

CONNECTING PIPELINES TO PATHWAYS FOR HEALTH EQUITY

The High School Alliance: A Pathways Program for the Biomedical Sciences

UNIVERSITY OF NEBRASKA MEDICAL CENTER

KEY POINTS

The UNMC High School Alliance is an academic enrichment program that immerses highly motivated, secondary students from varying educational and socioeconomic backgrounds into an environment which introduces them to a variety of health professions leading to a more diverse Nebraska workforce.

- ✓ Engaging and challenging courses taught by academic health center faculty provided to junior and senior high school students.
- ✓ Partnership with key stakeholders, including all Omaha, Nebraska metropolitan area public school districts and one Iowa school district.
- ✓ Certified high school teachers assist professional school faculty and act as liaisons to school districts and students' parents/guardians.
- ✓ A diverse student population provided with a broad outlook of biomedical professions including allied health fields, nursing, public health, pharmacy, medicine, and research.
- ✓ Excellent success rates during the 10 years of the program; 97 percent of ~500 Alliance graduates have attended college, 70 percent have pursued courses in health-related programs, and ~50 percent are in health-related professions.
- ✓ Online learning modules ([uBEATS](#)) developed to expand reach across the state and beyond. Almost 9,000 students across the country have enrolled in these courses since launch in August 2020.

ISSUES AND CHALLENGES

Addressing health professional shortages and increasing the diversity of the workforce by increasing interest in health careers, particularly for disadvantaged students

The University of Nebraska Medical Center (UNMC) is committed to addressing health professional shortages and increasing the diversity of the

workforce. The Alliance is a health sciences enrichment program targeting high school juniors and seniors that aims to increase interest in health careers, particularly for disadvantaged students.

THE UNIVERSITY OF NEBRASKA MEDICAL CENTER APPROACH

UNMC built on a successful program that fostered rural healthcare practitioners to develop an Omaha area program for high school students. UNMC first reviewed the feasibility of establishing such a program at inception by (1) determining community and industry need, and (2) assessing statewide workforce shortages.

UNMC's High School Alliance is unique and innovative in several ways. The five main concepts, described below, provide the foundation for the Alliance to serve as a national model.

1. Collaborative school district participation:

School administrators in the Omaha metropolitan area were immediately enthused about the Alliance. In fact, before the program had been fully developed, nine school districts and an educational service unit signed on to participate in the Alliance's inaugural year. Students in the inaugural class came from 17 different metro area high schools. Success in year one led to Omaha's second largest school district (third largest district in Nebraska) to participate. Currently, the total number of participating districts is 15, and the number of high schools is 28.

2. UNMC faculty as teachers: The opportunity to learn about medicine, science, and research from UNMC faculty and experts in their chosen fields appeals significantly to both high school students and school district administrators. UNMC faculty have provided a welcoming, open-door environment for participants and can often explain difficult concepts in nontraditional ways by inviting the students into a lab or clinic. These faculty are supported by three high school teachers from Omaha Public School Districts who also serve as liaisons with the students' home schools and the home schools of students from other school districts.

3. Location: Holding classes from 1:00-3:00 each afternoon at an academic health center provides ample opportunity to become

immersed in healthcare and research and gives the Alliance students a vision of what their careers may entail. Being on campus gives students the opportunity to physically see and touch what they might otherwise read in a textbook. From touring emergency and surgical areas, to shadowing health professionals, to conducting research alongside nationally recognized researchers, the Alliance students have access to a number of resources that are not found in a traditional high school setting. Additionally, working and studying among healthcare professionals profoundly improves their understanding of professionalism, sensitivity, and confidentiality.

4. Hands-on approach: Offering courses on UNMC's campus provides a variety of hands-on opportunities for Alliance students. With cutting-edge technology and machinery at their fingertips, course instructors are encouraged to integrate hands-on activities into their courses. Activities such as suturing, intubating, and performing Western blots help students better understand science and medicine.

5. Near-peer mentors: Many High School Alliance students are first-generation high school students, and a large number will be first-generation college students; thus, they need a role model and advisor as they transition to post-secondary education. The High School Alliance includes a near-peer mentor, a UNMC professional or graduate student volunteer, who serves as a role model to provide academic and career advice. Mentors and students communicate weekly and meet in person at least once per month. The UNMC High School Alliance sponsors official mentor-mentee events to help facilitate the relationship. UNMC students currently serving as mentors include students from the Colleges of Medicine, Nursing, Pharmacy, Public Health, Graduate Studies, and the School of Allied Health.

Assessing the Need and Support for a New Program

Some three decades ago the University of Nebraska Medical Center (UNMC) recognized the need for rural healthcare practitioners. Thus a “Build Our Own” Rural Health Opportunities Program (RHOP) was born. RHOP students were pre-admitted to medical, dental, or physician assistant school if they lived in rural parts of the state and attended a university in the State College system. Building upon the success of that program and with the need to reach younger students across demographics, a little more than ten years ago UNMC ushered in a novel program for Omaha area high school students, the UNMC High School Alliance.

