



Health Professions Pathway Programs: A Literature Review

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EXECUTIVE SUMMARY

Arizona is facing significant workforce shortages across its health professions.¹⁻³ These shortages are exacerbated by two issues: workforce maldistribution and a mismatch between the socio-economic, racial, ethnic, cultural, and linguistic diversity of health professionals and the population of the state. Rural and certain urban communities face disproportionate health professions shortages limiting their access to care. Arizona’s communities of color are underrepresented in the healthcare workforce, likely contributing to the state’s racial disparities in health outcomes.⁴⁻⁷ As part of the current Arizona Health Improvement Plan (AZHIP), Arizona Department of Health Services (ADHS) seeks to “address [the] health professional shortage by building a diverse healthcare workforce.”⁸ The Arizona Center for Rural Health (AzCRH) received funding from ADHS to “develop strategies to reduce financial and other barriers for underserved students in health professions/providers education programs.”⁸ In doing so, our team conducted a literature review to identify common practices of health professions pathway programs. Pathway programs support racially and ethnically underrepresented and rural students pursuing health professions to improve the racial diversity and maldistribution of the healthcare workforce.⁹ The purpose of this report is to summarize the findings from our literature review.

To identify and inventory the common practices of health professions pathway programs, our team reviewed the existing literature. Keyword searches were conducted using biomedical and social science databases. This review included articles if the programs assessed were administered in higher education settings, supported the primary care medical or dental professions, and served underrepresented, underserved, or rural students. We excluded studies of programs serving K-12 students and those based outside of the U.S. After two rounds of screening against our inclusion and exclusion criteria – firstly, the titles and abstracts and, secondly, the full articles – 26 articles were included in our review and summarized for this report.

Health professions pathway programs represented in this review are diverse in program length, reported outcomes, and the types of support they provide students. Program lengths can be arranged into three categories: short-term (less than three months), one year (roughly 12 months), and longitudinal (ranging one to four years). Because programs of the same length often provide similar services, this report categorizes article summaries by the lengths of the programs they describe. There is heterogeneity across reported program outcomes which include rates of student matriculation into health professional schools, workforce placement rates, and intrapersonal factors (e.g., knowledge and self confidence). Because of this, we did not perform a systematic analysis of program effectiveness, but kept within the bounds of our aim, identifying and summarizing program practices. Table 1 lists the most common forms of instructional and financial support provided by pathway programs.

Table 1. Common Pathway Program Support

Instructional Support	Financial Support
<ul style="list-style-type: none">▶ Academic Enrichment<ul style="list-style-type: none">◦ Science course, lecture series, or seminar▶ Mentorship or shadowing<ul style="list-style-type: none">◦ Peer, faculty, or clinician▶ Clinical or practical skill development<ul style="list-style-type: none">◦ Clinical rotation or workshop▶ School admissions preparations<ul style="list-style-type: none">◦ Test (e.g., MCAT) course, tutoring, application preparation, or mock interviews	<ul style="list-style-type: none">▶ Stipends▶ Scholarships<ul style="list-style-type: none">◦ Both are used to cover housing, required travel, food, tuition and fees, textbooks, examination preparation, and professional school application fees.

Beyond the student support listed in Table 1, the literature includes many unique and notable program features. Taylor et al. (2019) describe a program which recruits students from local community colleges as well as four-year universities. Other programs are unique in their acceptance standards. Kallial and McCurdy (2010) describes a program which only accepts students who have lived in rural communities. Upshur et al. (2018) describe another that admits students with promising, but not yet competitive GPAs, as they are likely to benefit most from pathway program support. Programs provide unique arrays of instructional support, including elements not included in Table 1, but described in the article summaries. Financial support, too, varies between programs. Bliss et al. (2020) describe a longitudinal program which provides students with paid mentorships and research positions rather than stipends or scholarships. To enhance matriculation, some programs have agreements with health professional schools. Cestone et al. (2018) and Kallail and McCurdy (2010) describe programs which assure medical school admission. The diversity in program support demonstrates how pathway programs can support their students in uniquely effective ways.

Our hope is that this review can inform the practices of Arizona's health profession pathway programs. Pathway program student support does not appear to be one size fits all but, rather, individualized for each program based on specific program goals. We suggest that pathway program administrators use the article summaries as a resource to survey the numerous structures, strategies, and practices of other programs. Health profession pathway programs have a critical role to play in Arizona. They will continue to offer a means of improving the distribution and socio-economic, racial, ethnic, cultural, and linguistic composition of the state's healthcare workforce.

INTRODUCTION

Arizona's healthcare system relies on the skill, coordination, and supply of its healthcare workforce. Numerous professions make up this workforce, including physicians, advanced practice providers, nurses, pharmacists, and allied health professionals. The Health Resources and Services Administration (HRSA) projects significant shortages across U.S. healthcare professions in the coming decade.¹⁰ In Arizona, only 39% of the need for primary care physicians is met.² The state has 80.2 active primary care physicians and 6.9 active general surgeons per 100,000 population, ranking 42nd and 43rd, respectively, in the U.S.⁶ Arizona's demand for registered nurses is projected to exceed its supply by 28,100 nurses in 2025, representing the country's largest state-level shortfall.³ Changes in the state's population are at least partially responsible for these shortages. Arizonans have grown in number by 12% since 2010 while becoming proportionally older.⁵ Those 65 years or older in the state grew 55% between 2010 and 2022.¹¹ Older Arizonans are hospitalized at approximately 2.5 times the rate of their younger peers.¹² To meet the demand for healthcare services, Arizona must invest in its healthcare workforce. Yet, growing the supply of healthcare professionals alone will not wholly resolve its issues.

Arizona's healthcare workforce faces two challenges: insufficient socio-economic, racial, ethnic, linguistic, and cultural diversity and maldistribution. In recent years, the state has become more racially and ethnically diverse.⁵ However, these demographic changes are not represented in the workforce. Nearly one third of Arizona's population identifies as Hispanic.⁴ The same is true for only 6.7% of its active physicians.⁶ Black and Native American Arizonans constitute 6.2% and 6.3% of the state's population, respectively, while representing only 3.8% and 0.9% of the state's active physician workforce.^{5,6} In Arizona, the overall health status for people who identify as Hispanic, Black, and Native American each rank more poorly relative to that of their Asian and non-Hispanic White peers.⁷ The National Academy of Medicine, formerly known as the Institute of Medicine, has asserted that racial and ethnic representation in health professionals is associated with "improved access to care for racial and ethnic minority patients, greater patient choice and satisfaction, [and] better patient-provider communication."¹³ Thus, greater proportions of Hispanic, Black, and Native American health professionals are needed to effectively address Arizona's racial and ethnic disparities in health outcomes.

