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ENVISIONING THE FUTURE OF HEALTH PROFESSIONAL EDUCATION

WORKSHOP SUMMARY

Patricia A. Cuff, *Rapporteur*

Global Forum on Innovation in Health Professional Education

Board on Global Health

Institute of Medicine

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

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[2] This is the list of Forum members as of April 24, 2015.

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Reviewers

This workshop summary has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published workshop summary as sound as possible and to ensure that the summary meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the process. We wish to thank the following individuals for their review of this workshop summary:

Geraldine "Polly" Bednash, American Association of Colleges of Nursing
Thomas Warren Clawson, National Board for Certified Counselors, Inc. and Affiliates
Michelle Troseth, National Academies of Practice
Sanjay Zodpey, Public Health Foundation of India

Although the reviewers listed above have provided many constructive comments and suggestions, they did not see the final draft of the workshop summary before its release. The review of this workshop summary was overseen by **Don Eugene Detmer,** University of Virginia. He was responsible for making certain that an independent examination of this summary was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this workshop summary rests entirely with the rapporteur and the institution.

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Acknowledgments

It has been 5 years since the release of the Lancet Commission report *Health Professionals for a New Century* (Frenk et al., 2010), which initiated conversations for starting a global forum on health professional education (HPE) through the National Academies of Sciences, Engineering, and Medicine. The Forum is now in its fourth year of existence and has explored numerous topics including interprofessional education, professionalism, assessment of HPE, and community-based HPE, as well as related policy issues. Part of the Forum's portfolio also looked at the business side of the health professions. By bringing together thought-leaders who are passionate about both empowering women and strengthening health systems, members of the Forum learned how investment firms are promoting both goals through the social financing of nursing and midwifery enterprises across the globe. Forum members recognize the importance of learning from developing country experiences despite the logistical challenges posed by engaging speakers from low-resource regions of the world. Regardless, the Forum remains committed to greater inclusivity from global experts as well as further attention to faculty development for building a competent global health workforce.

Combining all of these efforts with the 5-year anniversary of the Lancet Commission report, it seemed fitting for the Global Forum to take stock of how far health professional education has progressed in the past 5 years toward the recommendations put forth by the Lancet Commission report. The topic of this workshop, *Envisioning the Future of Health Professional Education*, did just that. The workshop planning committee pulled together an agenda that drew messages and lessons from past experiences for guid-

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ing the path forward. In particular, the workshop planning committee co-chairs, Beth Mancini and Christopher Olsen, deserve recognition for their leadership in this endeavor, as well as the planning committee members, Timi Agar Barwick, James Fox, Andrew Pleasant, Susan Skochelak, Maria Tassone, and Deborah Trautman, for their support throughout the workshop. Such a wonderful event could not have happened without the keen dedication of the Academies staff of the Global Forum, including Patricia Cuff, senior program officer and forum director; Megan Perez, research associate; and Bridget Callaghan, research assistant. A special thank you goes to Patrick Kelley for envisioning and establishing the Global Forum. And most importantly, the 45 sponsors and 55 members of the Global Forum on Innovation in Health Professional Education are deeply appreciated, and make it possible to host events like the workshop described in this report.

REFERENCE

Frenk, J., L. Chen, Z. A. Bhutta, J. Cohen, N. Crisp, T. Evans, H. Fineberg, P. Garcia, Y. Ke, P. Kelley, B. Kistnasamy, A. Meleis, D. Naylor, A. Pablos-Mendez, S. Reddy, S. Scrimshaw, J. Sepulveda, D. Serwadda, and H. Zurayk. 2010. Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. *Lancet* 376(9756):1923-1958.

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Acronyms and Abbreviations

AACN	American Association of Colleges of Nursing
AAVMC	Association of American Veterinary Medical Colleges
ACA	Patient Protection and Affordable Care Act
ADEA	American Dental Education Association
AHRQ	Agency for Healthcare Research and Quality
AIMS	Automated Intelligent Mentoring System
AMA	American Medical Association
CHW	community health worker
CRI	Canyon Ranch Institute
FAO	Food and Agriculture Organization
FIOCRUZ	Fundação Oswaldo Cruz
FQHC	Federally Qualified Health Center
HPE	health professional education
HPV	human papillomavirus
IHI	Institute for Healthcare Improvement
IHPE	Innovation in Health Professional Education (the Forum)
IOM	Institute of Medicine
IPE	interprofessional education
IPEC	Interprofessional Education Collaborative
IPP	interprofessional practice

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IT	information technology
LINC	Leaders in Innovative Care
MOH	Ministry of Health
MOOC	massive open online course
NGO	nongovernmental organization
NIH	National Institutes of Health
OIE	World Organization for Animal Health
PA	physician assistant
RDN	Registered Dietitian Nutritionist
REACH	Redesigning Education to Accelerate Change in Healthcare
SA	social accountability
SSH	Society for Simulation in Healthcare
SyNC	Systems Navigation Curriculum
TeamSTEPPS	Team Strategies and Tools to Enhance Performance and Patient Safety
TQA	Teachers of Quality Academy
WHO	World Health Organization

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Introduction[1]

In 2009, 20 experts from around the globe gathered to create a roadmap for transforming health professional education for advancing health. Their ideas were captured in the Lancet Commission report on health professions education for the 21st century (Frenk et al., 2010). According to Richard Horton, editor of *Lancet*, the commissioners had certain guiding principles to adhere to in producing a report that would address population health needs from a global perspective, while considering a systems approach to education reform within the context of a changing health workforce.

