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## Academic Medicine

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### Lessons From the First Decade of the Native American Summer Research Internship at the University of Utah

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## **Abstract**

### **Problem**

American Indian/Alaska Native (AI/AN) populations are facing multiple health crises, including limited access to care, high rates of chronic disease, and early mortality that is far worse than other underrepresented minorities in the U.S. According to the Association of American Indian Physicians, AI/AN people represent 2.0% of the U.S. population but only 0.2% of medical students and 0.1% of full-time faculty at MD-granting institutions. Increasing the number of AI/AN clinicians and scientists is one strategy to improve health outcomes in the AI/AN population and address these crises.

### **Approach**

In 2010, the University of Utah partnered with research, cultural, and professional mentors to create a 10-week summer Native American Research Internship (NARI) program for AI/AN college students across the U.S. who are interested in pursuing biomedical careers. NARI attracts and supports AI/AN students by offering mentored summer research internships in an innovative, culturally-aware framework that adapts to observed challenges to optimize educational experiences and support biomedical career aspirations.

### **Outcomes**

During the first decade of the NARI program, 128 students from 22 U.S. states, representing 46 tribal nations and 57 colleges and universities, have participated. Of those 128 students, 113 (88%) have completed a bachelor's degree and the remaining 15 (12%) are currently working towards a bachelor's degree. No NARI student has dropped out of college. Twenty-six (20%) NARI alumni have matriculated to medical school and 30 (23%) to graduate school. Eight (6%)

participants have completed medical school and 3 (2%) participants are pursuing a PhD in science. An additional 36 (28%) have gained employment in biomedical research fields.

### **Next Steps**

The NARI program has increased the participation of AI/AN students in medicine and the biomedical sciences. The innovative, culturally-aware, and adaptive framework is a model for other programs for AI/AN students and students in other underrepresented communities.

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## **Problem**

Health disparities persist in the United States for American Indian/Alaska Native (AI/AN) populations and contribute to poor health outcomes and early mortality.<sup>1-3</sup> One quarter of AI/AN deaths occur before age 45, with these communities experiencing higher rates of infant mortality and increased morbidity and mortality from diabetes, infection, cardiovascular disease, chronic liver disease, substance use disorder, and trauma, among others.<sup>1-3</sup>

The Association of American Indian Physicians (AAIP) and the Association of American Medical Colleges (AAMC) recommend increasing the presence of AI/AN providers in academic health centers to narrow the health disparities that exist for AI/AN communities.<sup>1</sup> This recommendation is challenging because AI/AN high school students have little educational exposure to math and science<sup>4</sup> and may struggle with their initial college science classes, discouraging their pursuit of STEM (science, technology, engineering, and math) careers.<sup>4</sup> AI/AN people represent 2.0% of the U.S. population<sup>5</sup> but only 0.2% of people enrolled in medical school and 0.1% of full-time faculty at MD-granting institutions.<sup>1</sup> Because AI/AN medical school graduates are more likely to work with underserved populations (38% vs 24% of non-AI/AN medical school graduates),<sup>1</sup> practice primary care in rural underserved areas,<sup>1</sup> and support their communities longitudinally when compared to their non-AI/AN peers,<sup>1</sup> the training of additional AI/AN physicians and other health care professionals may provide solutions to AI/AN health disparities.

The University of Utah is home to the Native American Research Internship (NARI) program, where 2.3% of the population identifies as AI/AN.<sup>6</sup> The NARI program was created in an effort to follow the AAIP/AAMC recommendations and to support and prepare AI/AN people for medical and graduate school as a step toward improving health in the AI/AN community. The

NARI program is one of the few for underrepresented minority students in the country that is focused only on AI/AN participants. NARI attracts and supports AI/AN students interested in research and medicine at an institution with few AI/AN researchers by integrating the surrounding AI/AN community into the program. Through AI/AN near-peer mentorship, outreach activities, and community, cultural, and academic mentoring professionals (CCAMPs), NARI participants are well supported during the summer program and the years beyond. This Innovation Report outlines how the NARI program supports AI/AN participants and moves the needle to increase AI/AN representation in the biomedical workforce.