Health professionals are currently distributed unequally across Arizona. Even as racial, ethnic, and cultural representation improves in the workforce, professionals must be distributed appropriately to meet the needs

of underserved communities. At the moment, many rural and certain urban areas are underserved relative to more greatly resourced metropolitan areas. While Arizona’s urban areas maintain 80.1 primary care physicians per 100,000 persons, its isolated small rural towns have only 10.1.¹⁴ HRSA applies Health Professional Shortage Areas (HPSAs) designations to areas, populations, or facilities experiencing shortages of health services. While the majority of HPSAs in Arizona are at least partially rural, there are also 219 non-rural geographic, population, and facility HPSAs across the state, indicating many underserved urban communities.¹⁵ It’s clear that merely increasing the supply of healthcare professionals will not fully resolve the issues associated with health workforce shortages. To meet the needs of Arizona’s evolving population, the workforce must also become representative of the communities it serves and distributed adequately across the state.

Health professions pathway programs have existed since the 1960s to “improve the maldistribution of physicians and other health professionals and to improve the racial and ethnic diversity of the healthcare workforce.”⁹ Pathway programs provide a combination of academic enrichment, admissions preparation, mentorship, clinical skill development, and financial support to racially or ethnically underrepresented, rural, or socioeconomically underserved students. They have been employed to address healthcare workforce shortages and, in turn, disparities in health outcomes. The National Academy of Medicine has posited that racially and ethnically underrepresented clinicians are significantly more likely to practice in medically underserved communities.¹⁶ Similarly, evidence demonstrates that trainees from rural communities are far more likely than their urban peers to practice in rural areas.^{17,18} Arizona’s public universities house a multitude of these health professions pathway programs, varying in targeted health profession, length of programming, and demographic of students served.

PURPOSE AND AIM

Our project is in support of ADHS’ AzHIP. The purpose of the AzHIP is to bring together partners in the state “to improve the health of communities and individuals across Arizona.”⁸ Our team was funded to “develop strategies to reduce financial and other barriers for underserved students in health professions/providers education programs” as a part of the “Rural and Underserved Urban Health” priority area.⁸

The aim of our project is to inventory, analyze, and identify gaps in the strategies of Arizona’s health education pathway programs which address financial and other barriers faced by students. The specific aim of this report is to summarize and disseminate the findings of our team’s literature review of the common practices of health professions pathway programs. In completing our project, two approaches were employed: a program inventory and stakeholder interviews. The program inventory involved identifying the practices of Arizona’s pathway programs and, then, comparing them with a literature-informed inventory of program practices. Stakeholder interviews were then conducted with administrators and managers of pathway programs and other representatives from academic and student services. The review summarized in this report supports both project approaches, firstly by informing the inventory of promising practices and, secondly, by advising our interview questions.

METHODS

To identify and inventory the common practices of health professions pathway programs, our team conducted a review of existing literature. PubMed and EBSCOhost databases were searched to survey the biomedical and social science literature, respectively.

Selection Criteria

This review includes studies and reviews of any type pertaining to health professions pathway programs published during or after 2010. Articles were included if the programs assessed were in higher education settings, supported the primary care medical or dental professions, and served underrepresented, underserved, or rural students. For the purpose of this review, we defined each of these criteria. Higher education refers to four-year

universities. Primary care medical professionals include physicians, nurse practitioners, and physician assistants who are specialized in family medicine, internal medicine, pediatrics, geriatrics, and obstetrics and gynecology. Underrepresented students are students whose racial or ethnic identity is underrepresented in the healthcare workforce relative to their proportion in the general population. Underserved students include those from nontraditional backgrounds (e.g., first generation), low-income households, or minoritized groups which have relatively limited access to the material resources needed to pursue health professional education. The articles included for review use heterogeneous terminology in describing student demographics, yet the programs they describe all serve student populations contained in the just-mentioned definition. This review excludes articles published before 2010 and outside of the U.S. To note, we did not include program outcome measurements in our inclusion or exclusion criteria. As the aim of this review is to summarize the existing literature rather than analyze and compare program efficacy, the articles identified for review report heterogeneous program outcome data.

Search and Study Selection

To collect relevant literature, we conducted keyword searches in Pubmed and EBSCOhost databases. The final search terms used to collect articles were [((underrepresented students) OR (underserved students) OR (minority students)) AND ((health professions) OR (health careers)) AND pipeline]. Databases were last searched on April 27, 2023. We collected 164 articles from PubMed and 76 articles from EBSCOhost for initial screening. All article information was exported and collated in Microsoft Excel where duplicates between databases were removed. We screened all article titles and abstracts against our inclusion and exclusion criteria. 70 articles from Pubmed and 12 from EBSCOhost remained. After screening the full articles, a total of 26 articles – 20 from Pubmed and 6 from EBSCOhost – were included for this review.

Data Collection and Review

From the articles identified for review, key programmatic information was extracted and collated in Microsoft Excel for review. This included program funding, length, population served, services provided, outcomes measured, and result data. These data were used to categorize pathway programs, identify their common practices, and highlight remarkable program elements.





ARTICLE SUMMARIES

Articles are categorized by program length and reported in alphabetical order. Program length appears to be an important differentiating factor amongst pathway programs. Different durations of programming serve different initiatives. Some support services (e.g., didactic coursework) can only be provided by longer-term programs. Short-term programming may be well suited for other support services (e.g., clinical shadowing). For the purpose of this review, short-term programs are those which last less than three months. One-year programs are 11 or 12 months in length and are generally post baccalaureate or masters programs. Longitudinal programs are greater than one year in length, often spanning over multiple years of students' undergraduate studies. Dental programs are categorized separately and reported last. The Pipeline, Professional, and Practice: Community-Based Dental Education was a unique national program and appears in most dental-related articles, necessitating a distinct category for dental training programs.

SHORT-TERM PROGRAMS

Program Name: Future Public Health Leaders Program at the University of Michigan

Aim: Increase the number of diverse students in the public health professional pipeline

Length: Short-term

Direct Financial Support: Not mentioned

Caldwell, C. H., Thomas, D., Hoelscher, H., Williams, H., Mason, Z., Valerio-Shewmaker, M. A., & Panapasa, S. V. (2021). Tailoring Recruitment and Outreach Strategies for Underrepresented Students in Public Health Pipeline Programs. *Pedagogy in Health Promotion*, 7(Suppl 1) S36–S43.

This article discusses the efficacy of recruitment strategies used to diversify the applicants for the Future Public Health Leaders Program (FPHLP) at the University of Michigan. The 10-week summer pathway program is funded by the Centers for Disease Control and Prevention's (CDC) Undergraduate Public Health Scholars Program (CUPS). The program aims to increase the number of diverse students in the public health professional pipeline. The authors define diverse students as those from underrepresented racial and ethnic groups, diverse gender identities, physical abilities, colleges and universities, and geographic regions. The article primarily describes the program's recruitment strategy. The program uses three different approaches to recruit students: institutional linkages (e.g., advisors and professors), collaborative partnerships (e.g., public health organizations), and interpersonal contacts (e.g., alumni, webinars, and websites). On the program's application form, students indicated how they became interested in the program. Across all racial and ethnic groups, the majority of applicants were recruited through interpersonal contacts. Hispanic/Latinas were more likely than other groups to be recruited through institutional linkages.