One of the commissioners of the report, Susan Scrimshaw, provided opening remarks at the Forum's public workshop taking place in Washington, DC, on April 23–24, 2015.[2] Titled Envisioning the Future of Health Professional Education (HPE), this workshop aimed to

- Explore the implications that shifts in health, policy, and the health care industry could have on HPE and workforce learning.

[1] The planning committee's role was limited to planning the workshop. The workshop summary has been prepared by the rapporteur (with acknowledgment of the assistance of staff as appropriate) as a factual account of what occurred at the workshop. Statements, recommendations, and opinions expressed are those of individual presenters and participants and are not necessarily endorsed or verified by the National Academies of Sciences, Engineering, and Medicine. They should not be construed as reflecting any group consensus.

[2] For the list of Forum members and their affiliations, please see the Forum roster on pages vii and viii.

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- Identify learning platforms that could facilitate effective knowledge transfer with improved quality and efficiency.
- Discuss opportunities for building a global health workforce that understands the role of culture and health literacy in perceptions and approaches to health and disease.

In her remarks, Scrimshaw reflected on the development of the Lancet Commission report and the desire of many of the commissioners to expand the report's messages beyond medicine, nursing, and public health. But due to time and financial constraints, they were forced to focus their messages and hope a more diverse group, such as the Global Forum, would expand upon the messages of the report. Scrimshaw expressed great satisfaction in knowing the National Academies of Sciences, Engineering, and Medicine is continuing the commission's work through convening and consensus activities.

Scrimshaw and others believed that more was needed from the less formal sectors, such as traditional healers and midwives who fill key roles in health systems around the world. She also felt the social determinants of health deserved greater recognition in the report. And while the commissioners anticipated some of the ensuing societal changes, they did not fully anticipate the pace of change in health care delivery and intense economic pressures driving change. For example, the commissioners discussed the effect of technology on health professions education and the work of health professionals, but they did not anticipate how rapidly technology would transform these and other sectors. Similarly the commissioners talked about pandemics but could not have imagined the destruction of health care systems and the loss of health professionals that occurred in Guinea, Liberia, and Sierra Leone as a result of Ebola.

As Scrimshaw speculated about the task ahead—envisioning the future of HPE—she encouraged the group to consider the challenges she just mentioned as well as a very major challenge that some Forum members recently referred to as a "chasm." This chasm is the increasing gap between what future health care professionals are being taught and what the health care delivery system and the social and local environments currently look like. Students are being prepared for a system that no longer exists. It is a system that is changing far more rapidly than the context of HPE as outlined by the Lancet Commissioners:

> Professional education has not kept pace with these challenges, largely because of fragmented, outdated, and static curricula that produce ill-equipped graduates. The problems are systemic: mismatch of competencies to patient and population needs; poor teamwork; persistent gender stratification of professional status; narrow technical focus without broader contextual understanding; episodic encounters rather than continuous

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> care; predominant hospital orientation at the expense of primary care; quantitative and qualitative imbalances in the professional labour market; and weak leadership to improve health-system performance. (Frenk et al., 2010, p. 1923)

This, said Scrimshaw, is our challenge.

Some of today's HPE may not be relevant even by the time students graduate, said Scrimshaw, further hampering change because tomorrow's faculty are also not being trained in a relevant environment. To remain relevant, educators would have to anticipate what the health and medical systems would be like in 10, 20, and 30 years, and structure an education that allows health professionals to adapt to unanticipated changes. The goal is to create lifelong learners. But that does not alleviate the current challenge of working with existing health professionals to bring them into the world that has changed tremendously since their educational experience.

Chris Olsen, with the Association of American Veterinary Medical Colleges (AAVMC) and associate director for One Health at the University of Wisconsin–Madison Global Health Institute, is part of the current educational workforce. He offered his own metaphor in how he and his generation were taught to think about evolutionary change. "It was like this big, gently rolling ball that moved across the landscape at a gentle, consistent pace. That is how change happened." Olsen went on to say that his thinking has since shifted. Evolution is more like taking a big heavy square block and putting pressure on one side until eventually, it tips over to the next side. It is more of a punctuated process. Olsen compared his square evolutionary rock to changes in health and well-being around the world, as well as changes in health policy, health care workforce education, and health care systems. These have not been gentle rolling balls in recent decades, but more like massive bricks that require intense outside pressure to move. When enough force is placed on the system, there is a jolt into a new world order. What will be the outside pressure that compels education to change? And might it be possible, asked Olsen, to shift HPE from a reactive mode that follows trends in health care to one that is proactive and leads changes in health systems and societies?

