greater diversity in the health care professions has continued, with groups such as the Sullivan Commission, the American Association of Colleges of Nursing, the Department of Health and Human Services, and the Public Health Service all reinforcing the need and the push for increased minority representation in the health care workforce.[17-19,24-31]

With regard to pharmacy, the US Department of Health and Human Services noted in 2008 that there was a moderate shortfall of pharmacists in the workforce

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and this was particularly dire among minority pharmacists.[32] The percentages of minority pharmacy school graduates did not reflect the percentages in the US general population. Moreover, in 2011, 59.8% doctor of pharmacy degrees were awarded to Whites, 21.5% to Asian Americans, 6.4% to Blacks/African Americans, 4.3% to Hispanics/Latinos, and 0.4% to American Indians/Alaska Natives. It was noted that if demographics remained the same, this shortfall would expand over time.[32] Increasing diversity in pharmacy is desired by the American Association of the Colleges of Pharmacy, and by the American Society of Health Systems Pharmacists, which formed ad hoc committees to provide solutions to increase diversity in the pharmacy profession.[33-35]

A similar situation was seen for physician assistants. White students made up 75.1% of the 5536 graduates from PA programs in 2010, followed by Asian Americans (6.7%), Hispanics/Latinos (6.3%), Blacks/African Americans (4.9%), and Hawaiian or Pacific Islanders (0.7%).[36] These numbers prompted a joint task force of the American Academy of Physician Assistants and the Physician Assistant Education Association to develop recommendations in 2011 for the PA workforce; these included multiple recommendations specifically designed to improve PA workforce diversity.[37]

Studies indicate that URM students become more competitive medical school candidates if they participate in postbaccalaureate enrichment programs.[6,17,19,23,24,38-43] Examples of these short-term and long-term efforts include cooperative programs between multiple historically Black colleges and high schools with large URM enrollment,[43] directed and concerted programs for specific medical schools,[17] postbaccalaureate premedical programs,[24] and fellows programs for URM students in large, urban public schools in partnership with state medical societies.[6]

Though there are, and have been, many initiatives promoting careers in medicine to underserved minority students, little work to promote pharmacy and PA careers to this population of students has been done.[44] Furthermore, most work focused on older students, while a paucity of work exists targeting younger students, who might be particularly open to encouragement.[45] Examples of the few successful projects that have been undertaken to improve or incentivize minority interest in health care professions other than medicine include a program that increased interest in health care careers among high school students in underserved areas of New York State after participation in health-related curricula/activities, such as an engaging science class, an internship in a health care setting, or a career fair or field trip.[46] Results of another program at the Medical College of Georgia, in which 101 URM high school and college students were enrolled in an 8-week Student Educational Enrichment Program, found that 71 students had chosen science majors for their undergraduate degrees. Twenty-four continued to medical or dental school and 10 students enrolled in pharmacy or nursing school.[19]

With regard to pharmacy, Awé and Bauman worked with URM students from Chicago public schools over a 4-year period. The students participated in a 6-week program that included 3 weeks of prepharmacy curriculum and 3 weeks working as a pharmacy technician in a chain pharmacy. After completing the program, they found that 75% of the students were motivated to pursue pharmacy as a career.[44] Others have targeted URM students by running health fairs at which pharmacy students provided educational sessions to elementary school students.[47] Of these programs, only the last was undertaken with students younger than high school age.

In an effort to target younger, perhaps more receptive,[45] URM students, we developed and provided an interactive, hands-on program in partnership with a local middle school. The program was designed to expose URM seventh grade students to higher education in general and health care careers in particular, with an emphasis on providing these students with an opportunity to learn skills that pharmacy and PA professionals regularly use. The goals of the program were: (1) to broaden URM students' thinking about their futures, including entertaining the possibility of pursuing professional degrees in health care; (2) to encourage younger URM students than had been targeted in most previous work to aspire to higher education and health care professions; (3) to develop a program with minimal cost and time required, but that would still pique URM students' interest in the health professions; and (4) to determine if these URM middle school students gained an understanding of opportunities in pharmacy and PA careers through their participation in the program.