## **Approach**

### **Program design**

The NARI program was created in 2010 using community engagement principles with the guidance of Native elders, university faculty, and undergraduate students. The result is a National Institutes of Health (NIH)-funded, 10-week paid summer research internship that respects and supports Native culture while providing hands-on basic, translational, or clinical research opportunities to participants.<sup>7</sup> NARI recruits junior and senior college students nationally who have completed at least one college-level science course with a laboratory component. Interested students submit an application, transcript, and at least one letter of recommendation. A selection committee—which includes research and cultural mentors—reviews and ranks applicants. Students may also competitively apply for a second summer internship experience. Students who are selected for the program participate in mentored research and cultural experiences supported by physicians, scientists, and committed CCAMP leaders drawn from the university and local communities. The NARI program's success is due to the community aspects of the program and its support for AI/AN cultures.

## Curriculum

Table 1 outlines the educational and professional development components of the NARI program. NARI faculty and staff work with students to set expectations and to orient them to effective research mentor-mentee relationships, budgeting, living in a dormitory, interacting with students from diverse backgrounds, work expectations, traveling for scientific meetings, and networking. During orientation, we teach professionalism for scientific and medical settings and introduce the students to their core and elective experiences and requirements. We also teach scientific presentation skills including writing abstracts, applying for travel scholarships, and preparing and delivering PowerPoint and poster presentations.

## Mentorship

**Research mentorship.** Students are assigned to one of over 80 principal investigators (PIs) (41 of whom have served the program for more than 3 years) with mentorship experience and excellent NARI student evaluations. Many NARI mentors are early-stage faculty who participated in general institutional research mentoring programs that included training and education related to inclusion and underrepresented groups in biomedical research.<sup>8</sup> Faculty mentors are not paid, but participation in the program is valued in promotion and tenure decisions. (See Table 2 for examples of NARI mentoring activities, challenges, and solutions.) The NARI program directors select PIs who are engaged in research related to health priorities identified by AI/AN communities, such as cancer, child health, diabetes, heart disease, and lung disease. Students select from research experiences in laboratory, clinical, or community settings. NARI participants discuss their top 5 research selections with staff prior to matriculation to assure strong and sustainable research pairings.

Given the paucity of AI/AN scientists and clinicians, most students are not matched with an AI/AN research mentor. NARI mentors include women and people from other underrepresented groups who possess a cultural curiosity to learn from the NARI students, a commitment to increasing inclusion in biomedical research, and the ability to provide a supportive research environment during the summer. Our research mentors are engaged with the students; they frequently write letters of support and stay in contact with trainees for years after they complete the program.

**Cultural mentorship and climate.** Although our institution has robust summer research internships, we had no AI/AN students participate in these mainstream programs prior to the creation of NARI. During the planning of the NARI program, the Native elders identified 2 impediments to AI/AN participation: (1) lack of an AI/AN community and (2) cultural barriers. Therefore, the cultural aspects of the NARI program are prioritized to create a climate of belonging and respect for the students. With engagement from AI/AN faculty, staff members at the university, and community members, we created a nurturing environment to help our students grow scientifically, culturally, and professionally. Each NARI participant is paired with a CCAMP who is available to help them integrate their AI/AN cultural identity inside and outside of the research environment. CCAMPs engage NARI participants in organizing community outreach events with AI/AN youth and serve as important translators for students as they immerse themselves in the new environments of academic medicine and biomedical research. Topics of focus in the program range from professional expectations in an academic health center to community-wide discussions on how to navigate an interest in research when it conflicts with cultural beliefs, such as the opposition of some AI/AN populations to using animals in research. CCAMPs meet individually with their mentees at least 3 times over the

summer to help problem solve and, like the research PIs, many remain in contact with their mentees for years after they complete the program.

