An Innovative Program in the Science of Health Care Delivery

Workforce Diversity in the Business of Health

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According to the most recent statistics from the National Center for Education Statistics, disparities in enrollment in undergraduate and graduate education are significant and not improving commensurate with the national population. Similarly, only 12% of graduating medical students and 13% of graduating physician assistant students are from underrepresented racial and ethnic groups. Established in 2012 to promote health care transformation at the organization and system levels, the School for the Science of Health Care Delivery is aligned with the university and college missions to create innovative, interdisciplinary curricula that meet the needs of our diverse patient and community populations. Three-year enrollment trends in the program exceed most national benchmarks, particularly among students who identify as Hispanic and American Indian/Alaska Native. The Science of Health Care Delivery program provides students a seamless learning experience that prepares them to be solutions-oriented leaders proficient in change management, innovation, and data-driven decision making. Defined as the study and design of systems, processes, leadership and management used to optimize health care delivery and health for all, the Science of Health Care Delivery will prepare the next generation of creative, diverse, pioneering leaders in health care.

BY 2050, an estimated 50% of the U.S. population will be racially and ethnically diverse. Despite underrepresented minorities constituting 30% of the U.S. population, students in underrepresented racial and ethnic groups earn approximately 6% of the doctoral degrees in science and engineering. These rates are similar for students in medicine; only 12% of graduating medical students and 13% of graduating physician assistant students are from underrepresented racial and ethnic groups.

The proportion of biomedical sciences faculty in underrepresented racial and ethnic groups is even lower. According to the most recent statistics from the National Center for Education Statistics (NCES), disparities in enrollment in undergraduate and postgraduate education are significant and not improving commensurate with the national population (Table 1, Figure 1).

The College of Health Solutions (CHS) at Arizona State University (ASU) is the ideal incubator (as indicated by its recent ranking by US News and World Report as being the most innovative university in the country) for launching innovative programs to enhance student success in health and health care, and is committed to developing the workforce representative of the population. Currently, 41% of the student population in CHS are from underrepresented ethnic and/or minority group and 43% of students are first-generation college attendees (n=5,265). The college ranks second of all campus colleges in minority new student enrollment, and ASU ranks sixth nationally when compared with peer institutions.

Established in 2012 to promote health care transformation at the organization and system levels, the School for the Science of Health Care Delivery is aligned with the university and college missions to create innovative, interdisciplinary curricula that meet the needs of our diverse patient and community populations. A new type of innovative, master learner is required to improve the design and delivery of our health care systems. The Science of Health Care Delivery graduate program addresses this need by educating and training a diverse graduate student body to understand multiple aspects of the health care system through an innovative curricular framework that merges business and medicine (Figure 2). The Science of Health Care Delivery program provides students a seamless learning experience that prepares them to be solutions-oriented leaders proficient in change management, systems thinking, and data-driven decision making.

Preparing the Health Care Workforce

The delivery of quality patient care is hindered due to multiple factors including the lack of racial and ethnic
diversity in the health professions to represent the local, regional, or national populations, and normative isomorphism caused by the professionalization of the health care professions. A recent commentary highlights the lack of diversity in the health professions: 86% of PAs are white, and 75% of physicians are white and male. In addition, professional silos hinder the ability of medical personnel to develop team-based relationships and deliver the best quality care to the patients. It is incumbent on educational institutions to prepare a representative health workforce with sufficient skills to collaborate, adapt, and succeed in meeting the challenges facing the health care system. Commensurate with the mission of the university, and supported by diverse student cohorts, the School is committed to accessible, high-quality education in health and health care (Table 1, Figure 1). Arizona State University (ASU) faculty in business, law, and public policy work with clinical leaders in health care delivery, health care administration, public health, and health informatics to develop and administer this innovative 30-credit accelerated academic program to train the health workforce of the future. Faculty and students work across disciplines and with community partners in health and health care to drive change in education, research, and policy. These partnerships are critical for student leadership development, and can lead to long-term research, employment or professional development opportunities.