DESIGN

In 2008 the New Hampshire College and University Council (NHCUC) and Campus Compact for New Hampshire (CCNH) sent out a call for applications for mini-grant money (less than $1000) ear-marked for development of programs aimed at encouraging URM students to access higher education. To be eligible for the grant, applicants had to develop or expand upon a partnership between a community-based organization or a Kindergarten-12 (K-12) school in New Hampshire and a higher education institution. As a relatively new higher education institution in the state, we were in the early stages of developing our presence in the community and embraced this opportunity.

Several steps had to be taken, including developing goals for the program, determining what age group to target, finding a partner K-12 school or community organization with shared interests and goals, determining the program format, gaining buy-in from faculty members, staff, and students on campus, applying for the grant, working out the program logistics to fit our partner's and our time and budget constraints, and assessing the program's effectiveness. While a daunting list, the time required from initially learning about the funding opportunity to conducting the program for the first time was 6 months (a development plan for this program is shown in Table 1).

We were able to tackle all of the steps with relative ease—except one—finding a partner institution. Members of CCNH provided some initial public school contacts in our geographical area, but of those contacted, not one responded. Admittedly, our initial contact was via e-mail, which may have resulted in our mail going to a junk folder or simply being ignored because of the "cold call" nature of the mail and lack of previous contact from us. Because these initial attempts proved fruitless, we looked for partners on our own by searching the web for local middle schools and again "cold e-mailed" their principals with our proposal. Ultimately, we heard back from one local middle school principal, who had been a science teacher in the school prior to becoming principal. He was interested in the project and our partnership began.

Next, we wrote the grant application, collected feedback on it, and submitted the application. The grant was submitted and approved 1 month prior to conducting the program for the first time. Funding covered the costs of refreshments, lab supplies, and transportation for up to 40 visiting students. Although MCPHS is a multi-campus university, this program has not been extended to other campuses yet because finding a local partner institution was so difficult.

The program that was developed involved visiting URM students spending 1 morning at the Manchester campus of MCPHS. The program was highly interactive and hands on, with 3 interactive components; 2 were laboratory activities and 1 was conversation-based. The conversation-based component occurred in a casual setting and involved introducing the visiting URM students to pharmacy and PA careers through discussions with professors and students from both the PA and pharmacy departments. During the informal discussions, food was served and visiting students were paired with 1 or 2 pharmacy or PA students to keep conversations intimate. In the interactive, hands-on components, visiting URM students worked in the pharmacy and the PA physical assessment laboratories to learn skills essential to pharmacists and PA professionals. Visiting students learned to compound medicine-free lozenges or gummy bears in the pharmacy laboratory. Each visiting student made his or her own products, with pharmacy students and faculty members demonstrating and assisting as needed. In the PA physical examination laboratory, visiting students learned basic physical assessment techniques, such as taking blood pressure and pulse, examining ears and eyes, and checking reflexes. As had been done in the pharmacy laboratory, the seventh grade students worked in pairs with PA and pharmacy students and faculty members

Table 1. Action Plan to Develop Program for Underrepresented Minority (URM) Middle School Students Aimed at Fostering Interest in Health Care Professions

Program design
Determine format (eg, all day, part of day)
Determine activities to include (eg, hands-on, lab-based, discussion, multiple activities)
Determine age range to target (eg, elementary, middle, or high school)
Determine who will be involved and who will facilitate (eg, faculty members, students, admissions, administration)
Determine if refreshments will be provided
Determine budget requirements based upon final program design
Desired outcomes
Engender interest in higher education and the sciences among local URM youth
Spark enthusiasm for higher education and the sciences among local URM youth
Demonstrate that higher education and health care professions are attainable for local URM youth
Increase awareness of pharmacy and physician's assistant professions among local URM youth
Establish long-term collaborative relationship between K-12 partner institution and MCPHS*
Resources needed
MCPHS faculty member, staff, administration, and student buy-in
Partner K-12 institution buy-in
Grant funding to provide laboratory supplies, refreshments, and transportation
MCPHS administrative approval for student visit and use of facilities

* Massachusetts College of Pharmacy and Health Sciences.

who demonstrated techniques and then oversaw and refined each student's techniques.