Since 2011, we have prioritized hiring AI/AN program coordinators to administer the NARI program. Three coordinators have been NARI alumni, which strengthens student support by providing another near-peer mentor who is able to assist in navigating relationships with mentors, other participants, and family members. The coordinators have used this position as an opportunity to gain additional experience prior to entering medical school, graduate school, or seeking other employment. The NARI alumni program coordinators contribute to the success of the recruitment and tracking of students because they are trusted individuals who can serve as liaisons to tribes, tribal colleges, and AI/AN programs at institutions outside of the University of Utah or the state. Their advocacy and support have led to the program receiving 3 applicants for every position and have allowed us to track the academic and career outcomes of all NARI alumni.

To foster a sense of community amongst our students and mentors, we host meetings every Friday which include lunch, research and professional development presentations, and “talking circle” discussions. Talking circles, a traditional practice for many AI/AN people, are led by cultural mentors. Participants sit in a circle and communication is fostered by the passing of a stick (an object with symbolic meaning). Only the person who holds the stick may speak. Program staff and CCAMPs attend and support students by listening as they reflect on their experiences with health disparities and their academic, career, and personal development. Students feel safe enough to share their experiences and personal and professional challenges in this supportive venue. The presence of scientific, cultural, and peer mentors at these circles has

been associated with significant gains in student confidence in many domains by creating a community with layers of research, career, and cultural mentorship.

### **Recruitment**

AI/AN students are recruited through established infrastructures, locally and nationally, through offices of student affairs and offices of diversity in U.S. colleges and universities and at national conferences with targeted presentations and opportunities for one-on-one conversations with staff members and students. We also recruit students using email announcements, customized flyers, brochures, website advertisements, and social media (our Facebook group is called NARI/UOFU). Finally, NARI students and alumni who share their experiences at their own institutions are the best recruiters as they inspire the next generation of AI/AN youth to pursue college and biomedical careers.

### **Funding**

The NARI program began with institutional support from the University of Utah Department of Pediatrics and today partners with the institutional MD/PhD program and Office of Diversity and Equity. The NARI program has been supported by awards from 4 institutes within the NIH aimed at increasing AI/AN inclusion in the biomedical workforce: National Heart, Lung, and Blood Institute, National Institute on Minority Health and Health Disparities, National Institute of Diabetes and Digestive and Kidney Diseases, and Eunice Kennedy Shriver National Institute of Child Health and Human Development. Maintaining grant funding and regularly updating our university and community stakeholders on the successes of our alumni are key to the sustainability of the NARI program.

## Outcomes

During the first decade of the NARI program, 128 students from 22 U.S. states—representing 46 tribal nations and 57 colleges and universities—have participated and 53 (41%) returned for a second summer. No one has dropped out of the program. In total, 102 (80%) participants had 137 abstracts accepted to a national conference and 74 (58%) participants were awarded 91 travel scholarships.

In response to Likert surveys of NARI participants done at the beginning and end of the 2019 program, participants reported increased self-efficacy in research skills ( $P = .03$ ) and interpreting and disseminating study findings through oral ( $P = .026$ ) and written ( $P = .007$ ) presentations. Participants reported increased knowledge of health disparities within AI/AN populations ( $P = .001$ ) and completed individual career development plans ( $P = .002$ ).

Of 128 students, 113 (88%) have completed a bachelor's degree and the remaining 15 (12%) are currently enrolled as college students working towards a bachelor's degree. No NARI student has dropped out of college. Twenty-six (20%) NARI alumni matriculated to medical school and 30 (23%) to graduate school. Eight (6%) participants have completed medical school and are enrolled in a residency program in family medicine, surgery, or emergency medicine. Three (2%) participants are pursuing a science PhD. An additional 36 (28%) NARI alumni have gained employment in a biomedical research field. While we cannot know if these students would have been successful without the NARI program, the success of our students compares favorably to historical success rates of non-NARI AI/AN students completing college in STEM fields.<sup>1,4</sup> The collection of NARI students' academic and career outcomes for this report was deemed exempted by the University of Utah institutional review board (00120810).

