

# ACCELERATING CHANGE IN MEDICAL EDUCATION

CREATING THE MEDICAL SCHOOL  
OF THE FUTURE



# CREATING THE MEDICAL SCHOOL OF THE FUTURE



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# MEDICAL SCHOOL OF THE FUTURE

HEALTH CARE SYSTEMS

PATIENT OUTCOMES

LIFELONG  
LEARNERS

PHYSICIAN  
WORKFORCE

COMPETENCY-BASED  
ASSESSMENT

TEAM-BASED  
CARE

ADVANCED  
TECHNOLOGY

QUALITY IMPROVEMENT • HEALTH CARE FINANCING • PATIENT SAFETY

DIVERSITY • UNDERSERVED POPULATIONS

DIAGNOSIS • DISEASE MANAGEMENT • TEACHING TOOLS



# CREATING THE MEDICAL SCHOOL OF THE FUTURE

As medicine and health care delivery in our nation continue to evolve in new and exciting ways, the U.S. medical education system, which is based largely on an educational model more than a century old, has not kept pace. There's been much discussion and the consensus is clear—it's time for change.

The American Medical Association and leading medical schools across the nation are now focused on turning this rhetoric into reality. To address the needs of patients and ensure future physicians are equipped to provide patients with excellent care, the AMA, through its **"Accelerating Change in Medical Education"** initiative, is funding major innovations at 11 schools. These schools now form a consortium that is sharing best practices, lessons learned, and a deep commitment to bringing innovation and bold thinking to creating the medical school of the future.

This report captures the inspiring, collaborative effort involved in this exciting and challenging journey to reimagine physician education from the ground up.

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During the AMA's initial call for proposals, **83 percent** of accredited U.S. MD-granting medical schools filed letters of intent outlining potential projects, showing wide support for the proposed changes in physician education.

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On the pages that follow you will see how the consortium is making great progress in four key areas:

- Making medical school flexible through competency-based curricula
- Teaching new content areas

- Working with health care delivery systems in novel ways
- Creating innovative uses for technology

In addition to learning how the participating schools are taking unique approaches to transforming medical education, you will also see how the consortium's collective efforts are proving vital to driving transformation of this magnitude. Indeed, the consortium's collaborative work has proven so successful to date that the AMA, through new grant opportunities, is more than doubling its participating schools. These newly selected schools will officially join the consortium beginning in 2016.

While no single organization holds all the answers for how to reform medical education, together, we can tackle today's challenges and make a positive, meaningful difference in how future physicians are trained and, ultimately, in the health of our nation. ■

# WORKING TOGETHER, FORMING A CONSORTIUM

The cornerstone of the AMA's medical education transformation efforts is the Accelerating Change in Medical Education Consortium, a learning collaborative formed in partnership with the AMA and 11 selected schools. The consortium supports and drives collaboration and provides a platform for developing common projects and a national evaluation plan so that evidence-based, best practices can be developed, evaluated, shared and implemented across all medical schools.

Since funding began in September 2013, the 11 grant recipient schools have demonstrated an affinity for working together by sharing their innovations and methods within a formalized agreement on intellectual



*Susan E Skochelak*

*"This is too big of a job for one medical school to do. The consortium allows the opportunity for each of them to take what's best of all the programs."*

**Susan E. Skochelak, MD, MPH**  
Group vice president, Medical Education  
American Medical Association



property protection that enhances collaborative work. The schools meet regularly to share progress and identify additional consortium-wide programs that can be developed through working interest groups.

To allow tested innovations to spread, the consortium members have formed a community, and this community is now connecting to other schools. Additionally, the consortium is working with entities from across the physician education continuum, including graduate and continuing medical education, to further underscore the concept of lifelong learning for physicians.

The consortium regularly hosts meetings and activities with national organizations that have an

important stake in the future of medical education, including the Association of American Medical Colleges, the Accreditation Council for Graduate Medical Education, the Liaison Committee on Medical Education, the Federation of State Medical Boards, the National Board of Medical Examiners and the National Resident Matching Program. These varied perspectives have inspired creative thinking and collaboration and provided important input on how best to design for sustainable transformation.

As consortium members continue to implement solutions, schools are sharing materials, tools and ideas with one another. In addition, these solutions are being communicated and disseminated to the greater academic community, facilitating widespread adoption of new ideas.

## DEEP WORK IN SEVERAL KEY AREAS

The Accelerating Change in Medical Education Consortium established interest groups for grant recipients working in similar areas. These topic-based groups cut across consortium member schools in the areas of technology, competency-based assessment and milestone development, systems-based practice, master adaptive learning, organizational change and faculty development.

These groups are focusing on:

- Creating a robust virtual health care learning system with authentic

clinical data sets, teaching electronic medical records and interactive ePortfolios

- Developing curricular models and real-world learning experiences focused on the components of health care delivery sciences
- Conducting a faculty development needs assessment survey to address this critical component of all the grant projects
- Drafting a conceptual model of the master adaptive learner—an expert, self-directed, self-regulated and

lifelong workplace learner—to serve as a roadmap for medical students and schools

- Establishing a collaborative evaluation and learner assessment approach, including the development of knowledge-based tests and the collection of simulation cases that focus on interprofessional education, quality/safety improvement and evidence-based practice

## MEASURING THE IMPACT

MORE THAN  
\$1 MILLION

TO EACH OF  
11 MEDICAL SCHOOLS  
OVER A  
FIVE-YEAR PERIOD



TODAY, THESE FUNDS  
SUPPORT  
**7,000**  
MEDICAL STUDENTS



**WHO WILL ONE  
DAY PROVIDE CARE  
FOR MORE THAN  
12.2 MILLION  
PATIENTS ANNUALLY**

*"We have intrinsic barriers all around us to changing the future, so at this stage the question should not be, 'How about this problem?' The question should be, 'Are these aspirations great enough?'"*

**James L. Madara, MD**  
Executive vice president, CEO  
American Medical Association





“The consortium ... allows us to really exchange ideas and experiences with each other and learn from each other’s struggles. Many of us are working on similar initiatives but in different ways, and we have things to teach each other, especially about potential ways not to do things. And that’s always very valuable when you’re trying something big and innovative. So many times innovations happen in a silo, and then you don’t get to learn from others and get enough reflection on how to move forward. **Innovation needs to be social.**”



Rajesh S. Mangrulkar, MD

Principal investigator and associate dean, medical student education, University of Michigan Medical School

## PROFILE

The University of Michigan Medical School is transforming its entire curriculum in order to graduate physician leaders and change agents who will improve health care at a system and patient level. Intentional leadership development exercises are already underway and will connect with all components of the new curriculum, including the M-Home, which launches in fall 2015. The M-Home is a longitudinal learning community designed to foster a strong professional identity based on doctoring skills, professionalism and an understanding of one's values in the service of medicine. Student expression of leadership also will occur through completion of one of a growing number of scholarly concentrations known as Paths of Excellence.

