

Preparing medical students for the 'third science'

June 14 2016

Penn State College of Medicine faculty are helping shape the "third science" of medical education by defining what health systems science is and how student perception of it should be addressed in designing curriculum.

Two recent College of Medicine research studies address health systems science, the study of methods and principles for improving quality, outcomes and costs of health care delivery for patients and populations within medical care systems. Health systems science is often called the third science that complements the traditional pillars of basic and clinical science, and has as its primary goal the education of systems-ready physicians.

Penn State was an early adopter of adding health systems science to its program, and has developed a curriculum that is a model for other medical schools. In 2013, the College of Medicine was one of 11 U.S. medical schools to receive a five-year, \$1 million Accelerating Change in Medical Education grant from the American Medical Association (AMA). The grant funded a new component called the Systems Navigation Curriculum in which students learn health systems science while also serving as patient navigators in the health system. This allows them to assist patients in a meaningful way during their education and prepare them to work within all aspects of the nation's evolving health care system.

Although medical schools are beginning to incorporate aspects of health

systems science into coursework, a comprehensive curricular framework does not yet exist, said Jed D. Gonzalo, assistant professor of medicine and public health sciences and associate dean for health systems education.

"Basic and clinical sciences are important, but they're not enough," said Gonzalo. "In the past couple of years there has been an increasing focus in medical schools on the [health care delivery](#) system. This raises the question: What is the learning that all [medical students](#) should know about health systems science to better prepare them for practice?"

To answer this question, Gonzalo led a study with faculty at the 10 other original Accelerating Change in Medical Education grant recipients, as well as with leadership from the medical education arm of the AMA. The group looked at 30 Accelerating Change in Medical Education grant submissions and health systems science curricula at the 11 grant-recipient schools.

Based on this analysis, they identified 12 domains split into three categories that should be included in comprehensive health systems science curricula. The core curricular domains align directly with health systems science. These topics include health care structures and processes; health care policy, economics and management; clinical informatics and health information—the electronic medical record, data protection and use of data in real time; population and public health; value-based care; and health system improvement.

The cross-cutting domains are areas that have been traditionally included in undergraduate [medical education](#) curricula, but were emphasized within the context of health systems science for the study. These include leadership and change agency, which looks at types of leadership and the ability to make change in an organization; teamwork and interprofessional education, which includes how to communicate as a

team and the understanding of the different roles in the system; evidence-based medicine and practice, which includes integrating appropriate guidelines with cost-conscious decision making; professionalism and ethics, which includes understanding what professionalism is and awareness of it in the context of social media and care delivery; and scholarship, which includes opportunities for population-based research and scholarly projects associated with patient safety and care quality.

A linking domain connects core curricular and cross-cutting domains to each other or to other areas of curriculum. Systems thinking involves an awareness of the larger social and economic context in which health systems exist. The researchers published their results online in the journal *Academic Medicine*.

"With this study, we are placing a stake in the ground that says: This is the third science and these are the components that fit into it," Gonzalo said.

In a second study, published online in the journal *Medical Education* in May, Gonzalo and co-authors found that medical students do not yet prioritize health systems science because it's not a key part of board examinations and residency placements. The findings were based on focus groups conducted at the medical school.

"An important reason for this is that health systems science is not yet rigorously tested on board exams, but this is changing," Gonzalo said.

He hopes that an increasing focus on health systems science in medical school curricula and on board exams will help medical students prioritize the third science alongside basic and clinical sciences.

The AMA consortium is working to develop both of these areas.

The curricular framework established in the study published in *Academic Medicine* will be used as the basis for one of the first health systems science [medical school](#) textbooks, written by AMA consortium members and co-led by Penn State faculty. It is also guiding the development of new medical board exam questions on health systems science.

"Many medical students believe [health systems](#) science is important for their careers, but they often struggle with balancing this area of study with their active workload," Gonzalo said. "We have to think about how our educational programs are designed, and we have to work with the learners to make sure they're fully engaged."

Provided by Pennsylvania State University

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