Curricular Framework

The School for the Science of Health Care Delivery seeks to create, teach, and disseminate knowledge to positively and measurably impact the delivery of the patient care experience, population health, and reduction of cost. Students in the graduate program learn from leaders and experts in the field, merging traditional didactic content with applied knowledge and activities. This accelerated curriculum is grounded in the principles of the Triple Aim (improved experience of care, improved health of populations, and reduced costs of health care per capita), and framed around six key conceptual domains: leadership, population health, information science, systems engineering, health care management, and health economics and policy. (Figure 2). All students complete a capstone project in research, quality improvement, or process engineering. Students work with faculty and community mentors at health care sites such as the Mayo Clinic–Arizona, Banner Health, or the Arizona Department of Health Services.

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**TABLE 1. Enrollment in the MS in SHCD by Race and Ethnicity, 2013–2015**

<table>
<thead>
<tr>
<th></th>
<th>White</th>
<th>Black</th>
<th>Hispanic</th>
<th>American Indian/Alaska Native</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment in the SHCD, Fall 2013 (n=35)</td>
<td>49%</td>
<td>9%</td>
<td>17%</td>
<td>3%</td>
</tr>
<tr>
<td>Enrollment in the SHCD, Fall 2014 (n=36)</td>
<td>58%</td>
<td>—</td>
<td>14%</td>
<td>6%</td>
</tr>
<tr>
<td>Enrollment in the SHCD, Fall 2015 (n=31)</td>
<td>52%</td>
<td>16%</td>
<td>6%</td>
<td>—</td>
</tr>
<tr>
<td>Enrollment in the SHCD, 3-yr mean</td>
<td>53%</td>
<td>8%</td>
<td>12%</td>
<td>3%</td>
</tr>
<tr>
<td>Enrollment in graduate institutions (NCES)</td>
<td>64%</td>
<td>12%</td>
<td>6%</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

Data from Office of Institutional Analysis at Arizona State University, 2015, and National Center for Education Statistics (NCES), 2008.

**FIGURE 1.** Three-year mean enrollment in SHCD by race and ethnicity, 2013–2015, compared to mean national enrollment trends. Data from Office of Institutional Analysis at Arizona State University, 2015, and National Center for Education Statistics (NCES), 2008.
Faculty mentors facilitate professional and academic development, while community mentors help students network and apply classroom content to the health care setting. Capstone projects represent the broad array of challenges in the health care system, including staffing patterns and flow analyses for outpatient clinics; outcomes measures for patient-centered medical homes; root causes analyses to reduce inpatient readmissions; team-based care coordination for inpatient management and discharge, etc.

Methods

This observational study evaluated 3 years of admissions data and 1 year of graduate data to assess program outcomes and inform the current graduate-level curricula. Descriptive statistics include means and percent-ages. In order to continually improve outcomes involving team-based learning, curriculum, and student success, the data were used to create or strengthen team-based assignments, faculty mentoring, professional seminars, and capstone projects within this cohort-based graduate program.

Results

In the fall of 2013, the program received 51 applications. The mean GPA of the entering class of 37 students was 3.38. Ninety-seven percent of the fall 2013 cohort successfully completed the program (n=35) (Figure 3). When comparing race and ethnicity of the student cohort with the National Center for Education Statistics (NCES), 49% of the cohort self-identified as white (vs. 64%), 9% self-identified as black (vs. 12%), 17% self-identified as Hispanic (vs. 6%), and 3% self-identified as American Indian/Alaska native (vs. 0.6%) (Table 1, Figure 1). From this inaugural graduating class, 63% are currently employed in the health care industry (n=22). Of the remaining 13 graduates, 5 successfully matriculated to law (n=1), medical (n=2), or dental school (n=2), 2 hold faculty positions, and 4 are employed in the business sector. Two were lost to follow up. Loss of 1 student was attributed to non-academic reasons (Figure 4).