Implementation will continue in 2016 with a new two-year "trunk" of foundational courses that integrate basic science and clinical experiences from day one. Flexible professional development "branches" will follow in the next phase in 2018, allowing students to develop advanced clinical skills, build scientific depth within the clinical setting and be ready for residency on day one.



## PROJECT HIGHLIGHTS

Before the University of Michigan Medical School could truly transform its entire curriculum, the institution had to gain buy-in from students, faculty, staff, administrators and anyone else who could be touched by such a significant change. Those leading the charge initiated deliberate change management strategies. In September 2013, over 300 members of the medical school community were invited to a campus-wide retreat for an open discussion of issues related to the impending changes. All work groups included a wide range of members and perspectives from the community. The University of Michigan Medical School built a coalition of leaders from the health system community including clinical leaders, students and interprofessional colleagues. Over the course of a year, these leaders organized and led more than 15 workgroups and subgroups to develop ideas and initiate planning of the details of the new curricular model. In February 2014 the steering and operations committees were convened to define the vision of the "new" graduate. This coordinated creativity has resulted in a very specific implementation plan. The process of building consensus, engagement and design has brought together over 200 faculty, staff and students across the university, sharing work to build the next system of medical student education.



**MEDICAL SCHOOL**  
UNIVERSITY OF MICHIGAN



### PROFILE



Oregon Health & Science University (OHSU) School of Medicine is implementing a novel, learner-centered, competency-based curriculum. This program enables students to advance through individualized learning plans as they achieve key milestones tracked by a personal portfolio. Additionally, faculty members serve as student coaches and mentors, teaching and assessing skills related to informatics, quality science and interprofessional teamwork.

Students will be able to complete medical school based on their demonstration of meeting defined milestones. The program creates master adaptive learners who are accustomed to continuous self-assessment and professional development. Students who successfully complete this program are prepared to manage the needs of patients and populations.



“What we aim to produce are **change agents**. What I mean by that is not just someone who can take care of patients and populations of patients but [someone] who actually can keep improving themselves and also improve where they work.”



## PROJECT HIGHLIGHTS

OHSU students are learning how to optimally use data and information systems to take care of patients and populations in the digital era. The creation of medical student informatics competencies such as searching for the best available evidence, engaging patients through social media and using data to improve patient safety has paved the way for other schools to incorporate these key skills.

This curriculum began at OHSU in August 2014 and includes a system that awards students a badge for each entrustable professional activity that is mastered. To increase the number of valuable experiences in the learning environment, OHSU has developed communities of learners and identified 28 faculty members to act as portfolio coaches.



OREGON  
HEALTH  
& SCIENCE  
UNIVERSITY



**George C. Mejicano, MD, MS**

Principal investigator and senior associate dean, education, Oregon Health & Science University



## PROFILE

Vanderbilt University School of Medicine's Curriculum 2.0 aims to create master adaptive learners—physicians who will learn, engage in guided self-assessment, and adapt to the evolving needs of their patients and the health care system throughout their careers.

All students are embedded in the health care workplace beginning with the earliest phases of their undergraduate medical education. These early clinical experiences provide them with opportunities to participate in a variety of clinical settings assuming increasing responsibilities as they acquire new competencies. Learning communities, comprehensive learning portfolios and coaching from trained faculty help students acquire and practice self-directed learning skills. Vanderbilt is continuously improving the logistics of its educational portfolio and is currently developing a "GPS" to further assist students in navigating the curriculum.

Other educational innovations produced at Vanderbilt include integrated science courses in the third and fourth year of medical school and milestone-based student assessments for the core clerkships and all clinical rotations.





## PROJECT HIGHLIGHTS

The transformed curriculum at Vanderbilt University School of Medicine involves having all medical students in every year of study contribute in meaningful ways to patient care. For example, second-year students participating in the Foundations of Healthcare Delivery course were involved in a care transitions curriculum pilot. Each student monitored four different patients moving from one care setting to another. At least one of these transitions involved a visit to the patient's home.

Students monitored more than 300 care transitions and identified many areas for process improvement. Medical students connected 77 patients to community resources, and, most importantly, these exercises enabled students to explore the characteristics of each care setting and discuss which one was ideal for a given patient. Special emphasis was placed on the patient's home as a care setting, and the majority of students participated in a home visit for one of their patients. This pilot experience will be expanded for all second-year students.

**"We believe that all of our students are capable of learning a set of self-regulated, self-directed learning skills with the goal of developing true learning expertise. However, like all of the competencies needed for good doctoring, the skills needed for expert lifelong learning must be deliberately taught, modeled and practiced."**

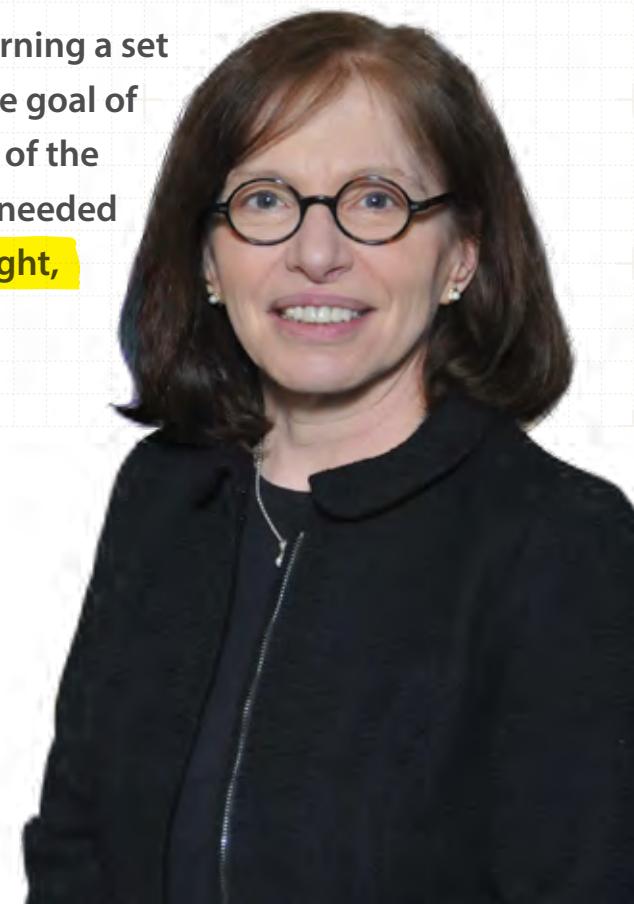
*Bonnie M. Miller*

**Bonnie M. Miller, MD**

Principal investigator, senior associate dean, health sciences education, and associate vice-chancellor, health affairs, Vanderbilt University School of Medicine



**SCHOOL OF MEDICINE**  
VANDERBILT UNIVERSITY



# DEVELOPING FLEXIBLE, COMPETENCY-BASED PATHWAYS



Medical education is shifting away from time spent in lectures and classrooms and toward acquiring the necessary knowledge and skills for transitioning to residency and patient care. Schools are incorporating milestones and entrustable professional activities (EPAs) into their curriculum to determine the best path to move to the next level of training. These flexible, competency-based pathways create physicians who continually assess and update their abilities and address deficiencies throughout their careers.