Program Name: Trover Rural Scholars at the University of Louisville

Aim: Increase the number of rural physicians by supporting rural students' pursuit of medical school

Length: Short-term

Direct Financial Support: Summer stipends and small scholarships

Crump, W.J., Fricker, R.S., & Crump, A.M. (2010). Just what are rural premedical students thinking? A report of the first 6 years of a pathways program. *The Journal of Rural Health*, 26, 97–99.

This article describes the Trover Rural Scholars (TRS) program at the University of Louisville. The TRS is a four-week summer pathway program that aims to increase the number of rural physicians by supporting rural students' pursuit of medical school. The TRS program serves undergraduate students who are interested in rural medicine, have demonstrated academic proficiency, and are from rural towns. The authors define rural towns as those with populations under 30,000 persons that are not adjacent to metropolitan areas. TRS provides students with physician shadowing, science tutorials, mentorship by medical students, and opportunities to provide physical examinations to primary school children, all based in a rural town. Students receive a summer stipend and small scholarship for program participation. The authors administered a survey to former program students to evaluate pathway retention data. They found that 12 of the 24 participants surveyed were in medical school or reapplying to it. Seven of the remaining participants reported that they were working in or pursuing other health professional careers. Additionally, the authors surveyed participants on factors which may contribute to medical pipeline attrition. The factors more strongly associated with students who left the pipeline include awareness of alternative career options, concerns regarding one's academic performance, and perceptions that physicians' lack job satisfaction.

Program Name: Minority Senior Scholarship Program at the National Children’s Hospital

Aim: Assemble pediatric residency classes that are racially and ethnically representative of the Washington, D.C., community

Length: Short-term

Direct Financial Support: Travel and housing stipends

Escalante, E., Smiley, Y., Agrawal, D., Teach, S.J., Cora-Bramble, D., & Barber, A. (2022). Increasing Pediatric Residency Class Diversity to Improve Patient Outcomes and Address Structural Racism. *Academic Medicine*, 97(6), 850–854.

This article describes the National Children’s Hospital’s Minority Senior Scholarship Program (MSSP). It is a month-long pathway program for fourth-year medical students who are racially or ethnically underrepresented in medicine (UIM). Funded by the hospital’s operational budget, MSSP aims to assemble pediatric residency classes that are racially and ethnically representative of the Washington, D.C., community. To this end, National Children’s Hospital also implements enhanced recruitment efforts and a quarterly Diversity Dinner event series. MSSP provides students with clinical experiences, networking, mentorship by peer UIM students, didactics, and professional development sessions. The program also provides students with a stipend for travel and housing. The authors surveyed students regarding program feedback and residency placement outcomes. In the six years serving 73 students, 19 of them matched with the National Children’s Hospital pediatric residency program. According to pre- and post-program survey results, the proportion of students interested in a career in academic pediatrics increased considerably. Additionally, the number of UIM interns at National Children’s Hospital increased from two in 2014 to 21 in 2021. They represented 5% and 51% of the intern cohorts, respectively. The authors attribute the increase in UIM interns primarily to the enhanced recruitment efforts.

Program Name: Summer Undergraduate Mentorship Program at the Albert Einstein College of Medicine

Aim: Prepare students who are racially or ethnically underrepresented in medicine or economically and/or educationally disadvantaged for matriculation into medical school

Length: Short-term

Direct Financial Support: Transportation assistance and stipends

Hunter, C. S., Adames, T. R., Franco, S., Hosgood, D., & Correa, N. (2019). Analysis of the Curriculum of a Summer Pipeline Program for Economically Disadvantaged Premedical Students in the Bronx, NY. *Journal of Best Practices in Health Professions Diversity: Research, Education, and Policy*, 12(1), 1–23.

This article describes the Summer Undergraduate Mentorship Program (SUMP) at the Albert Einstein College of Medicine. The authors use the Association of American Medical Colleges’ (AAMC) Competencies for Entering Medical Students to perform a gap analysis. The six-week summer pathway program is primarily funded by the HRSA Health Career Opportunities Program. SUMP’s goal is to prepare students who are racially or ethnically underrepresented in medicine (URM) or economically and/or educationally disadvantaged for matriculation into medical school. Furthermore, it aims to prepare URM students to address the health disparities seen in the school’s local community, the Bronx, NY. The program provides local transportation assistance and stipends. Its instructional services include lectures, workshops, a systematic literature review, clinical shadowing, and additional evening workshops for students’ families. The results of the authors’ gap analysis, using AAMC Competencies as the gold standard, showed five – out of a potential fifteen – partial curriculum gaps. Furthermore, matriculation outcomes were assessed indicating that 60% of students had matriculated into medical school, or were on track to do so. Many other students were pursuing alternative health professions.

Program Name: Summer Public Health Scholars Program at Columbia University Irving Medical Center

Aim: Equip underrepresented undergraduate students with the knowledge, interest, and skills to pursue public health degrees and related professions

Length: Short-term

Direct Financial Support: Not mentioned

Joyner, D., Faris, E., Hernández, D., Moon Howard, J., Fullilove, R. E., Cohn, El. G., Odlum, M., Mitchell, D., & Hutcherson, H. (2021). A Pipeline to Increase Public Health Diversity: Describing the Academic Enrichment Components of the Summer Public Health Scholars Program. *Pedagogy in Health Promotion, 7*(Suppl 1), S44–S50.

This article describes Columbia University Irving Medical Center’s Summer Public Health Scholars Program (SPHSP). SPHSP is a 10-week summer internship that equips underrepresented undergraduate students with the knowledge, interest, and skills to pursue public health degrees and related professions. The program is funded by the CDC and sponsored by its Office of Minority Health and Health Equity. Eligible students are undergraduates from underrepresented or low-income populations as defined by the CDC. Demographic information is self-reported during the application process. The authors frame the program’s services within an instructional model informed by cognitive apprenticeship and situated learning theories. The program’s primary services are coursework, public health seminars, internship mentorship, professional development, writing workshops, GRE preparation, small-group work, and case studies. The authors report statistics on students’ job and educational placement. At 18 months post-program, the majority of former SPHSP students in the two cohorts surveyed were either working in public health-related jobs or pursuing an MPH degree.

Program Name: Premedical Rural Enrichment Program at California Health Sciences University

Aim: Increase the matriculation of students from the Central Valley of California into medical school

Length: Short-term

Direct Financial Support: Not mentioned

Kadavakollu, S., Lund, K.S., Swamy, V., Kim, W.D., Llenado, R.A., Nunes, T.F., Qureshi, M., Graneto, J.W., & Boyanovsky, B.B. (2022). Promoting cultural competency and osteopathic medicine awareness among pre-medical students through a summer premedical rural enrichment program. *Journal of Osteopathic Medicine, 122*(11), 553–561.