## Next Steps

The NARI program, built with the engagement of AI/AN community members, faculty, and students at the University of Utah, demonstrates that AI/AN students who are supported by the community are capable of thriving in biomedical fields. Individuals have helped identify what to improve within our program, but our ultimate decisions on how to advance NARI have been based on a strong foundation of community, belonging, and AI/AN culture. Over the past decade, community input has shaped decisions, such as how we balance students' academic and cultural achievements during selection, support cultural identity, and empower our NARI participants to continue with their career aspirations. We hope to expand the NARI community support and track the long-term outcomes of this program with regards to improving AI/AN representation in medical schools and the overall health of AI/AN people. The short-term impact of the program has been personal for each student. The program has helped 56 students enter advanced professional and scientific training and 36 students have undertaken biomedical work. A 2011 participant noted:

More than enlarging an AMCAS [American Medical College Application Service] application, more than money, even more important than the networking this program has provided, is the great job it has done in fostering and strengthening our self-identity as future physicians. The fires ignited here can bring light to our tribes for generations.

The NARI program has been a model for the University of Utah in creating additional programs for underrepresented minorities. It also acts as a framework for other institutions to increase the representation of AI/AN students and other underrepresented minorities in the biomedical fields, which ultimately helps eliminate health disparities.

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Table 1

## Educational and Professional Components of the University of Utah Native American Research Internship (NARI) Program

Components	Details
<b>Available for all participants</b>	
Educational curriculum and training elements	<ul style="list-style-type: none"> <li>• Responsible conduct of research</li> <li>• Faculty presentations of disease-specific topics</li> <li>• Oral research preparation and presentation</li> <li>• AI/AN health presentations</li> <li>• Abstract preparation/submission</li> <li>• Travel scholarship submissions</li> <li>• Conference and faculty poster presentations</li> <li>• Individual development plans and self-reflection</li> <li>• Writing personal statements</li> </ul>
Research mentorship	<ul style="list-style-type: none"> <li>• Students are mentored in lab and/or clinical settings by PIs and lab/research staff including postdoctoral fellows, graduate students, and research assistants (30+ hours/week of research, 2-4 hours/week of research mentorship)</li> </ul>
Cultural mentorship	<ul style="list-style-type: none"> <li>• Students are paired with a cultural mentor and meet for at least 3 hour-long sessions during the summer program</li> </ul>
Physician mentorship	<ul style="list-style-type: none"> <li>• Students shadow PIs, physicians, or other health professionals in a variety of fields</li> </ul>
One national conference (depending on grant)	<ul style="list-style-type: none"> <li>• SACNAS, AAIP, AAP, PAS, NHRC, ADA, National Conference on AI/AN Injury and Violence Prevention</li> </ul>
Friday “talking circles”	<ul style="list-style-type: none"> <li>• PowerPoint presentations of student research</li> <li>• Peer and self evaluation of presentations</li> <li>• Cultural mentors discuss AI/AN health disparities</li> <li>• Networking with research and cultural mentors</li> <li>• Peer and near-peer mentorship and support</li> </ul>
Community outreach	<ul style="list-style-type: none"> <li>• Mentor AI/AN youth at the Urban Indian Center of Salt Lake and Earth Connections Camp</li> </ul>
Post program support	<ul style="list-style-type: none"> <li>• Letters of recommendation</li> <li>• Academic advising by research/cultural mentors</li> <li>• Facebook page/networking support</li> <li>• Conference travel support</li> <li>• Peer and near-peer mentorship</li> <li>• Scholarship and professional opportunities</li> <li>• Interviewing support</li> </ul>
<b>Supplementary elective experiences</b>	
Optional courses	<ul style="list-style-type: none"> <li>• MCAT/GRE preparatory courses<sup>a</sup></li> <li>• Research Administration Training Series Course</li> </ul>
Community outreach	<ul style="list-style-type: none"> <li>• Educational health activities for children at the Confederated Tribes of the Goshute Nation</li> <li>• Shadowing at Chinle Health Center, Chinle, Arizona</li> </ul>

Abbreviations: AI/AN, American Indian/Alaska Native; PI, principal investigator; SACNAS, Society for Advancing Chicanos and Native Americans in Science; AAIP, Association of American Indian Physicians; AAP, American Academy of Pediatrics; PAS, Pediatric Academic Society; NHRC, Native Research Network Annual Native Health Research Conference; ADA, American Diabetes Association Scientific Sessions; MCAT, Medical College Admission Test; GRE, Graduate Record Examinations; NARI-NIMHD, Native American Research Internship-National Institute on Minority Health and Health Disparities.