The schools participating in the “Accelerating Change in Medical Education” initiative are incorporating multiple aspects of competency-based assessment and are involved in the competency-based assessment/milestones interest group within the consortium. An additional consortium interest group is creating a conceptual model for the master adaptive learner that will serve as a guide for medical students, schools and other audiences.

**Oregon Health & Science University School of Medicine**, for example, has developed a content map for students to follow by combining the competencies and milestones defined by the American Board of Medical Specialties and the Accreditation Council for Graduate Medical Education with the EPAs put forth by the Association of

American Medical Colleges (AAMC). All achievements are tracked in a portfolio, and faculty members serve as coaches and mentors for students.

At **Vanderbilt University School of Medicine** students use data collected in their portfolios to carry out self-

“The competencies that our students need to have when they graduate from our medical schools are going to really be quite dramatically different than they were 50 or 100 years ago.... Is that going to impact patient care and the health of the patients they take care of? Absolutely, yes. Is their ability to be lifelong learners and constantly adapt going to impact that care? Absolutely, yes. So, we need to make sure as a medical school that we’re empowering these students to not only have the new competencies but to be lifelong learners.”

—**Marc Triola, MD**

Principal investigator and associate dean, educational informatics, New York University School of Medicine

assessments two or three times a year. Students indicate areas of strength, room for improvement and gaps in experience. These assessments are then reconciled with those performed

by portfolio advisors. The goal is to improve the accuracy of self-assessment and promote the habit of reflection.

Although competency-based assessment has myriad benefits, making the shift can be challenging. For instance, most residencies have not yet changed to accommodate variable graduation times. Also, measuring student competencies requires valid and reliable assessment tools. Faculty must consistently and reliably interpret their observations and assessments of learners, which requires institutions to increase their investment in faculty development. The AMA Accelerating Change in Medical Education Consortium schools are working closely with the AAMC and the National Board of Medical Examiners to develop new measures and assessments for readiness to enter residency training.

While change is not easy, physicians who become master adaptive learners—capable, equipped and continue to engage in learning and self-assessment throughout their careers—are prepared to be future leaders with the ability to maximize the potential of our health care system to deliver safe, high-quality care. Creating master adaptive learners through educational design that includes competency-based assessment is key to making this happen. ■

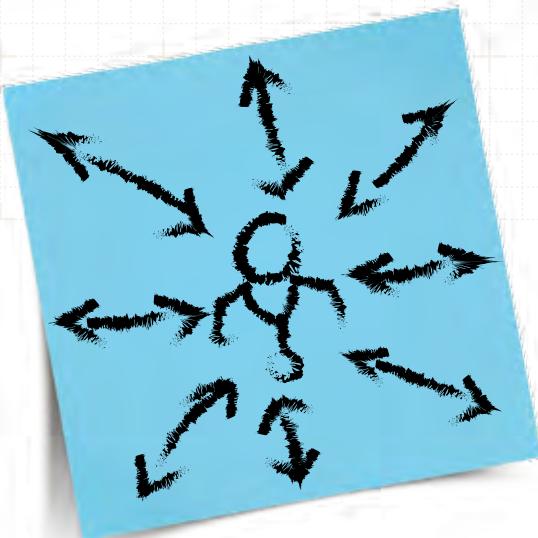
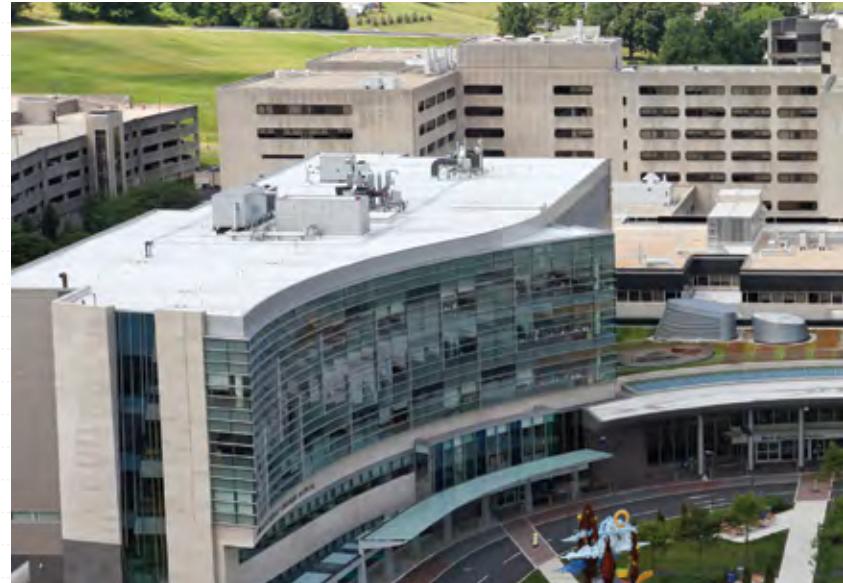


### PROFILE

Penn State College of Medicine's initiative involves collaborating with the leaders of affiliated health systems in central Pennsylvania to design educational experiences that align medical education with health system needs. Its Systems Navigation Curriculum (SyNC), launched in August 2014, combines a course in the science of health systems with an immersive experience as a patient navigator.

The curriculum integrates core systems sciences—such as health policy, high-value care, and population and public health—with two threads related to evidence-based medicine, along with teamwork and leadership training throughout seven modules. Educational objectives, content, cases and a seminar-based 17-month course have been developed in collaboration with health system leaders in the central Pennsylvania region.

The patient navigation component of the curriculum began with all first-year medical students, approximately 150 individuals, interviewing standardized patients portraying high utilizer or vulnerable patient scenarios. In October 2014, 85 of these medical students were embedded at clinical sites across central Pennsylvania working as patient navigators. To prepare for the patient navigator program, Penn State conducted visits to clinical settings that would support the patient navigators and completed data collection on relationships with external agencies/health systems and clinical sites.