This article describes the Premedical Rural Enrichment Program (PREP) at California Health Sciences University (CHSU) College of Osteopathic Medicine. It is an eight-week summer pathway program funded by the CHSU Office of the President. PREP aims to recruit pre-medical students from the Central Valley of California and increase their awareness of osteopathic medicine, matriculation into medical programs, and intention to practice in rural or medically underserved areas (MUA). The program provides students with MCAT preparation, didactic training on osteopathic curriculum and manipulations, medical school application workshops, mock interviews, and cultural competency sessions. The authors distributed and collected data from a pre- and post-program student survey. The results show a significant increase in students’ confidence in their MCAT performance and a non-statistically significant increase in their interest in practicing medicine in a rural area or MUA. Additionally, all students who self-reported matriculation outcomes had matriculated into some type of medical training, most commonly osteopathic medicine.

Program Name: Bronx Health Opportunities Partnership Virtual Summer Program at Albert Einstein College of Medicine

Aim: Support students who are underrepresented in medicine pursue biomedical careers

Length: Short-term

Direct Financial Support: Not mentioned

Stephenson-Hunter, C., Franco, S., Martinez, A., & Strelnick, A.H. (2021). Virtual Summer Undergraduate Mentorship Program for Students Underrepresented in Medicine Yields Significant Increases in Self-Efficacy Measurements During COVID-19 Pandemic: A Mixed Methods Evaluation. *Health Equity, 5*(1), 697–706.

This article describes and analyzes the Bronx Health Opportunities Partnership at Einstein (HOPE) Virtual Summer Program. The program modality was adapted from in-person to virtual in 2020 due to the COVID pandemic. The study aims to measure the effects of the six-week virtual pilot program. Bronx HOPE is administered by the Albert Einstein College of Medicine and its university hospital, Montefiore Medical Center. It supports students who are underrepresented in medicine (URiM) – defined here as Black and Hispanic/Latinx students – pursuing biomedical careers. The program’s funding source was not expressly stated, but the authors’ funders include the Human Resources and Services Administration and National Institutes of Health. Bronx HOPE offered its students mentorship, professional skill development, knowledge on applying to graduate biomedical programs, and exposure to scientific topics. The authors used a mixed methods approach to measure short-term outcomes and understand COVID-related challenges. Analysis of pre- and post-program survey results show significant increases in career self-efficacy, as well as increased interest in becoming a physician, rising from 82.9% to 93.3%. Thematic analysis of students’ open-ended data generated two themes regarding COVID’s impact: loss of supportive environment and uncertain futures. Furthermore, students reported that Bronx HOPE Virtual Summer Program provided them with a supportive community and inspired or reinforced their biomedical career interests.

Program Name: Health Disparities Clinical Summer Research Fellowship Program at University of Connecticut

Aim: Increase the matriculation of traditionally underrepresented and underserved students into health professions

Length: Short-term

Direct Financial Support: Not mentioned

Stewart, K.A., Brown, S.L., Wrensford, G., & Hurley, M.M. (2020). Creating a Comprehensive Approach to Exposing Underrepresented Pre-health Professions Students to Clinical Medicine and Health Research. *Journal of the National Medical Association, 112*(1), 36–43.

This article describes the University of Connecticut’s (UConn) Health Disparities Clinical Summer Research Fellowship Program (HDCSRFP). It is a seven-week summer program established to increase the matriculation of traditionally underrepresented and underserved students into health professions. HDCSRFP is funded through UConn Health, The Aetna Foundation, the Connecticut Health Foundation, and Newman’s Own Foundation. It offers opportunities to conduct a research project, shadow a healthcare provider, attend lectures on health equity, learn clinical skills through simulation training, and prepare for medical and dental school admissions. Of the 79 former HDCSRFP participants who had completed their undergraduate studies, 92% are either engaged in a career or pursuing further studies in the health professions. 46% of these graduates were accepted or have matriculated into medical school.

Program Name: Chicago Cancer Health Equity Collaborative Research Fellows Program

Aim: Support underrepresented students pursuing careers in cancer research or medical professions

Length: Short-term

Direct Financial Support: Paid

Taylor, S., Iacobelli, F., Luedke, T., Matthews, P.A., Monge, M., Cooper, J., Moreira, J., Grippo, P., Girotti, J., Molina, Y., Yanez, B., & Simon, M.A. (2019). Improving Health Care Career Pipeline Programs for Underrepresented Students: Program Design that Makes a Difference. *Progress in Community Health Partnerships: Research, Education, and Action*, 13(5), 113–122.

This article describes the Chicago Cancer Health Equity Collaborative (ChicagoCHEC) Research Fellows Program. It is an eight-week summer research fellowship which aims to support underrepresented students pursuing careers in cancer research or medical professions. The program is funded by the National Cancer Institute's Comprehensive Partnership to Advance Cancer Health Equity program and administered by three institutions: University of Illinois at Chicago, Northeastern Illinois University, and Northwestern University. The authors define underrepresented as those who are racially minoritized and first-generation students. Chicago area undergraduate students of universities or community colleges, as well as those who have recently graduated, are eligible to apply. ChicagoCHEC provides mentorship, group reflection, transdisciplinary lecturing, community immersion, professional development, and a journal club. Additionally, the students are paid, yet the authors do not describe this in detail. The article reports a few survey results, including intrapersonal and pathway retention data. Of the 31 participants surveyed, 30 of them reported satisfaction with the program. Regarding students' intent to pursue work related to health disparities, there were only negligible differences between pre- and post-program survey results. About one third of the students transitioned to the next step in research or medical education.

ONE-YEAR PROGRAMS

Program Name: Drexel Pathway to Medical School at Drexel University

Aim: Support the advancement of underrepresented students in medicine

Length: One year

Direct Financial Support: Not mentioned

Cestone, C., Russo, D., Berardi-Demo, L., Weber, V., White, M., Shumsky, J., Baird, D., Walker, L., & Núñez, A. (2018). Broadening Diversity in Medicine: Outcomes of the Drexel Pathway to Medical School Postbaccalaureate Medical Science Program. *Journal of Best Practices in Health Professions Diversity: Research, Education, and Policy*, 11(1), 1–12.