A career interest assessment from the Nebraska Department of Education’s Career Education department revealed that for students in Nebraska, health sciences ranked as the most desired career path. Similarly, reports from the college-entrance exam testing company ACT® indicate that healthcare is one of the top five growing career fields in Nebraska, although workforce demands will outpace the supply of healthcare workers. The ACT® report also stressed the importance of academic preparation, noting that of Nebraska students expressing interest in high-growth career fields, including healthcare, less than one-half are ready for college-level math or science courses.

Omaha’s Learning Community, a governing body charged with addressing social and academic barriers to student achievement, surveyed families in the 11 school districts that comprise the Learning Community to measure interest in and need for focus school programs.



Key findings at the time included:

- When presented with possible focus school career specialties, parents of middle and high school students were most interested in sending their children to science and health focus schools. In fact, science, technology, engineering, and math (STEM) and health-science schools ranked in the top three of all possible focus school specialties.
- Nine in ten respondents indicated that the opportunity to earn college credit would make them more likely to consider a focus school.

UNMC High School Alliance Courses

The program provides opportunities for students to learn key professional skills, such as effective communication and presentations, appropriate dress code, punctuality, study habits, teamwork, and leadership. Specific topical course areas and hands-on work include:

Biomedical Research

UNMC graduate studies students guide High School Alliance students through an exploration of The Central Dogma. Students learn to use lab equipment and how to conduct experiments utilizing the latest technology. Students investigate current biomedical research through hands-on experience and training. Students gain an appreciation for the biological processes that occur at the molecular level and develop an understanding of how bench lab research leads to the interventions of healthcare providers.

Exploration of Human Anatomy

Going beyond the textbook and classroom, Alliance students gain the experience of working with UNMC faculty and students in the Gross Anatomy Lab. Students in this course learn the inter-workings of the human body through distinctive classroom lessons and hands-on activities in the anatomy lab. In this course, students gain an appreciation for the complexity of the human body.

Human Genetics - Medical and Societal Implications

The Genetics course explores the connections between understanding the science and the actions people take with that information. The course also brings ideas of ethics to the use of genetics. Open discussions give students the opportunity to think

about how information could and should be used. Concepts covered include the nature of genetic material, patterns of inheritance, gene expression and regulation, genetic variation, evolution, and genetics within society. Students undertake laboratory-based and interactive exercises, including molecular biology techniques, and examine the ethics surrounding genetic testing and policies for the future.

Infectious Disease - Microbes: The Good, The Bad, The Ugly

This introductory course focuses on the study of human infectious disease and the clinical laboratory's role in diagnosis and treatment. Emphasis is placed on the correlation of clinical laboratory data with the diagnosis and treatment of bacterial, fungal, parasitic, and viral infections. Instructional methods include lecture, class discussions, learner-centered projects, real-life case studies, and a hands-on laboratory component.

The Study of Patient Care

This course engages students in the basic understanding of patient care. Instructional methods include: class discussions, learner-centered projects, case studies, lectures, and work in the simulation lab using high-tech human patient simulation Manikins. Students meet healthcare practitioners working in the fields of trauma, neonatal intensive care, community/home healthcare, nursing education, and research, among others.

Pathology - Connecting Cells to the Clinic: Fundamentals of Disease

Through a combination of lectures, discussions, projects, and hands-on activities, students explore the mechanisms that underlie many common diseases and conditions. Using examples from the media and real life as a framework, students are exposed to concepts such as inflammation and healing, cancer, immunology, and system-based pathology. Students gain an appreciation for how changes that occur at the microscopic level lead to physical symptoms and develop an understanding of how the interventions of healthcare providers alter disease processes.



Introduction to Pharmacy

The focus of this course is on the many different aspects that surround the wide range of expertise needed within the pharmacy profession. Students are given instruction on Pharmacognosy (history of medicines), drug discovery and formulation, pathophysiology and therapeutics to specific diseases, and personalized medicine. Students have the opportunity to learn from, and shadow, pharmacists in varying career fields, explore pharmacy through hands-on activities, and investigate real-world scenarios involving medications and point-of-care testing.

Community Health Outside the Individual: Investigating the Public's Health

Clean drinking water. Sewage and waste disposal. Restaurant inspections. Data on the high rates of STDs. Impacts on infant mortality rates. These issues and many more describe the daily work of public health professionals. This class explores public health from all angles and through core areas of epidemiology, environmental health, health promotion, biostatistics, health policy, and maternal and child health. The course offers information, board games, field trips, reflections, and listening together. The end goal is to better understand community health issues, the need for social justice, and routes for improving health through education, prevention, environmental factors, policy, and justice.