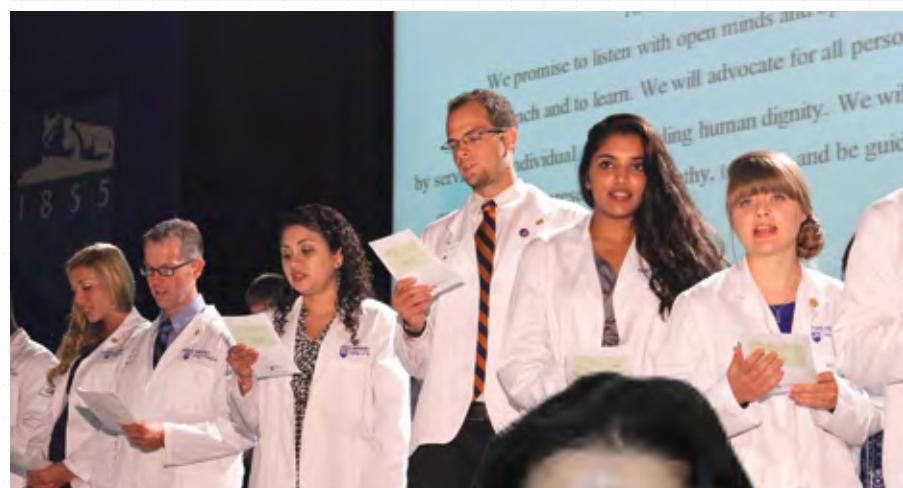


*"We need to start talking to engineering schools, business schools, community leaders and nursing and physician assistant programs, and begin to provide truly authentic diverse learning experiences for our students."*



## PROJECT HIGHLIGHTS

SyNC has required significant collaboration between medical school and health system leaders. Penn State has formed an advisory board of relevant stakeholders, and has visited numerous internal and external clinical care sites to identify dozens of opportunities for embedding medical students as patient navigators. Several health system leaders are serving as consultants to the science of health systems course. Health system leaders also have provided the "patient stories" for the modules involving standardized patients. Additional roles in SyNC are being created for health system leaders to contribute in meaningful ways.



PENNSTATE HERSHEY  
College of Medicine



*Therese M. Wolpaw*

**Therese M. Wolpaw, MD**  
Principal investigator and vice dean, educational affairs,  
Penn State College of Medicine



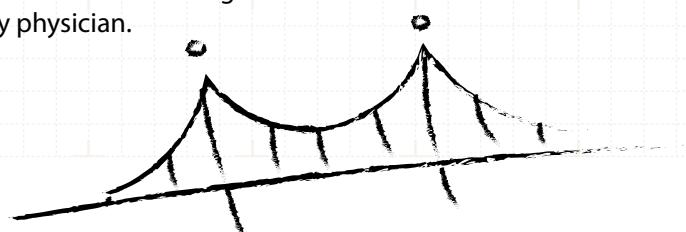


## PROFILE

The new Bridges Curriculum at the University of California, San Francisco (UCSF) will prepare physicians to achieve the competencies needed to promote health and reduce the burden of suffering from illness and disease. This "Bridges" physician will be a committed professional whose expertise is grounded in the ability to lead and participate in interprofessional and interdisciplinary teams to deliver high-quality compassionate patient care, continuously improve our health care delivery systems and contribute to advancement of knowledge. The curriculum is crafted to

allow students to contribute to improving health care outcomes today while being educated to work within complex systems to improve health care and advance science for future generations of patients.

The UCSF Bridges Curriculum will enhance the acquisition of enduring knowledge and skills while integrating the emerging knowledge and skills that are critical to becoming a 21st century physician.



**"It's trying to jump-start the process improvement that we want to see in the health care system using our very, very talented and purpose-driven students, and helping them understand that being a physician in the 21st century looks a lot different than being a physician in the 20th century."**

## PROJECT HIGHLIGHTS

The UCSF Bridges Curriculum incorporates a significant interprofessional component. First- and second-year medical school students are involved in health care coaching and cardiology clinical research projects with those studying pharmacy and physical therapy. Additional projects and other health care professions will be recruited for interprofessional teams in the immediate future. The UCSF School of Pharmacy has launched its own curriculum redesign called the "UCSF Pharmacy Bridges Curriculum," based on the mission, vision and value of the medical school Bridges project.



**UCSF** School of  
Medicine

*Catherine R. Lucey*

**Catherine R. Lucey, MD**

Principal investigator and vice dean, education,  
University of California, San Francisco, School of Medicine





# TEACHING NEW CONTENT IN HEALTH CARE DELIVERY SCIENCES

To fully serve patients today and into the future, physicians need to know more than biomedical and clinical sciences—they need to understand health care delivery sciences.

This new discipline includes understanding how to improve health care quality, increase the value of care provided, enhance patient safety, deliver population-based medical care and work collaboratively in teams. Physicians need to learn how to advocate for their patients and communities and understand the socio-economic determinants of health, health care policy and health care economics.

The consortium schools are developing extensive new curricula and experiential learning in these new content areas.

The **University of California, San Francisco, School of Medicine**, for example, is designing a systems improvement immersion school to prepare students to be contributing members of a health system's improvement team.

At **Warren Alpert Medical School of Brown University** nine new

courses will constitute the basis for a Master of Science degree in population medicine that can be completed concomitantly with an MD degree. The master's curriculum on health systems and health disparities will include a course that all

"It's time for us to take a leap forward in educating physicians for the health care delivery models of the future—those who aim to improve not just the health of the individual patient and their family, but also the community and the population. To achieve this, we need to bring in issues such as safety, quality improvement, health disparities, bias and population health."

—Jeffrey Borkan, MD, PhD  
Co-investigator and chair, Department of Family Medicine, Warren Alpert Medical School of Brown University

medical school students will be required to take.

The **Brody School of Medicine at East Carolina University** is implementing a comprehensive, longitudinal core curriculum focused on patient safety and

quality improvement for all medical students through didactic, online and experiential components.

**Mayo Medical School** features a new education model for the science of health care delivery that trains students in interprofessional teams providing patient-centered, science-driven, community/population-oriented high-value care.

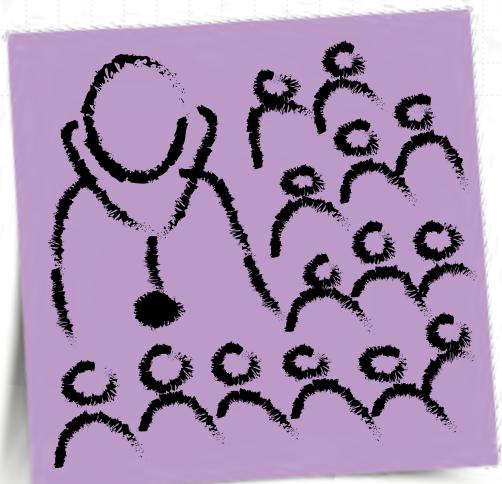
In implementing new and innovative curriculum, schools have had to address important barriers that impede change and progress—barriers such as faculty resistance, resource constraints, need for new tools and training sites, as well as student expectations. To support change, schools are developing comprehensive faculty training materials and student leadership activities and have incorporated new admissions strategies. They are making great strides in implementing these necessary changes that will help educate physicians who are well-versed in the science of health care delivery and who are highly capable of leading improvements in health outcomes for patients and communities. ■



## PROFILE

NYU School of Medicine is creating the NYU Health Care by the Numbers Curriculum, a flexible, three-year, individualized, technology-enabled blended curriculum to improve care coordination and care quality. The foundation for the curriculum is virtual patient panels derived from de-identified patient data gathered from NYU Langone Medical Center physician network practices and open data sources. These patient panels immerse students in the data of a simulated group practice setting and are available for use by other schools.