In the fall of 2014, the program expanded to include both on-ground and online programs. Admissions criteria were refined based on program evaluation. The graduate program received 138 applications from prospective students, of which 97 students were admitted, and 74 students enrolled. Applications were evenly distributed between on-ground (n=70) and online programs (n=68) (Figure 3). The mean GPA of enrolled students was 3.91. Attrition of two students in the on-ground program was attributed to academic reasons. In this cohort, 58% percent self-identified as white (vs. 64%), 14% self-identified as Hispanic (vs. 6%) and 6% self-identified as American Indian/Alaska native (vs. 0.6%) (Table 1, Figure 1). Graduate employment data are in progress.
In the fall of 2015, applications declined for both on-ground \((n=58)\) and online \((n=34)\) programs, consistent with the general decline in graduate school applications to the university. Thirty-one students enrolled in the on-ground program (Figure 3). In this cohort, 52\% self-identified as white (vs. 64\%), 16\% self-identified as black (vs. 12\%), and 6\% self-identified as Hispanic (vs. 6\%) (Table 1, Figure 1). The mean GPA was 3.18. Fifteen students enrolled in the online program. The mean GPA was 3.48. To date, 9 students have successfully completed the online program; graduate employment and outcomes data are in progress.

Three-year enrollment trends in the program exceed most national benchmarks established by NCES, particularly among students who identify as white (53\% vs. 64\%), Hispanic (12\% vs. 6\%), and American Indian/Alaska native (3\% vs. 0.6\%) (Table 1, Figure 1).

**Discussion**

A new type of master learner is required to improve the design and delivery of our health care systems. Defined as the study and design of systems, processes, leadership and management used to optimize health care delivery and health for all, the School for the Science of Health Care Delivery was founded to address the current and future needs of the health care system by improving the quality of care for patients, reducing health care costs, and improving the overall health of populations. The Science of Health Care Delivery will prepare the next generation of creative, representative, pioneering leaders in health care and continue to evolve and adapt to address new challenges in the health care system.

**Lessons Learned**

Challenges include demographic and professional variability between online and on-ground students, and multiple admissions cycles for the program. The online student population favors students who are employed full-time in the health care community. The online curriculum lends itself to flexibility and access. Recent online cohorts include respiratory therapists, physicians, hospital administrators, and dietitians. The on-ground student population tends to favor students who recently (within the past 3 years) completed their undergraduate degree and plan to pursue post-graduate education in the health professions, or enter the health care workforce. On-ground students may also use the program as a gap year or post-baccalaureate program in an attempt to increase their competitiveness before applying to professional schools.

Admissions cycles provide further challenges. The on-ground program admits one student cohort each fall semester; in this model, students enter and complete the program together. In the online program, students are admitted six times per academic year and move through the curriculum in varying speeds. Despite these differences, student characteristics are similar in that they want to become change agents in the evolving health care system. Graduates of the on-ground program have been accepted to medical, dental, and physician assistant programs.

**Workforce Diversity**

Within 3 years of its inception, the School continues to grow with excellence. At the end of the academic year, over 100 students from a variety of backgrounds will successfully complete the graduate program, with cutting-edge knowledge, skills and attitudes necessary to lead change in the dynamic health care environment. Three-year enrollment trends in the program exceed most national benchmarks, particularly among students who identify as Hispanic and American Indian/Alaska native. The average persistence to graduation exceeds 95\% with a mean graduate GPA of 3.56.
In order to meet the needs of the entry-level workforce, the School developed and launched an undergraduate program, fall 2014. In the undergraduate program, the majority of students in the matriculating classes of 2014 and 2015 classes self-report as minority (62% and 53%, respectively) which suggests a complementary and representative entry-level workforce.

Growth with Excellence

The School for the Science of Health Care Delivery successfully recruited five new faculty members with plans to expand during the 2015-2016 academic year. The Mayo Medical School–Rochester partnered with ASU to integrate graduate program modules within the medical school curriculum, and the Mayo Medical School–Arizona will model this partnership when their program launches in 2017. An Executive Education division was established with plans to offer professional certificate programs, custom programs, and immersion workshops by fall 2016. These programs and workshops will incorporate delivery science, informatics, and leadership content for health care executives and health care organizations on a local, regional, national, and global scale.

These efforts place the School for the Science of Health Care Delivery at the forefront of developing innovative curricula to provide students from multiple disciplines and diverse backgrounds the opportunity to learn from, with, and about one another in order to improve patient outcomes and decrease costs.

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References