<sup>a</sup>NARI-NIMHD and NARI participants selected to the University of Utah School of Medicine MCAT prep course program.

Table 2

**The University of Utah Native American Research Internship (NARI) Program: Mentoring Activities, Challenges, and Solutions**

Activity	Challenges	Solutions
NARI program	Overall evaluation of program and mentorship	360° evaluations of program, mentors, and students
Research mentorship	Mentorship training	University of Utah faculty summer mentorship training
	Research mentorship expectations not met: <ul style="list-style-type: none"> <li>• 3 separate 1-on-1 meetings with research mentor</li> <li>• Develop a research training plan with mentee</li> <li>• Review IDP of educational/career goals</li> <li>• Create abstracts, oral presentations, and posters</li> <li>• Attend weekly lab/research meetings</li> </ul>	Research Expectation Contract reviewed with researcher
	Cultural mentorship training needed for researcher	<ul style="list-style-type: none"> <li>• URM mentorship training offered by University of Utah</li> <li>• Support from AI/AN program coordinators and CCAMPs</li> </ul>
Researcher/NARI participant pairing	Pairing of research interests not met	NARI participants rank research opportunities
	Researcher/NARI participant pairing not compatible	Phone interviews with every NARI participant prior to being paired
	NARI participant has difficulty conducting research with animals	Screen and pair with researcher who does not work with animals
	Recognizing and troubleshooting research pairing difficulties that arise after the internship has started	<ul style="list-style-type: none"> <li>• Lab visits for all participants</li> <li>• NARI PPI and PC meet with researcher/student</li> <li>• Student is reassigned if needed</li> </ul>
NARI participant expectations	NARI participant not meeting NARI program or researcher's expectations	Mentor/Mentee Agreement and NARI Program/Mentee Agreement reviewed
	NARI program expectations: <ul style="list-style-type: none"> <li>• 30-35 hrs/week of research</li> <li>• 5-10 hrs/week professional development</li> <li>• 3 1-on-1 meetings with research mentor</li> <li>• 3 1-on-1 meetings with CCAMP mentor</li> <li>• Create IDP</li> <li>• Abstract writing/submission</li> <li>• Oral presentation of research</li> <li>• Poster presentation</li> <li>• Attend a conference</li> </ul>	NARI Expectation Contract reviewed <ul style="list-style-type: none"> <li>• 8-hour orientation</li> <li>• Weekly announcements</li> <li>• Weekly meetings</li> <li>• Mentor/Mentee Agreement</li> <li>• Template provided and reviewed</li> <li>• Examples provided of abstract</li> <li>• Lecture and examples of oral presentation</li> <li>• Lecture and examples of poster presentation</li> <li>• Lecture on how to attend a conference</li> </ul>