The NYU Health Care by the Numbers Curriculum emphasizes the use of big data and technology for patient and population management, and includes an ePortfolio that allows students to track their own activities for quality improvement, safety and value-added care. A new online portal for student self-directed learning is being used and updated based on student experiences.





## PROJECT HIGHLIGHTS

To ensure all second- and third-year medical students, including those not on the three-year pathway, are achieving appropriate competencies, clerkship preceptors now have a real-time dashboard of all patient encounters their students are logging, as well as where their students are in meeting minimum expectations for that particular clerkship. All students have been issued tablet computers with apps allowing them to review data in person with their preceptor every two weeks. NYU also initiated a program of faculty development to ensure preceptors are giving the students appropriate feedback on their clinical activities, discussing the differences and similarities between what the students are seeing and what is expected of them. Preceptors provide feedback on students' diagnostic distribution in comparison to the "actual" diagnoses seen on the ward. The students also receive feedback on competencies and their milestones at each meeting.

**"For the first time in the history of our educational program, our medical students are analyzing and managing and looking at patients' health through the lens of big, authentic clinical data sets. It's made a huge difference in their engagement, and it's made the experience of much higher fidelity as a part of their education."**



**Marc Triola, MD**

Principal investigator and associate dean, educational informatics, New York University School of Medicine



## PROFILE

The Indiana University School of Medicine's initiative creates a virtual health care system (vHS) and a teaching electronic medical record (tEMR) to ensure competencies in system-, team- and population-based health care as well as clinical decision-making.

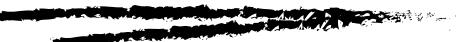
Faculty are being trained as quality systems coaches in current health systems practice, and they are prepared to expertly use the tEMR, which is a clone of a health care system's actual clinical care EMR. The first phase of educational activities using this tool addresses health care financing, access to care, quality improvement and health care disparities. Students practice in virtual clinics with faculty serving as virtual attendings. Students will use the tEMR to review patient data and write virtual

orders and notes that become part of the tEMR but do not appear in the de-identified patients' real EMRs. Students will see the costs of interventions they order, and this information will be compared with publicly available databases. Students and faculty will then discuss the impact of demographic and insurance factors on health care delivery.

In addition, this competency-based curriculum focuses on quality improvement and patient safety. Technology improves students' ability to practice systems- and team-based care for individual patients and patient populations. The project runs sequentially over each year of medical school and across all phases of the curriculum for all students.

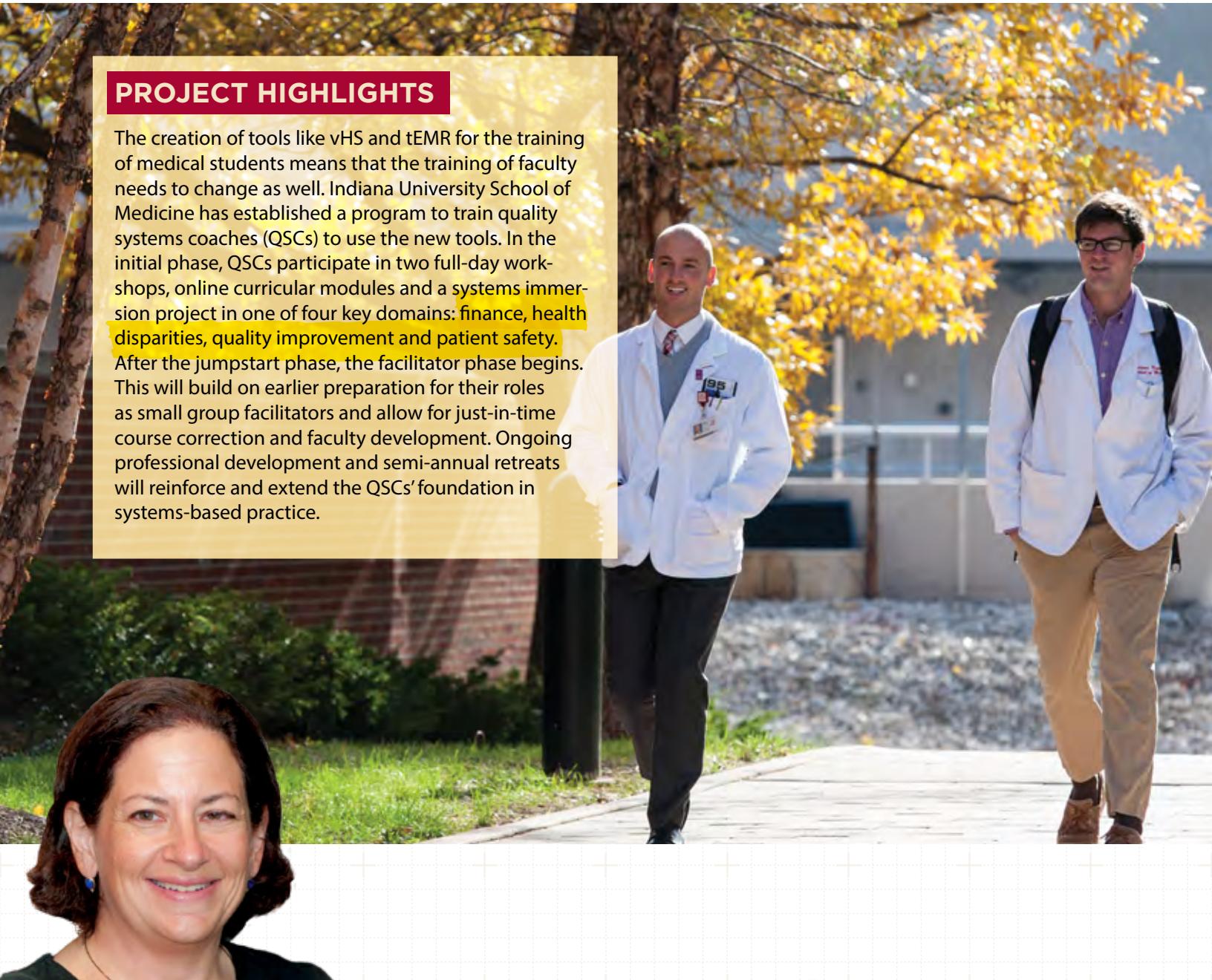


**"I hope that the end of our project will show we've not only educated our students but changed our health care systems by creating a cadre of faculty with confidence in systems medicine so that the climate our students are learning in will be different—not just for the specific time periods and activities contained within the grant, but for the role models that they work with and for the community of educators with whom they're engaged."**



## PROJECT HIGHLIGHTS

The creation of tools like vHS and tEMR for the training of medical students means that the training of faculty needs to change as well. Indiana University School of Medicine has established a program to train quality systems coaches (QSCs) to use the new tools. In the initial phase, QSCs participate in two full-day workshops, online curricular modules and a systems immersion project in one of four key domains: finance, health disparities, quality improvement and patient safety. After the jumpstart phase, the facilitator phase begins. This will build on earlier preparation for their roles as small group facilitators and allow for just-in-time course correction and faculty development. Ongoing professional development and semi-annual retreats will reinforce and extend the QSCs' foundation in systems-based practice.