The program was offered in partnership with a local middle school for the first time in 2008. The partner school's guidance counselors were asked to seek out underrepresented seventh grade students who desired to attend college and who had an interest in science; no other criteria were required for their participation in the program. Our partner school's guidance counselors provided basic demographic information for the students who participated in the program (Table 2).

The program has been offered annually since 2008. In both 2008 and 2012, but not in other years because of time and personnel limitations, participating students were surveyed anonymously to assess their knowledge of the pharmacy and PA professions and to gauge their interest in attending college and in pursuing health care careers. Students took the survey before participating in the program and again after completion of the program. They were asked to circle "yes" or "no" in response to the following survey questions: (1) Are you considering attending college? (This was asked as a validation of our required criterion for participation, as noted previously.) (2) Are you considering careers in the health sciences (for example, nursing, veterinary medicine, physician, pharmacy, occupational therapy)? (3) Do you know what a pharmacist does? and (4) Do you know what a physician's assistant does? Students also had the opportunity to add comments to open-ended questions about their experiences.

Twenty-eight participating 7th grade students completed presurveys and postsurveys in 2008, and 25 completed surveys in 2012. Surveys were given anonymously, and differences in survey responses before and after the educational program were analyzed using the paired *t* test function in MS Excel, with a p value of < 0.05 considered a significant difference. The protocol for this study was approved by the MCPHS University Institutional Review Board.

EVALUATION AND ASSESSMENT

As seen in Table 2, the students who participated in the program were underrepresented as compared to the demographics of the general population of the state of New Hampshire and, frequently those of the United States. While many participants were White, there was a greater representation of Black/African American, Hispanic/Latino, Asian American, and Native American racial/ethnic backgrounds among the participants than was recorded for the general population for the state. In addition, a higher percentage of participants qualified for reduced or free lunch (33% and 57% of participants in 2008 and 2012, respectively) than among the New Hampshire student population overall (20.5% in 2008-2009), indicating that participants' families were economically disadvantaged. A final indication that the participating students differed markedly from the overall New Hampshire student population was that a high percentage of participants were not native English speakers—30% and 17% in 2008 and 2012, respectively—compared to 1% of all New Hampshire students.

After completing the program, there were significant increases in participants' knowledge of pharmacy and PA careers compared to their knowledge of these careers prior to the program (42% preprogram vs 89% postprogram, $p<0.001$ and 40% preprogram vs 91% postprogram, $p<0.001$, respectively; see Figure 1). Participants also expressed increased interest in health care careers after the program as compared to before the program, though this increase was only marginally significant (Figure 1).

Table 2. Profile of Participants with New Hampshire and US Comparators

	% 2008 participants (n=28)	% 2012 participants (n=25)	N.H. %	U.S. %
Male	50	17	49.4[a]	49.2[a]
Female	50	83	50.6[a]	50.8[a]
ESL/ESOL*	30	17	1[b]	5[b]
Will be first in family to college	63	65		22[c]
Free or reduced lunch	33	57	20.5[d]	44.6[d]
Black/African American	10	22	1.4[a]	13.1[a]
Asian American	10	0	2.4[a]	5.1[a]
Hispanic/Latino	15	4	3.0[a]	16.9[a]
Native American	0	4	0.3[a]	1.2[a]
White	65	70	94.4[a]	77.9[a]

* ESL=English as a Second Language; ESOL=English for Speakers of Other Languages.

[a] Statistics are from US Census 2012.[52]

[b] Statistics are from year 2011-2012, for 8th grade students from Institute of Education Sciences.[53]

[c] Statistic is for 12th graders pursuing postsecondary education.[54]

[d] Statistics are from year 2008-2009, US Department of Education.[55]