This article presents a five-year retrospective study of the academic performance of medical students at Drexel University College of Medicine (DUCOM) who completed the Drexel Pathway to Medical School (DPMS) prior to matriculation. DPMS is a 12-month master's degree program for students underrepresented in medicine pursuing the medical profession. The program assures acceptance into DUCOM, contingent on academic performance. DPMS provides academic science courses, MCAT preparation, academic support sessions, and life coaching for professional development. The primary analysis retrospectively compares the academic performance of two cohorts at DUCOM: one of DPMS students and the other of randomly selected non-DPMS students. The authors find that, although DPMS students entered medical school with comparatively

lower GPAs and MCAT scores, they academically performed on par with their non-DPMS peers. The authors note some attrition of former DPMS students from medical school. 10-15% of the DPMS students admitted to DUCOM leave by the time of STEP 1 licensing exams. The significance of the issue is unclear as the authors do not report the attrition rate of non-DPMS students.

Program Name: Master of Science in Medical Sciences at Western University of Health Sciences

Aim: Increase enrollment rates of diverse students, particularly at the university's College of Osteopathic Medicine

Length: One year

Direct Financial Support: Not mentioned

Goode, C. & Talbot, C. (2016). A Special Master's Program as a Pipeline to Increase Diversity at an Osteopathic Medical College. *Journal of Best Practices in Health Professions Diversity: Research, Education, and Policy*, 9(2), 1198–1216.

This article describes the Master of Science in Medical Sciences (MSMS) program at Western University of Health Sciences in Pomona, CA. The 11-month program serves as a stepping stone between undergraduate education and health professional schools for students who are not yet competitive for matriculation. It aims to increase enrollment rates of diverse students, particularly at the university's College of Osteopathic Medicine (COMP). The authors define diverse students as those who are from underrepresented ethnic groups, rural communities, and of low socioeconomic status. The program has modified its eligibility criteria. It previously permitted students to self-identify as "disadvantaged", while it now uses proxies for socioeconomic status (e.g., having a primary address in a medically underserved area). MSMS primarily focuses on academic preparedness, yet program services are not discussed in depth. For each of the six years evaluated, 90-100% of MSMS graduates matriculated into health professions programs. MSMS graduates made up between 6% and 44% of COMP's URM matriculants each year. Ultimately, the proportion of URM students matriculating into COMP increased from 4% in 2009 to 7% in 2015. Additionally, the authors used a linear regression model to assess if MSMS graduates' COMP academic performance was associated with their GPAs or MCAT scores. MSMS graduates' class rank in COMP was moderately correlated with students' MSMS GPA. No significant relationship was found between COMP class rank and students' MCAT scores, though.

Program Name: 1) Successfully Training and Educating Pre-medical Students and 2) Summer Health Internship Program at Northeast Kentucky Area Health Education Center

Aim: Increase the number of rural physicians in northeastern Kentucky

Length: 1) one year; 2) short-term

Direct Financial Support: 1) subsidized MCAT course; 2) paid internship

Gross, D.A., Mattox, L.C., & Winkleman, N. (2016). Priming the Physician Pipeline: A Regional AHEC's Use of in-state Medical School Data to Guide Its Health Careers Programming. *Journal of Health Care for the Poor and Underserved*, 27, 8–18.

This article describes two parallel pathway programs administered by the Northeast Kentucky Area Health Education Center (NE KY AHEC) – Successfully Training and Educating Pre-medical Students (STEPS) and the Summer Health Internship Program (SHIP). They are funded by the Bureau of Health Workforce's AHEC program grants. Both programs share the aim of increasing the number of rural physicians in northeastern

Kentucky (NE KY) by supporting pre-medical students from the region. During the Spring semester of students' junior year, STEPS provides a MCAT course and practice exam, physician shadowing, an application process tutorial, mock interviews, and 12 group meetings. SHIP is a six-week paid internship at local health organizations, intending to bolster students' medical school applications and provide health organizations with a source for recruitment. The authors report promising program data. Of the 16 students who completed STEPS, 14 have been accepted or matriculated into medical school. All STEPS' participants who took practice MCATs received higher scores on their actual MCAT. In 2015, students' scored an average of 7.6 points greater on the actual MCAT than they did on their practice attempt. Lastly, the average annual number of in-state medical school matriculants from NE KY increased from 18.5 in the years preceding SHIP and STEPS to 22.5 per year in the programs' first two years. The authors do not discuss other possible correlates nor do they present statistical analysis for any of the results due to small sample sizes.

Program Name: Pathways for Students into Health Professions at the University of California, Los Angeles

Aim: Support the training of undergraduate students from underrepresented minority groups pursuing MCH careers

Length: One year

Direct Financial Support: Not mentioned

Guerrero, A.D., Holmes, F.J., Inkelas, M., Perez, V.H., Verdugo, B., & Kuo, A.A. (2015). Evaluation of the pathways for students into health professions: the training of under-represented minority students to pursue maternal and child health professions. *Maternal and Child Health Journal*, 19(2), 265–270.

This article describes the University of California, Los Angeles' Pathways for Students into Health Professions (PSHP) program. PSHP is funded by HRSA's MCH Bureau. It aims to support the training of undergraduate students from underrepresented minority groups pursuing MCH careers. The authors do not further define the student demographic criteria. The one-year program provides a four-unit course, summer field practicum, volunteer experience, academic advising, and personal counseling by a faculty mentor. The authors conducted pre- and post-program surveys related to students' knowledge of and interest in MCH careers. From the three cohorts studied, 32 students completed both surveys. The authors report statistically significant increases in most knowledge-related measures. Furthermore, they found a significant increase in students' interest in MCH careers and a non-significant increase in their interest in contributing to MCH programs.

LONGITUDINAL PROGRAMS

Program Name: Maternal and Child Health Pipeline Training Program at University of South Florida

Aim: Guide underrepresented minority undergraduate students towards MCH-related health professions

Length: Longitudinal

Direct Financial Support: Stipends for completion of summer institute and tuition waivers

Armstrong, A.T., Noble, C.A., Azeredo, J., Daley, E., Wilson, R.E., & Vamos, C. (2022). An Overview of an Undergraduate Diversity MCH Pipeline Training Program: USF's Train-A-Bull. *Maternal and Child Health Journal*, 26(Suppl 1), S26–S36.

The article describes the University of South Florida's maternal and child health (MCH) pipeline training program (PTP). It is a two-year program funded by a HRSA grant that aims to guide underrepresented minority

(URM) undergraduate students towards MCH-related health professions. The authors define URM students as those from racially or ethnically diverse backgrounds or who are economically or educationally disadvantaged. PTP provides students with seminars, summer institutes, public health courses, mentorship, internship, and professional networking opportunities. Stipends are awarded when students complete the summer institute. Tuition waivers are granted to cover PTP's required coursework. The authors collected pre- and post-program survey data and tracked the transitions of three cohorts after program completion. The survey results demonstrate significant increases in student knowledge of MCH practice and research topics. Most of the 35 students – over 90% – transitioned into either MCH-related graduate programs or entered a MCH-related profession directly after their undergraduate education.