**Sara Jo Grethlein, MD**

Medical director, oncology services  
EMR and professor, clinical medicine,  
Indiana University School of Medicine

A handwritten signature of Sara Jo Grethlein, MD.



**SCHOOL OF MEDICINE**  
INDIANA UNIVERSITY

# WORKING WITH HEALTH CARE DELIVERY SYSTEMS IN NOVEL WAYS



Consortium schools are creating new learning experiences embedded within health care systems that not only teach principles of health care delivery sciences, but also bring value to the health care system. Training students to be patient navigators, to plan and execute quality improvement projects, and to perform important functions that benefit patient-centered teams serve dual purposes: (1) students learn by working in authentic settings, and (2) they are able to contribute to improving the health of patients in meaningful ways.

For example, the **University of California, Davis, School of Medicine's** Accelerated Competency-based Education in Primary Care (ACE-PC) program immerses students in the Kaiser Permanente Northern California health system, a large managed care integrated system that includes health plans, hospitals and medical groups.

The project at **Penn State College of Medicine** involves training students to serve as patient navigators at sites across central Pennsylvania. As patient navigators, students provide patients information and education about their health condition, as well as emotional and supportive care.

"The really innovative part, I think, is the authentic, in-depth clinical experience of students serving as patient navigators, both within our health system and also health systems in south-central Pennsylvania."

—**Jed Gonzalo, MD**  
Assistant dean, health systems education,  
Penn State College of Medicine

They also facilitate coordination and continuity of care. This includes identifying patient-specific barriers to obtaining high-quality health care.

The **University of Michigan Medical School** is creating and implementing the M-Home, a longitudinal learning

community that places medical students in one of four virtual houses as they connect with each other in small groups and across classes, as well as to a cadre of coaching and advising faculty, helping them prepare to become leaders in their future practice settings. This curricular design is fostering the development of competencies required to function in these interprofessional teams.

The hands-on, real-world experiences that students are now engaging in are better preparing them for the realities of the modern practice environment. By helping them apply lessons in systems of practice, patient safety and providing care for populations and communities, students will become effective members of health care teams. Ultimately, the health care system will benefit from students who are knowledgeable and ready to navigate today's challenges, using what they've learned beyond the classroom in real, tangible ways. ■



## PROFILE

Mayo Medical School is creating an educational model to prepare students to practice within and lead patient-centered, community-oriented, science-driven collaborative care teams that deliver high-value care. It is working closely with health system leaders and has launched teams that will develop detailed educational models for each of the six science of health care delivery domains.

While these models are under development, the school has created early science of health care delivery experiences around the topics of patient- and population-centered care, teamwork, health policy and economics. Mayo is developing milestones and novel assessment strategies to allow for flexible progression through the curriculum.

In addition, as physician well-being impacts patient outcomes and access to care, Mayo is developing curricula and tools to enhance student well-being and resiliency. Mayo is testing the functionality of the Medical Student Well-Being Index, which allows self-assessment of distress and immediate access to local and national resources. The school has also created wellness learning modules and has implemented a required curriculum focused on wellness and resiliency with facilitated small group discussions.

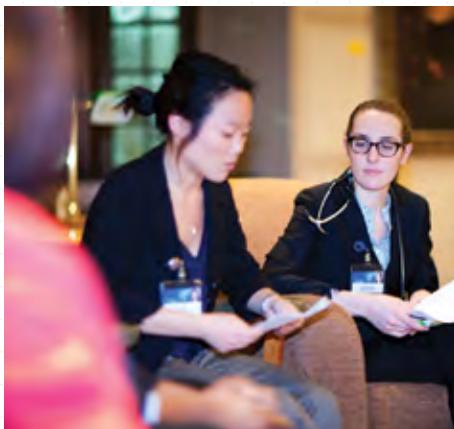


**"Mayo Medical School in partnership with Mayo Clinic Health System is developing a novel model of science of health care delivery education, flexible student progression based on milestone achievements, and programming to optimally prepare students to be ready to practice in today's rapidly evolving health care system. Transforming medical education is central to inspiring hope, contributing to health and well-being, and providing the best care to every patient."**



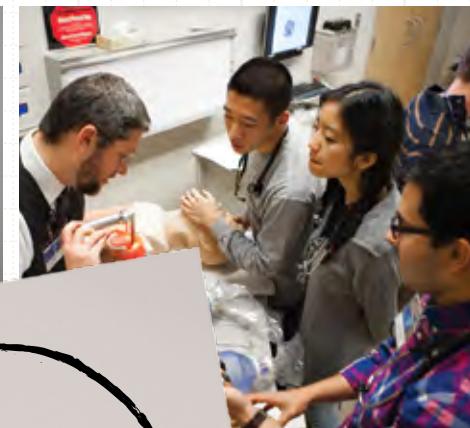
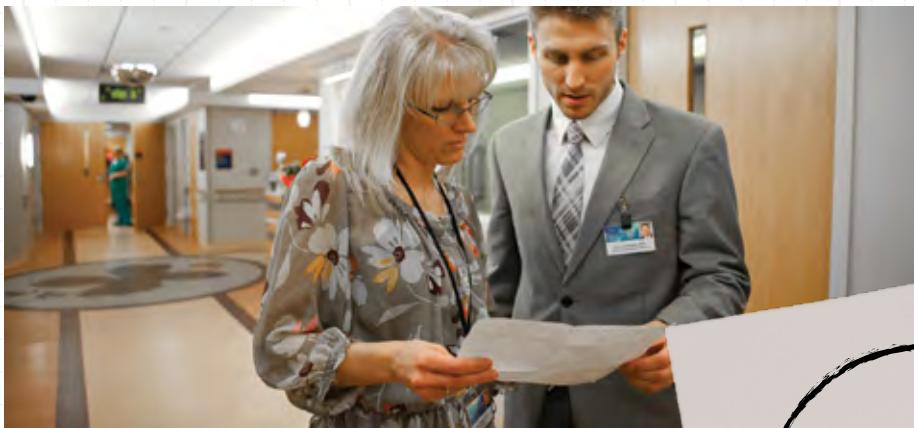
**Lotte N. Dyrbye, MD**

Principal investigator and professor, medical education,  
Mayo Medical School



## PROJECT HIGHLIGHTS

Mayo Medical School is reforming how it handles student wellness as well as reforming its curriculum. Mayo is developing a Web-based version of its Medical Student Well-Being Index (MSWBI) and has made it available for use by consortium member schools. The Web-based MSWBI enables students to assess their current level of distress, immediately learn how their distress level compares to what is typical for medical students, ascertain when the level of distress puts them at higher risk for potentially serious personal and professional repercussions, track their scores over time, and gain access to just-in-time information regarding mental health resources and independent wellness learning modules. Schools participating in MSWBI will be able to enroll their students and view aggregated data on those who use the Web-based tool. This tool also will allow comparisons between aggregated student data at a particular school to national medical student norms.