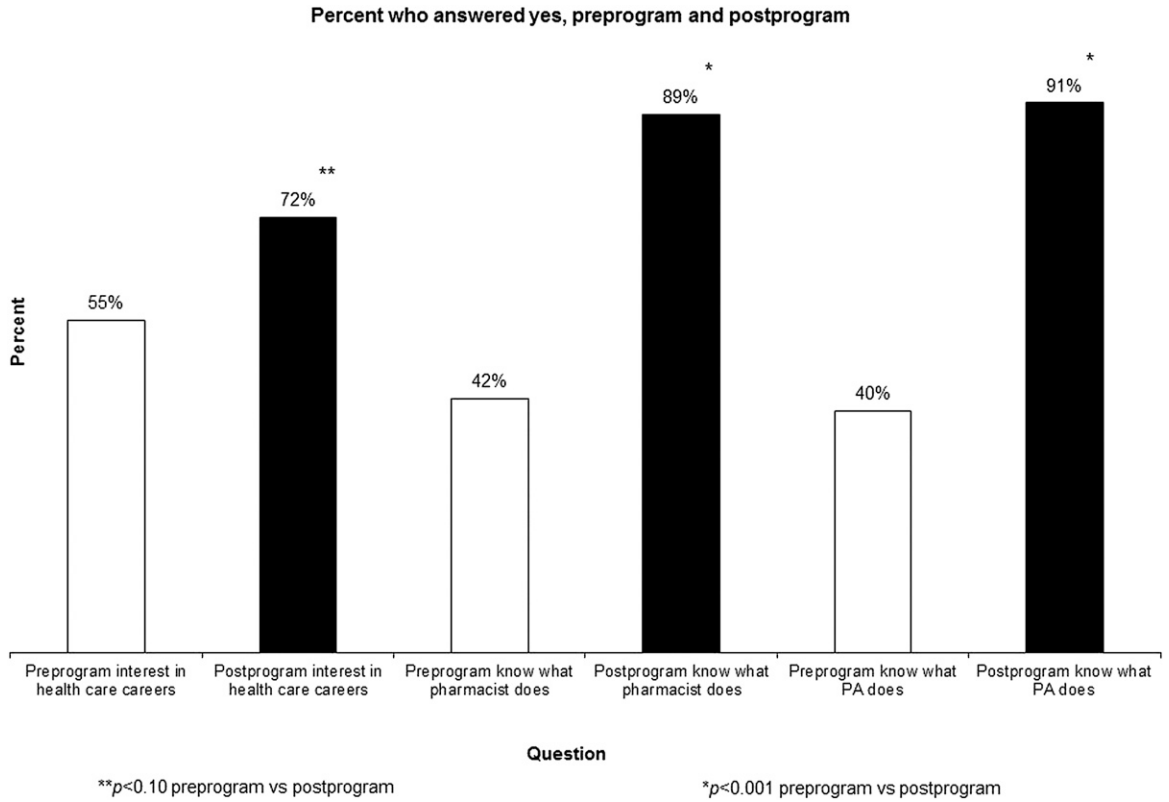

Figure 1. Comparison of percentages of participants who answered "yes" to survey questions before and after the program (combined results from participants in 2008 and 2012, n=53)

Participants' open-ended comments were overwhelmingly positive, with 40 of the 53 participants making some form of positive comment. Examples of student responses were that they enjoyed "meeting the students there," "making lozenges," "taking blood pressure," and even "I really liked everything. It was a wonderful experience." When asked what they liked least about the program, or if they had suggestions to improve the program, not all participants answered, but of the 35 that did, 26 responded with variations of "no" or "nothing." Eight of the participants who answered "no" or "nothing" added comments to their responses, including "No, not really," "Nope (it's awesome!)," "Making the lozenges taste better!" "I think it was pretty good," "No, I don't. I like that college. :-)," "No, I think it was great," "No, it was actually very good," and "Not that I can think of." The only other suggestion was "To make the medicines taste better."

DISCUSSION

Despite efforts to increase URM interest in the health care professions, the minority representation in these fields still does not mirror the percentages of these minorities in the US general population. Inroads have been made, particularly in medicine, and efforts have seen some success,[6,17,19,24,31,39,43,44,46-48] but the inroads made have not kept pace with the increasing minority populations in the country. Furthermore, most of the programs dedicated to improving the disparity in minority representation in the health care professions have been focused on high school and postbaccalaureate students and careers in medicine, while little work has been done to involve younger students who may be more open to careers in the health care professions.