Program Name: Health Sciences Learning, Engagement, Achievement, and Progress at University of Utah

Aim: Increase racial and ethnic diversity in the health professions by enrolling and supporting students who are underrepresented in medicine

Length: Longitudinal

Direct Financial Support: Paid mentorship and research positions

Bliss, C., Wood, N., Martineau, M., Hawes, K.B., López, A.M., & Rodríguez, J.E. (2020). Exceeding Expectations: Students Underrepresented in Medicine at University of Utah Health. *Family Medicine*, 52(8), 570-575.

This article describes the Health Sciences Learning, Engagement, Achievement, and Progress (HS-LEAP) Program at the University of Utah. HS-LEAP is a four-year undergraduate pathway program funded through a partnership between University of Utah Health and the LEAP program in the university's Undergraduate Studies. HS-LEAP aims to increase racial and ethnic diversity in the health professions by enrolling and supporting students who are underrepresented in medicine (URM). The authors define URM as those from American Indian/Alaska Native, Black, Latinx, Pacific Islander, Southeast or Refugee Asians, lower socioeconomic, and rural backgrounds. HS-LEAP provides opportunities and support which varies year to year. They include coursework, peer mentorship, shadowing, lectures, research jobs, community engagement, and professional development. Mentorship positions – available to second-year students – and research jobs are financially compensated. The authors compare the outcomes of HS-LEAP students with their non-HS LEAP peers by ACT levels. HS-LEAP students achieve higher GPAs in the first semester, higher fall-to-fall retention rates, and higher 6-year graduation rates compared to their non-program peers. Yet, although the program is associated with higher fall-to-fall retention at the University, only 38% of participants are retained through the entirety of HS-LEAP. The authors suggest that most students who leave the program do so because they are no longer interested in the health professions.

Program Name: Scholars in Rural Health at the University of Kansas School of Medicine

Aim: Increase the number of students who choose to practice primary care in rural Kansas

Length: Longitudinal

Direct Financial Support: Not mentioned

Kallail, K.J. & McCurdy, S. (2010). Scholars in Rural Health: outcomes from an assured admissions program. *Family Medicine*, 42(10), 729–31.

This article describes the Scholars in Rural Health program at the University of Kansas (KU) School of Medicine,

a pathway program for prospective medical students from rural areas. The program aims to increase the number of students who choose to practice primary care in rural Kansas. The two-year premedical program provides students who previously had significant experience living in a rural Kansas community with mentorship from a rural primary care physician, physician shadowing, case reports, and education on population health. Students who complete the program along with their undergraduate studies have assured acceptance into KU School of Medicine. The authors performed a retrospective review of program data to evaluate program success. The results show that 85% of former participants completed the program and matriculated into KU School of Medicine. When compared to school-wide proportions, former scholars matched with primary care and family medicine residencies at much higher rates. Furthermore, the authors report that 16 of the 18 former scholars who have completed residency now practice in rural or underserved urban areas.

Program Name: Pathways for Students into Health Professions at University of California, Los Angeles

Aim: Support underrepresented minority undergraduate students pursue health careers

Length: Longitudinal

Direct Financial Support: Stipend for summer practicum

Kuo, A.A., Verdugo, B., Holmes, F.J., Henry, K.A., Vo, J.H., Perez, V.H., Inkelas, M., & Guerrero, A.D. (2015). Creating an MCH Pipeline for Disadvantaged Undergraduate Students. *Maternal and Child Health Journal, 19*, 2111–2118.

This article describes University of California, Los Angeles' Pathways for Students into Health Professions (PSHP). To note, Guerrero et al. (2015) describes the program, as well. PSHP is a four-year pathway program which supports underrepresented minority undergraduate students pursuing health careers. It is funded by the Maternal and Child Health (MCH) Bureau. The target population are freshmen with borderline, but not yet competitive GPAs. Furthermore, due to state-based limitations on admission procedures, the authors describe how recruitment of economically or educationally disadvantaged students facilitates racially and ethnically diverse cohorts. PSHP provides students a four-unit course, summer field practicum at a MCH community-based organization, volunteer experience, academic advising, and personal counseling by a faculty mentor. For the summer field practicum, students receive a monetary stipend equivalent to that of a work-study job. The authors longitudinally surveyed students to collect and analyze career outcome data. Of the students who have graduated, 87% are either employed in healthcare, attending graduate school, or applying to graduate school in a healthcare-related field. Of the former students who were employed, nearly all are working in public health, healthcare, or research.

Program Name: Health Affairs Pipeline Initiative at University of North Carolina

Aim: Increase the number of underrepresented minority students who are successful in health careers

Length: N/A

Direct Financial Support: Some of the funds are used as direct support

Mitchell, B.E. (2014). Health Affairs Pipeline Initiative (HAPI). *Journal of Best Practices in Health Professions Diversity, 7*(1), 1001–1005.

This article describes the Health Affairs Pipeline Initiative (HAPI), a program which distributes financial support

amongst University of North Carolina's (UNC) pathway programs. The initiative aims to increase the number of underrepresented minority students who are successful in health careers. It is funded through an Area Health Education Centers' grant. HAPI's initial budget was \$40,000. The initiative distributes its budget to UNC health science departments as requested. Funding is utilized in diverse ways, including information sessions on career options and admissions processes, paid research positions, community service opportunities, recruitment fairs, financial assistance for textbooks, and GRE preparation. The article does not present any outcome data.

Program Name: Urban Health Program at the University of Illinois Chicago

Aim: Recruit, retain, and graduate minority students interested in health care careers

Length: N/A

Direct Financial Support: Not mentioned

Toney, M. (2012). The long, winding road: one university's quest for minority health care professionals and services. *Academic Medicine*, 87(11), 1556–1561.

This article describes the University of Illinois Chicago's Urban Health Program (UHP), a long-standing pathway program aiming to increase the number of underrepresented minority (URM) healthcare professionals. The author defines URM as African Americans, Latinos, and Native Americans. UHP is funded by the Illinois state legislature through yearly appropriations. The funding is distributed to participating health colleges based on their need and size. The author, UHP's former director, offers a descriptive narrative of the program's history, policy context, demographic statistics, and mechanisms for community accountability. Furthermore, he describes what the program provides, including the UHP Health Professions Resource Center, financial aid workshops, health profession seminars, health disparities coursework, summer research opportunities, board exam preparation, learning and living residence, and advising. The author also advocates for the preconditions needed to sustain UHP and to create similar programs elsewhere. These conditions include community action for a legislative mandate to increase the number of minority health professionals, early pipeline initiatives designed to increase interest in health-related careers, and more commitment from the highest institutional levels of health profession colleges.

Program Name: Health Equity Scholars Program at the University of Massachusetts

Aim: Support underrepresented minority students in completing health and science undergraduate degrees within six years

Length: Longitudinal

Direct Financial Support: Stipend for summer research positions

Upshur, C.C., Wrighting, D.M., Bacigalupe, G., Becker, J., Hayman, L., Lewis, B., Mignon, S., Rokop, M.E., Sweet, E., Torres, M.I., Watanabe, P., & Woods, C. (2018). The Health Equity Scholars Program: Innovation in the Leaky Pipeline. *Journal of Racial and Ethnic Health Disparities*, 5(2), 342–350.