## PROFILE

The initiative at The Brody School of Medicine at East Carolina University establishes a comprehensive longitudinal core curriculum in patient safety, quality improvement, population health and team-based care for all medical students. Components of the curriculum are integrated with other health-related disciplines to foster interprofessional skills and prepare students to successfully lead health care teams for systems-based health care transformation. The curriculum includes completion of the Institute for Healthcare Improvement Open School Certificate Program, system-wide patient safety seminars, problem-based learning cases, and new objective structured clinical examinations and simulation cases that incorporate delivery system science principles. Process improvement exercises also are being built into existing courses and clerkships.

As part of the implementation of the curriculum, Brody established its Teachers of Quality Academy to provide

faculty development in the new competencies that are to be incorporated in the new medical school curriculum. Faculty members participating in the Teachers of Quality Academy lead quality and safety efforts in their health care system and are helping to design the new integrated curriculum across all four years of a medical student's experience. They also will serve as faculty mentors and teachers for this curriculum.

For a smaller cohort of students, Brody has established a Leaders in INovative Care (LINC) scholars program. Up to 10 students per year will be enrolled in LINC. These students will complete advanced course work and experiential activities leading to a Distinction in Healthcare Transformation and Leadership in addition to their MD degrees.



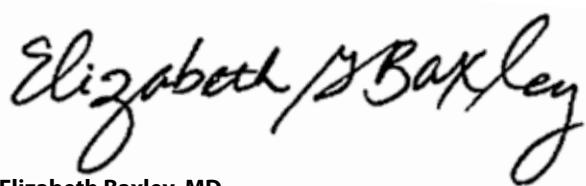
**“Our approach is integrative. It’s not to develop a new course ... it’s to develop components that we’ll integrate into already existing parts of the curriculum. What will come from this will be a collection of new curriculum components—new cases, new simulations, new group exercises, new interprofessional training—that we’ll map to our medical education curriculum throughout. This design is intentional to establish that these health system competencies are simply the way we ‘do business,’ not some parallel curriculum out of context of the remainder of their learning.”**

## PROJECT HIGHLIGHTS

Increasing the teaching of quality and patient safety is integral to Brody's medical education transformation project. The curriculum is a combination of online and didactic content delivery coupled with related experiential components. These include project-based learning cases and simulations along with individual and group exercises to integrate the content with real-world approaches to improving health care systems. Brody is working with its health system partner, Vidant Health, as well as the East Carolina University Physicians practice plan, to create a menu of clinical quality and safety initiatives that can accommodate students in process improvement teams in a meaningful way. Brody also is implementing patient safety seminars that will be included in the orientation for first- and second-year medical students. The 10 LINC scholars will graduate with enhanced training and applied experience in patient safety/quality improvement at a clinical systems level.



East Carolina University  
Brody School of Medicine



Elizabeth Baxley, MD

Principal investigator and senior associate dean, academic affairs,  
The Brody School of Medicine at East Carolina University





# MAKING TECHNOLOGY WORK FOR LEARNING



The Accelerating Change in Medical Education Consortium schools are adapting technology in new ways to solve key problems and advance physician training. They are teaching the use of electronic health records, management of patient panels to improve health outcomes, and interpretation of big data on health care costs and utilization in order to learn how to best use resources.

In addition, schools are applying learning technology to manage individualized, flexible progress by assessing student competencies along their medical education journey. New tools are compiling assessment data that will allow for easier self-assessment by students and review with faculty coaches. Badges and other methods of credentialing enable students to differentiate along "threads," or areas of scholarly concentration, as they progress through individualized tracks.

The consortium has an interest group focused on technology, and several funded projects are testing ways to incorporate technology into medical school curriculum.

**New York University School of Medicine** has developed a Web-based tool using real clinical data from the New York State Department of Health Statewide Planning and Research Cooperative System that

"With our teaching electronic medical record, which is a clone of an existing electronic medical record that contains patient-de-identified data, patient privacy is protected, but our students will have an electronic medical record as a learning lab. We are now completing the de-identification of the patients for that system as well as building curriculum because those two have to come hand in hand."

—**Sara Jo Grethlein, MD**  
Medical director, oncology services  
EMR and professor, clinical medicine,  
Indiana University School of Medicine

incorporates almost 5 million de-identified patient level records. These de-identified data create a virtual multi-practice care group that students can analyze to understand the fundamentals of measuring quality and value. The technology

infrastructure for this system is available at this NYU-hosted website: <http://education.med.nyu.edu/ace/sparcs>.

**Indiana University School of Medicine** is developing a virtual health system curriculum using a teaching electronic medical record (tEMR), an enhanced clone of its actual clinical care EMR. The tEMR includes de-identified data and allows order writing, note writing, medication management, report generation and data viewing. It also includes a sophisticated clinical decision support infrastructure to further understanding of clinical care choices.

Training students to understand and embrace technology throughout their education provides them with the core skills needed to maximize the health and well-being of their future patients. ■



## PROFILE

The Warren Alpert Medical School of Brown University initiative aims to educate medical students to become physician leaders equipped to promote the health of the individuals, communities and populations they serve. To meet this goal, Brown has developed an MD/ScM degree program in primary care and population medicine whose first class enrolled in 2015. The new Primary Care-Population Medicine (PC-PM) program integrates the third medical science (health care delivery) with the first (basic science) and the second (clinical science) over the four years of medical school. The Master of Science degree features nine courses, including one on health systems and health disparities that is introduced to *all* MD students, including those who are not in the PC-PM program.

As part of the PC-PM program, Brown has begun developing population medicine content and identifying sites for its longitudinal integrated clerkships (LIC). These clerkships, which involve students completing all clerkships simultaneously rather than in discrete blocks, were piloted with eight third-year medical students in May 2015. The LIC begins with all students doing a combined six-week experience in inpatient medicine and surgery. Students will then spend 32 weeks with mentors in outpatient family medicine, internal medicine, surgery, psychiatry, neurology, pediatrics and ob-gyn. During the LIC, students will follow a panel of patients and will have didactic sessions on both clinical and population medicine in courses that are part of the master's sequence.