Intro to Behavioral Health: Concepts and Careers from Family Therapy to Forensic Psychiatry

From skyrocketing deaths from prescription painkillers to the devastating aftermath of school shootings, behavioral health providers are at the frontlines of a battle for the emotional health of our country. This course equips students with core concepts in behavioral health including the criteria for common mental health diagnoses, cutting edge treatments, and the public health impact of untreated disorders. It offers a practical guide to exploring mental health careers. The faculty includes practicing psychiatrists, psychologists, social workers, alcohol and drug abuse counselors, psychiatric nurses, etc. The course has a strong active learning emphasis and includes a mix of interactive seminar discussions, interviews with live or simulated patients, shadowing experiences/field trips, and a media project about stigma and mental health.

The Biology and Prevention of Cancer

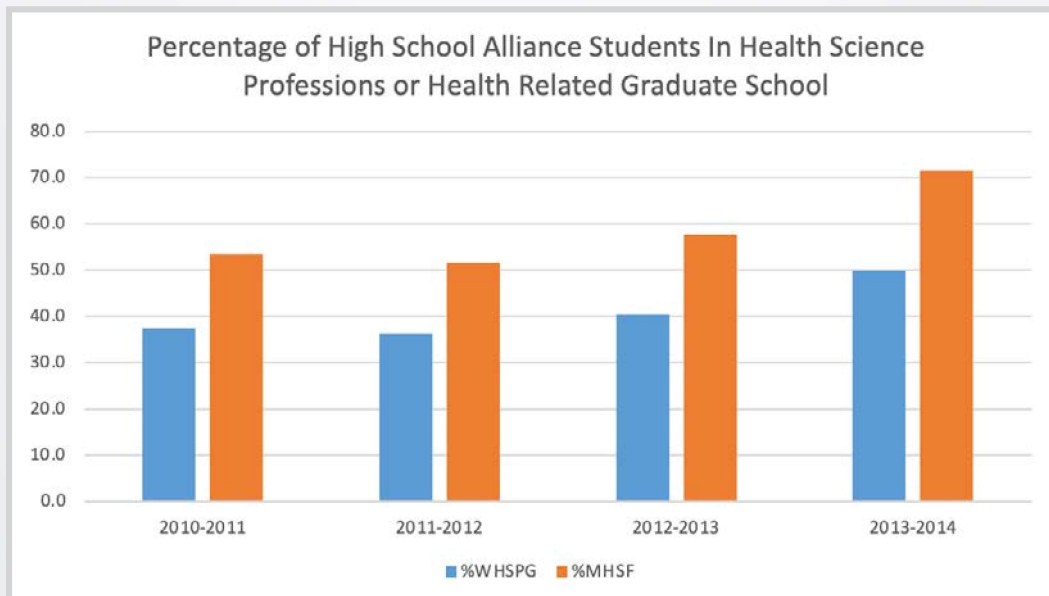
The Biology and Prevention of Cancer course introduces students to the molecular- and cellular-level of cancer through a combination of discussions, exploration, and hands-on activities. Students form teams to develop and implement cancer prevention campaigns focused on the communities in which they interact.

Medical Imaging

This course allows an in-depth investigation into pathology that may be encountered by the healthcare professional in clinical practice. The relationship of clinical symptoms, lab values, and imaging findings are covered for each disease process. The course covers three broad topics: the abdomen, the pelvis, and miscellaneous. Students taking this course also experience the Anatomage table, the virtual environment radiotherapy training system, and ultrasound technology as part of the curriculum.

Art and Science of Decision Making

Utilizing skills acquired through an array of disciplines such as literature, art, ethics, and observation, students in this course gain a greater appreciation for the many elements a healthcare provider must consider throughout the medical-decision making process. Students explore the mathematics behind various therapy options, historical context through art and literature, and the unique ethical dilemmas healthcare providers face throughout the medical decision-making process by observing actual, direct patient/caregiver interactions.



Y axis denotes percentages; the X axis denotes the matriculating year of the high school cohort.
 %WHSPG = % of Original Class Cohort Working in Healthcare/Science Profession or Grad School
 %MHSF = % Of Cohort Who Majored in Health Science Field During College Now Working in Health Science Field

RESULTS/OUTCOMES

- 500 students have completed the program. Among those who matriculated into the program, there was a 95 percent program completion rate, and 97 percent college attendance rate among graduates.
- About 70 percent of the students have majored in a health science field in college.
- Since the inception of the program, there has been an increasing number of participants ending up in health careers professions, including 50 percent of the 2014 matriculating cohort who completed the Alliance year, and 70 percent of those who majored in a health science field in college (see chart on page 5). These data compare to national data that suggest only 16 percent of college graduates are in STEM (Bottia et al).
- Of interest, among students who completed the Alliance and chose not to pursue a health-related profession, the vast majority (85 percent) indicated they would do it again, as they learned other professional or transferable skills that would be of value in any career.

FOR MORE INFORMATION AND RELATED MATERIALS ABOUT THE UNMC HIGH SCHOOL ALLIANCE

- <https://www.unmc.edu/diversity/programs/pipeline.html>
- Bottia et al. *Boosting the numbers of STEM majors? The role of high schools with a STEM program.* *Science Education* 2017, DOI: 10.1002/sce.21318.

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