This article describes the Health Equity Scholars Program (HESP), a health professions pathway program administered by both University of Massachusetts Medical School and University of Massachusetts Boston. The program and its office of administration are funded by the National Institute for Minority Health and Health Disparities. The program's objective was to support underrepresented minority (URM) students in completing health and science undergraduate degrees within six years. The authors define URM students

primarily as those who are Black/African American, Hispanic/Latino, and Native American. The program lowered the threshold for its GPA requirement to recruit both academically successful and promising, but not yet competitive students. HESP provides students with extracurricular seminars, mentoring, an elective course, and summer research opportunities which are paid in the form of a stipend. Comparison between pre- and post-program GPA data shows a marginally significant increase in mean GPA. Furthermore, 80% of those able to graduate at the time of the study have done so which is significantly higher than UMB's graduation rate of 42%. Lastly, of the 16 program participants followed-up with post-graduation, 15 of them are working in healthcare or research.

DENTAL PROGRAMS

Program Name: 1) Summer Medical Dental Education Programs and 2) Post Baccalaureate Programs

Aim: 1) Support the entry of students who are racially or ethnically underrepresented in medicine or dentistry into medical or dental school; 2) Improve the academic competitiveness of students who are underrepresented in dentistry for matriculation into dental school.

Length: 1) short-term; 2) one year

Direct Financial Support: 2) stipend and housing assistance

Alexander, C.J. & Mitchell, D.A. (2010). The role of enrichment programs in strengthening the academic Pipeline to dental education. *Journal of Dental Education*, 74(Suppl 10), S110–S120.

This review was published in a Journal of Dental Education supplement along with Brunson et al. (2010) and multiple other articles about dental pathway programs. The authors provide an overview and examples of Summer Medical Dental Education Programs (SMDEP) and Postbaccalaureate Programs (PBP). The SMDEP is a summer enrichment program funded by the Robert Wood Johnson Foundation. It serves students who are racially or ethnically underrepresented in medicine and dentistry or who come from economically or educationally disadvantaged backgrounds. The goal of the program is to support student entry into medical or dental school. These summer programs provide students with science academic enrichment, medical and dental career development, learning skills orientation, clinical experiences, and financial planning orientation. The PBPs are 12-month programs aimed at improving students' academic competitiveness for matriculation into dental schools. These programs provide academic coursework, DAT preparation, learning skill workshops, seminars, application support, and clerkships. Furthermore, most PBPs provide participants with stipends and summer housing. The authors discuss how the cost of a given PBP is greatly dependent on the amount of financial support it provides its participants. This review presents descriptive data from promising programs. For example, 80% of program students matriculated into health training programs at University of North Carolina at Chapel Hill's summer enrichment program, and 86% of students matriculated into dental schools through Baylor's postbaccalaureate program.

Program Name: Pipeline, Profession, Practice: Community Based Dental Education at Loma Linda School of Dentistry

Aim: Increase underrepresented minority and low-income students in dentistry and improve access to dental care through community-based training

Length: Multi-faceted program with various lengths of programming

Direct Financial Support: Partial scholarships through endowment funds

Arnett, M.R. & Forde, R. (2012). Increasing student diversity and cultural competence as part of Loma Linda University School of Dentistry's service mission. *Journal of Dental Education*, 76(6), 721–727.

This article describes the pathway program at Loma Linda University School of Dentistry (LLUSD). The school participated in the Pipeline, Profession, Practice: Community Based Dental Education program. Funding for the nation-wide program, which included LLUSD and numerous other schools, came from the Robert Wood Johnson Foundation, W.K. Kellogg Foundation, and The California Endowment. LLUSD aimed to 1) increase underrepresented minority (URM) and low-income students in dentistry and 2) improve access to dental care through community-based training. The program included an admissions whole-file review process, postbaccalaureate program, summer enrichment programs, courses on cultural competency, and community-based clinical rotations providing pro bono care. The postbaccalaureate program provided workshops, lectures, anatomy course, DAT tutoring and prep course, and counseling on dental school application. During the years LLUSD participated as a pathway program, it experienced modest effects on its proportion of enrolled URM students. URM student enrollment at LLUSD increased from three students in 2002-2003 to seven students in 2009-2010. URM student enrollment peaked at 11 students in the 2004-2005 and 2007-2008 academic years. The authors discuss how the school's endowed scholarships only partially cover tuition. Subsequently, multiple students who were accepted into LLUSD ultimately chose other schools for financial reasons.

Program Name: Pipeline, Professional, and Practice: Community-Based Dental Education

Aim: Increase matriculation of underrepresented minority and low-income students into dental schools

Length: Multi-faceted program with various lengths of programming

Direct Financial Support: Stipends, scholarships, loans vary between programs

Brunson, W.D., Jackson, D.L., Sinkford, J.C., & Valachovic, R.W. (2010). Components of effective outreach and recruitment programs for underrepresented minority and low-income dental students. *Journal of Dental Education*, 74(Suppl 10), S74-S86.

This article was published in a *Journal of Dental Education* supplement along with Alexander & Mitchell (2010) and multiple other reviews of the Pipeline, Professional, and Practice: Community-Based Dental Education program. Funding for the program came from Robert Wood Johnson Foundation, W.K. Kellogg Foundation, and the California Endowment. The program lasted 2001-2010 and involved 15 participating dental schools which all aimed to increase matriculation of underrepresented minority (URM) and low-income (LI) students into the participating dental schools. The authors review the schools' program features, recruitment strategies, and outcomes. They determine that mentorship, shadowing, summer enrichment programming, summer research, post baccalaureate education, and pre-matriculation assistance were the most common supports. Additionally, the article discusses the growing financial burden of dental school. At the time of publication, tuition had progressively increased and low-cost government loans did not cover dental education. The authors noted the importance of program stipends, scholarships, and loans for URM and LI student matriculation, like those provided by the Access to Dental Careers grant. The number of URM and LI first-year students in the participating dental schools rose from 184 students in 2003 to 286 students in 2007. They represented 16% and 20% of first-year enrolled students, respectively. 11 of the 15 schools showed increased URM and LI student enrollment when comparing data from these years. The authors also describe recruitment best practices, including University administration support, the combination of diversity-focused administrative units with student affairs, short- and long-term outreach programs, and financial assistance.

Program Name: Admissions Enhancement Program at the University of Missouri Kansas City School of Dentistry

Aim: Increase the enrollment of underrepresented minority students in dental school

Length: Short-term

Direct Financial Support: Not mentioned

Greenway, R.A., Scott, J.M., Loveless, E.C., Bigham, R.R., & Simmer-Beck, M.L. (2021). Evaluation of a pipeline program at strengthening applications, increasing diversity, and increasing access to care. *Journal of Dental Education, 85*, 642–651.