In addition, Brown is developing a continuum of leadership courses along with a student-led elective course that emphasizes principles of patient safety and quality improvement. The goal is to provide students with the knowledge, attitudes and skills to understand health and disease in context, and to be able to enlist system and interprofessional teams and resources in the pursuit of improved population health.



**"Our proposal at Brown is to prepare our graduating medical students ... to be able to provide care to individual patients and patients as a group."**



## PROJECT HIGHLIGHTS

As well as adding population medicine content to the curriculum for all medical students and creating the option for a master's degree in population medicine for a subset, Brown is also redesigning its basic science curriculum. A curriculum block integrating musculoskeletal anatomy with orthopedics and rheumatology will be

taught. This course will incorporate more active teaching modules, including small groups focused on anatomy and an orthopedics workshop. The human reproduction, cardiology and pulmonology courses also have been redesigned to emphasize more active learning. Medical students have given these course redesigns high ratings.

**Allan Tunkel, MD, PhD**

Principal investigator and associate dean, medical education,  
The Warren Alpert Medical School of Brown University



**BROWN**  
Alpert Medical School



## PROFILE



The University of California (UC) Davis initiative, the Accelerated Competency-based Education in Primary Care (ACE-PC) program, establishes a six-year, competency-based undergraduate medical education (UME) and graduate medical education (GME) pathway linked to Kaiser Permanente (KP) Northern California and UC Davis residency programs.

UC Davis medical students who are accepted into the ACE-PC program start school six weeks earlier than traditional students and complete a pre-matriculation course that prepares them to begin supervised work in a primary care clinic. ACE-PC students learn medical history-taking, physical examination skills and clinical reasoning related to common primary care concerns. In their second week, ACE-PC students start their three-year KP primary care clinic training under the supervision of KP primary care faculty preceptors and coaches.

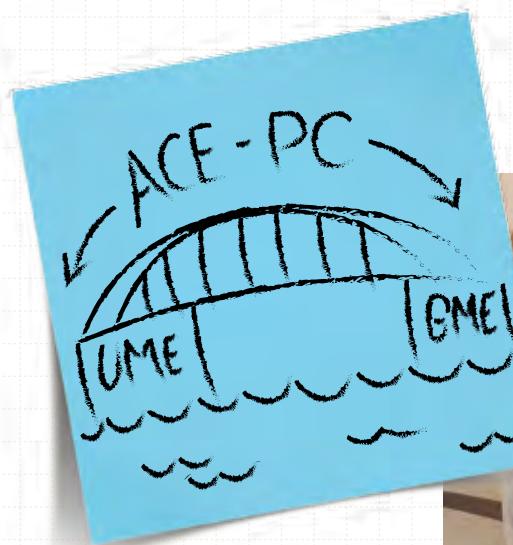
## PROJECT HIGHLIGHTS

This project has required the leadership and staff of UC Davis, a large public research university, to work closely with physicians and administrators at KP Northern California, a large integrated managed health care system. The fundamentals course for ACE-PC students is built upon KP's summer internship on chronic conditions management and the UC Davis doctoring course. UC Davis is modifying KP's physician "report card" to assess communication skills of ACE-PC students. Most of the clinical experiences will be at KP, including a new ACE-PC longitudinal integrated clerkship emphasizing primary care. The core team includes two UC Davis investigators and several KP physician leaders who facilitate relationships with clinical faculty and facilities. There are regular meetings between UC Davis and KP leaders, course directors and staff to discuss the new program, address concerns and manage implementation. KP faculty are increasingly engaged in UC Davis undergraduate medical education, including the admissions process, and UC Davis faculty remain highly engaged in both KP undergraduate and graduate medical education programs.

**"It seems really important to bridge the gap between UME and GME. These two worlds have really lived separately for probably too long."**

**Tonya Fancher, MD, MPH**

Principal investigator and associate professor,  
internal medicine, University of California, Davis,  
School of Medicine



ACE-PC students remain immersed in Kaiser's integrated health care system and patient-centered medical home for the duration of medical school, providing seamless integration between medical education and clinical practice. The clerkship year will be a longitudinal integrated clerkship in which students will complete all clerkships simultaneously rather than in eight-week blocks. Unique curricular content includes population medicine, chronic disease management, quality improvement, patient safety, team-based care, and preventive health skills with special emphasis on diverse and underserved populations. The first UC Davis ACE-PC students began in 2014.



**UCDAVIS**  
**SCHOOL OF MEDICINE**

# LOOKING TO THE FUTURE

Through the AMA "Accelerating Change in Medical Education" initiative, the original 11-school consortium is making impressive strides forward—strides that are now helping to reveal a clear blueprint for the medical school of the future.

This medical school will do more than produce students prepared for the next stage of physician training. It will imbue future physicians with the skills needed to be proficient in health care delivery science and prepare them to lead innovation in caring for patients and communities in our modern health system.

Today, our consortium schools are providing innovative curriculum that embeds students in real-world experiences, introduces them to cutting-edge technology and helps them become lifelong learners. More than expert clinicians, these schools will graduate new physicians who are system-based thinkers, change agents, technology champions and interprofessional team players.

To help drive this change, the Accelerating Change in Medical Education Consortium has formed an evalua-

tion committee and is developing the means to assess programs, gather information about effective reform, create national benchmarks and disseminate lessons learned as the various projects progress.

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"There appears to be a tsunami of interest in changing and enhancing medical education coming from the medical schools. They want to implement these ideas, but they face barriers that are extremely difficult to overcome. If it was easy, they'd be doing it. Now that we are partnering with the schools to break open constraints and lower the barriers, the opportunity for significant transformation is achievable."

—**Susan E. Skochelak, MD, MPH**  
Group vice president, medical education, AMA

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In 2016, with the expansion of our consortium, the AMA is more than doubling the number of schools participating in this effort. In expanding the consortium's ranks we seek mo-

tivated schools that want to make an impact, that have the ability to adapt and implement the innovations from our founding schools, and that will bring new ideas, projects and fresh perspectives to our work.

Creating a new model for physician education is an ambitious undertaking. It requires leadership, people, resources, institutions and organizations working together to drive meaningful change that will reverberate far beyond the "Accelerating Change in Medical Education" initiative.

At this watershed moment it's within our collective reach to influence the evolution of medical education and training in positive and dynamic ways. Having set our sights on building the medical school of the future, the AMA and our many partners are committed to creating a medical education system that both extends new models of learning across the continuum of physician training and carries new generations of highly skilled, highly motivated physicians deep into the 21st century. ■





"Medical students of the future will be better prepared to succeed, to learn and to practice in evolving health care systems. They'll be more capable of providing patient-centered care, practicing within professional teams, ensuring safety and providing good stewardship of our health care resources. They'll be able to use information technology to care for individual patients and to manage populations of patients."

—Richard Hawkins, MD  
Vice president, medical education outcomes, AMA



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