NARI participant support	NARI participants not feeling welcome	<p>Welcome reception attended by:</p> <ul style="list-style-type: none"> <li>• University administrators/leaders</li> <li>• Research mentors</li> <li>• Near-peer mentors</li> <li>• CCAMPs</li> </ul>
	Principal research mentor too busy to provide daily mentorship	<ul style="list-style-type: none"> <li>• Research group near-peer/peer mentorship identified</li> <li>• Routine lab visits for all participants</li> </ul>
	AI/AN cultural mentor too busy to provide significant mentorship	<p>NARI peer mentorship:</p> <ul style="list-style-type: none"> <li>• Contact NARI participant with lead cultural mentor</li> <li>• House NARI participants together</li> <li>• Second-year NARI participants support first-year NARI participants</li> <li>• NARI program meets 2-3 times/week</li> </ul>
	PI researcher/mentor not AI/AN or URM	NARI participant paired and mentored by a CCAMP
Student research training	Limited AI/AN or URM mentors at University of Utah	<ul style="list-style-type: none"> <li>• Establish a NARI research project with AI/AN researchers from the surrounding community</li> <li>• Select CCAMPs from the surrounding community</li> </ul>
	Limited basic laboratory skills Limited patient exposure experience	<p>Basic laboratory training during orientation</p> <ul style="list-style-type: none"> <li>• Professionalism in the hospital training</li> <li>• Clinical skills session during orientation</li> </ul>
CCAMP mentorship	Limited clinical research knowledge Limited research experience or knowledge	<p>Basic clinical research methods lecture</p> <ul style="list-style-type: none"> <li>• Attend other student research presentations</li> <li>• Weekly research lectures taught by faculty</li> </ul>
	CCAMP and NARI participant not connecting	<p>CCAMP social meetings to establish connections:</p> <ul style="list-style-type: none"> <li>• Welcome reception dinner</li> <li>• Weekly Friday talking circles</li> <li>• Closing ceremony</li> </ul>
	CCAMP mentorship expectations of 3 1-on-1 meetings with CCAMP mentor not met	<p>CCAMP Expectation Contract reviewed with mentor:</p> <ul style="list-style-type: none"> <li>• Head CCAMP organizes other CCAMPs</li> <li>• Head CCAMP should support participants who need it</li> <li>• CCAMP arranges social meetings</li> </ul>
Talking circles led by head CCAMP and attended by PI and PC	Other social gatherings needed for participant	Hikes, dinners, socials with CCAMPs are offered
	Difficulties bringing the group together <ul style="list-style-type: none"> <li>• Not sharing experiences</li> </ul>	<p>Share perspectives in a talking circle (pass option)</p> <ul style="list-style-type: none"> <li>• Listen/reflect on others' perspectives without talking</li> <li>• Provide program, near-peer, and peer support</li> </ul>

	<p>AI/AN backgrounds and experiences vary</p> <ul style="list-style-type: none"> <li>• Imposture syndrome</li> <li>• Unaware of AI/AN health disparities</li> <li>• Tribal similarities/differences</li> <li>• Rural vs urban AI/AN</li> </ul>	<p>Provide various topics of discussion for talking circles</p> <ul style="list-style-type: none"> <li>• Share insecurities and ways to gather strength</li> <li>• Discuss health disparities in participants' communities</li> <li>• Share differences/similarities</li> <li>• Share differences/similarities</li> </ul>
	<p>Emotional or traumatic difficulties arise</p>	<p>Provide counseling resources</p>
Other cultural support	<p>Spiritual support needed for NARI participant</p>	<p>Spiritual activities attended by PC and CCAMP for added support</p> <ul style="list-style-type: none"> <li>• Welcoming/Farewell spiritual blessing</li> <li>• Welcome dinner at "Native Voices" area of museum</li> <li>• AI/AN music at talking circle</li> <li>• Smudging with PC and others</li> <li>• Sweat lodge available</li> <li>• American Indian Resource Center campus socials</li> <li>• Campus and community pow-wows</li> </ul>
	<p>AI/AN Tribal networking experiences lacking</p>	<ul style="list-style-type: none"> <li>• 2 half-day science activities for AI/AN youth are offered: <ul style="list-style-type: none"> <li>○ AI/AN youth camp at UICSL</li> <li>○ Earth Connections camp</li> </ul> </li> <li>• Native American Tribal Governors Tribal Summit</li> <li>• CCAMPs assist with NARI participant selection and evaluation</li> <li>• Outreach health events at nearby reservations</li> </ul>
Personal issues	<ul style="list-style-type: none"> <li>• Issues arise with family, other students, etc.</li> <li>• More serious personal issues arise</li> <li>• NARI participant is home sick or socially isolated</li> </ul>	<ul style="list-style-type: none"> <li>• NARI PPIs and PCs assist with support</li> <li>• Counseling resources are offered</li> <li>• CCAMP assistance and socials are offered</li> <li>• Social calendar of summer community opportunities is provided</li> </ul>

Abbreviations: IDP, individual development plan; URM, underrepresented minority; AI/AN, American Indian/Alaska Native; CCAMP, community, cultural, and academic mentoring professional; PPI, program principal investigator; PC, program coordinator; UICSL, Urban Indian Center of Salt Lake.