This article describes the Admissions Enhancement Program (AEP) at the University of Missouri Kansas City School of Dentistry (UMKC SOD). AEP is a 10-week summer enrichment program funded by the Missouri Legislature’s “Caring for Missourians” grant. The program aims to increase dental school enrollment of underrepresented minority students. URM students are defined as American Indian and Alaska Native, Black or African American, Hispanic or Latino, and Native Hawaiian and Other Pacific Islander students, as well as those who are economically or academically disadvantaged. Through both online and residential learning, the program provides students with an eight-week dental admissions test (DAT) prep course, two-week campus-based activities, academic and professional development support, personal statement preparation, and mock interviews. The authors state the purpose of their study was to evaluate short, intermediate, and long-term outcomes through a descriptive, retrospective design. They performed statistical analyses of secondary outcome data, finding a significant increase in students’ post- vs. pre-program DAT scores and a 55% matriculation rate into dental school. 71% of program participants applied to UMKC. The authors identify that application costs could have presented a barrier for the others and suggest that schools consider subsidizing or waiving application fees. The article also reports on the career settings chosen by graduates; for example, 24% of program students who graduated dental school work in public health dentistry.

Program Name: 1) Pipeline, Profession, Practice: Community-Based Dental Education and 2) the Summer Medical Dental Education Program

Aim: Increase the enrollment of historically underrepresented minority students in dental school

Length: 1) Multi-faceted program with various lengths of programming; 2) short-term

Direct Financial Support: Scholarships, stipends, room and board, and travel allowances

Hewlett, E.R., Lobo-Marwah, E., & Hishaw, L.B. (2022). Dental school pathway programs: Best practices for increasing workforce diversity. *Journal of Dental Education, 86*, 1098–1106.

This literature review uses narrative analysis to determine pathway program best practices in increasing the enrollment of historically underrepresented minority (HURM) students in dental school. The authors define HURM students as those who are African American/Black, Hispanic/Latino, and Native American. The authors review findings from publications focused on two primary dental pathway programs: the Pipeline, Profession, Practice: Community-Based Dental Education (PPPCBDE) and the Summer Medical Dental Education Program (SMDEP). The former was a national program of 15 dental schools funded by the Robert Wood Johnson Foundation (RWJF), the W.K. Kellogg Foundation, and the California Endowment. The program’s best practices are found to be summer enrichment and/or postbaccalaureate programs, interprofessional training, quality advising, formal student mentoring in collaboration with minority dental organizations, and admissions’ use of whole file reviews. SMDEP is a six-week summer enrichment program, funded by RWJF. The authors determine

its best practices to be site leadership by medical or dental personnel and the reduction of clinical shadowing. The article mentions financial barriers associated with dental school and ways to mitigate them, including scholarships, stipends, and expansion of financial assistance programs. The authors note the need for further analyses to elucidate evidence-based best practices.

Program Name: Dental Prospects Club at University of Nevada, Las Vegas

Aim: Increase the number of underrepresented minority and disadvantaged students in the university's dental school

Length: Membership duration varies

Direct Financial Support: Not mentioned

McClain, M.A., Jones, F.R., McClain, C.R., & Curd, F.M. (2013). Increasing dental student diversity through the UNLV Dental Prospects Program. *Journal of Dental Education*, 77(5), 548–553.

This article describes the University of Nevada, Las Vegas School of Dental Medicine's (UNLV SDM) Dental Prospects Club. It is a pre-dental pathway program aiming to increase the number of underrepresented minority (URM) and disadvantaged students in the UNLV SDM. There are no formal prerequisites for student participation, but the club was initiated by racial and ethnic minority students from low- and middle-income households. Furthermore, the authors report that most participating students come from disadvantaged backgrounds. They do not describe the program's funding other than that students are required to pay a nominal membership fee. The program provides monthly meetings, didactic instruction, mentorship from dental students, peer shadowing, and weekend preclinical dental coursework. Although outcome data was not reported, the authors state that the program aims to improve students' GPAs and DATs, increase matriculation rates of URM students into dental schools, and improve students' ability to complete admissions processes.

CONCLUSION

Arizona is facing healthcare workforce shortages exacerbated by the maldistribution and insufficient socio-economic, racial, ethnic, cultural, and linguistic diversity amongst its health professionals. For decades, health professions pathway programs have supported underrepresented students in their admission into and matriculation through health profession programs. This review summarizes 26 peer-reviewed articles on pathway programs. Common program practices presented in the literature can be placed in two categories: instructional and financial. Instructional student support refers to the educational and training opportunities a program provides students. It includes academic enrichment (e.g., science course, lecture series, or seminar), mentorship and shadowing (e.g., peer, faculty, or clinician), clinical or practical skill development (e.g., clinical rotation or workshop), and school admissions preparations (e.g., MCAT course, tutoring, application preparation, or mock interviews). Financial support refers to the material support programs provide students to overcome financial barriers faced while pursuing health professions education. The most common financial supports are stipends and scholarships to cover academic, housing, and travel costs. Beyond these common practices, several notable program features and strategies could also be used to inform Arizona's health professions pathway programs.

Bliss et al. (2020) describes a longitudinal program which provides one of the most comprehensive sets of support services represented in this review. The program provides diverse forms of instructional support, like coursework, mentorship, and professional development, which progressively builds on itself over multiple years. Its financial support opportunities are structured into its operations, including a paid mentorship and research positions. Other articles discuss notable recruitment strategies. Taylor et al. (2019) describes a summer program co-administered by three regional universities which recruit both university and community college students. Kallial and McCurdy (2010) describe one which only accepts students with significant

experience living in rural communities. Most notably, these programs align their recruitment strategies with their program goals. Other articles discuss ways to reduce barriers of entry to pathway programs. Upshur et al. (2018) offers a compelling strategy, admitting students with promising, but not yet competitive academic achievement rather than only those with high GPAs. Kuo et al. (2015) discusses how students at the borderline of academic competitiveness may benefit most from pathway programs. Furthermore, Cestone et al. (2018) and Kallail and McCurdy (2010) describe pathway programs that assure medical school admission after successful program completion. Although less common, these highly promising practices demonstrate how each pathway program can uniquely serve its student population.

Both common and unique program practices identified in this report can be used to inform the practices of Arizona's health professions pathway programs. We hope that administrators can use this review as a resource when establishing or improving their programs. To address its workforce shortages, Arizona will need to support its health professions training pathways. Namely, the state should enhance the training of students underrepresented in the workforce and those likely to practice in underserved communities. Given their ongoing role in healthcare workforce training, health professions pathway programs continue to serve as a promising strategy in mitigating Arizona's health workforce shortages.



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