This work offers insight into developing a successful educational program for younger underrepresented youth. Development of the program required little time from conception to inception (6 months) and little money (less than $1000). The program was developed to be hands-on and geared toward younger students for several reasons. First, many previously described programs focused on the medical profession and were offered to older students, whereas ours was focused on pharmacy and offered to seventh grade URM students.[6,17,24,38,39,41-43,46,48,49] Second, students are more likely to pursue careers in health and science if they are exposed to positive educational experiences at a young age.[6,19,45,50] Third, among the factors that influence pharmacy students to pursue pharmacy careers is encouragement by pharmacists and pharmacy students to do so.[51] By providing the middle school-aged students with hands-on experiences in the pharmacy and PA laboratories and

personal conversations with pharmacy and PA students and faculty members, we attempted to address what we perceived to be important factors or shortcomings of previously reported programs. Our results indicated that our hands-on program was successful in increasing participants' knowledge of the pharmacy and PA professions and in increasing participants' interest in pursuing careers in health care.

This program was designed specifically to provide 1 day of extramural experience for the participants, which is substantially less than many previous programs provided.[6,17,24,38,39,41-43,46,48,49] The program design offered a logistically feasible, formative experience for the URM participants, while maximizing funding and personnel, which were limiting factors for our institution and might be for others wishing to replicate this type of work. Despite these restrictions, student responses indicated that the program was successful in providing participants with an enjoyable educational experience, and that the students gained knowledge about the pharmacy and PA professions. We do not have data on whether the program provided sufficient motivation for participants to pursue these professions as educational and career goals; nevertheless, certain seminal experiences early in a young person's life can have lasting positive effects. Outwardbound-type experiences, which occur for a week outside of the classroom, are examples of short duration extramural activities that can make an enduring difference to the participants.[56] For those entering science, technology, engineering, and mathematics (STEM) fields, formative experiences outside the family structure and the classroom can elicit interest in, and pursuit of, a STEM-related career path.[57] With specific regard to health care professions, short-term programs (2 weeks in duration) showed a positive effect on students' educational and career paths, and participants particularly valued hands-on experiences and interactions with student mentors and faculty members,[58] both of which were components of our program.

The positive effects of our program design were validated in the open-ended responses provided by the participants, which were, with few exceptions, favorable and enthusiastic. We believe that exposure to the sciences and health care fields ought to be enjoyable, and this was the case for our participants. While we expected participants to have fun in the laboratories, taking blood pressures, assessing reflexes, making gummy bears, and performing other health care-related tasks, we were surprised by the number of times participants indicated that they most enjoyed speaking with our PA and pharmacy students. We believe that allowing these URM students to see themselves reflected in our young, diverse student body and giving them time to have informal conversations with one another was not only enjoyable, as indicated by their comments, but allowed participants to see that they, too, could pursue health care careers. Furthermore, the program afforded a positive outreach experience for our own pharmacy and PA students and faculty members.

Our results, coupled with previous findings, suggest that it may be beneficial to target younger students in future attempts to increase numbers of URM students in health care professions. If these programs can regularly provide opportunities for young URM students to build and sustain their interest in science and research, the likelihood that they will pursue health care degrees improves.[6,19,38,39,44]

The state of New Hampshire is not racially diverse (Table 2). As a result, many of our participants were not ethnic or racial minorities; however, they were underrepresented in other ways, such as coming from economically disadvantaged households or not being native English speakers. As these populations often experience unequal access to comprehensive quality health care and to higher education, they qualified as underrepresented students for our program. A further limitation was a lack of means to track the progress of the program participants from the time they participated in the program until they graduated from high school. The impact of the program on the participants' college and career plans was not measurable as a result. A final limitation to the program was that the experiences the seventh grade students had on campus occurred once on a single day. The program was deliberately designed this way, but we recognize that this is a short duration. Combined with the inability to measure participants' educational and career paths over time, this left the long-term effects of this program unaddressed.

SUMMARY

This hands-on educational program developed for URM enrichment has been run annually since its inception in 2008. It has been effective in increasing understanding of the pharmacy and PA professions among the young URM participants. It has broadened their interest in health care careers and allowed them to develop an appreciation for the enjoyment and excitement these careers can provide. The URM participants and the PA and pharmacy students and faculty members who guided the participants exhibited enthusiam for the program. Similar programs that develop alliances between schools of pharmacy or other health professions and local public schools and youth community programs may help address the shortage of underrepresented minority students in healh care professions and help end disparities minorities encounter in the US health care system.

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