WORKSHOP CONTEXT

Remarks of Scrimshaw and Olsen provided some of the big picture ideas that were considered by the planning committee charged to structure a workshop agenda based on the statement of task in Box I-1. The Lancet Commission report mentioned in Scrimshaw's opening comments as well as the Institute of Medicine's (IOM's) *The Future of Nursing* report (2011) drove the establishment of the Global Forum and underpinned many of the

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BOX I-1
Statement of Task

An ad hoc committee under the auspices of the Institute of Medicine (IOM) will plan and conduct a 2-day public workshop to explore recent shifts in the health and health care industry and their implications for health professional education and workforce learning. The workshop will likely explore such topics as:

- Opportunities for new platforms of communication and learning
- Continuous education of the health workforce
- Global health professional education, training, and practice and the role of culture in perceptions and approaches to health and disease
- Opportunities for team-based care and other types of collaborations
- Social accountability of the health professions

These issues will be examined in a 2-day public workshop that will be planned and organized by an ad hoc committee of the IOM. The committee will develop a workshop agenda, select and invite speakers and discussants, and moderate the discussions. Following the workshop, an individually authored summary of the event will be prepared by a designated rapporteur in accordance with institutional guidelines.

topics explored by workshop presenters and participants at the workshop. In particular, Laura Magaña Valladares from the Instituto Nacional de Salud Pública described the recommendations in the Lancet Commission report as validation for why the health professional system of education must change.

The Lancet Commission Report: Where Do We Go Next?

Laura Magaña Valladares, M.S., Ph.D.
Instituto Nacional de Salud Pública

Laura Magaña Valladares began by summarizing why change is necessary for improving health care. This led to a description of how improving health involves pressure and challenges in both the health and education systems, as well as a review of recommendations that promote innovations from the Lancet Commission report. She closed with a description of what could potentially create the radical change she envisions that would reinvent HPE.

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Health Care System Forces Pressuring HPE to Change

Within the health system, Magaña identified four main forces pressuring HPE to change. The first involves global epidemiologic and geographic transitions. There is a growing elderly population and therefore a greater number of age-related ailments requiring care. Similarly, the health impacts of more people living with chronic disease and obesity have already begun to overwhelm health systems around the world. Second is the challenge of poverty and the huge disparities between and within countries. The *World Health Report 2006, Working Together for Health* called to light a variety of indicators for health disparities that were socially determined (WHO, 2006). For example, the life expectancy of a girl born in Sierra Leone is half as long (42 years) as a girl born in Japan (86 years). And the chance of a child dying before age 5 in Angola is 90 times higher than in Finland. Such disparities exist within high-income countries such as the United States; according to Michael Marmot (2006), life expectancy rises roughly 1.5 years for each mile traveled from Washington, DC, to the more affluent suburb of Montgomery County, Maryland.

The third main area of pressure on HPE stemming from health systems involves access and quality of care. This affects all countries around the world. There has been a shift in health services needed by the population; instead of care being focused on short, acute episodes, appropriate care for long, chronic diseases is required. Most health institutions and the health workforce have not yet made this transition. Besides, health systems are struggling to find ways to give services to all people in economically constrained times. The fourth area of pressure Magaña identified is globalization. Every global event has local consequences, and every local action has global implications, which leads to globalization. Globalization creates challenges to local health systems attempting to provide culturally sensitive care in a cost-conscious world.

Education System Forcing a Revolution

Magaña expressed a belief that the emergence of information and communication technologies is forcing a revolution within education. A new type of society has been created through Internet accessibility. However, many institutes of higher learning are having to be pushed to acknowledge other nontraditional sources of information and remain slow adapters of education that will prepare students to become lifelong learners. Such preparation might include demonstrating an ability to find accurate information and discriminate between biased and unbiased sources. It might also involve exhibiting competency in collecting, analyzing, comparing, and judging information from a variety of traditional and nontraditional

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sources. These sorts of skills, says Magaña, could position the next generation to be creative, imaginative thinkers rather than focusing on filling the curriculum with more content.

Another component of the technological education revolution is that mobile technology has enabled schools to move away from the traditional classroom into a virtual environment. And while learning is no longer associated with a physical facility, universities continue to request funds to build newer and larger facilities. This is in conflict with the technological revolution, as are paper handouts that continue to be used despite cloud-based technology enabling new ways to access, store, and share information. Having a mobile society in an increasingly interconnected world opens the classroom to global sharing of resources and greater integration of new actors and multiple stakeholders.

Enhanced collaboration holds the potential for minimizing fragmentation. There are examples where this is done effectively by making global connections through networks and alliances; but there are also examples—as in joining the planning mechanism between the Ministry of Health and the Ministry of Education—where fragmentation is the norm and collaboration remains inadequate. In education, technology provides opportunities to more easily integrate new professions into the curriculum, but it should be emphasized that it is not just about the technology. Technology is the platform by which connections can be made, but it is the pedagogy that engages students in learning. There have been great advances in education and cognitive sciences; it is now known how people learn, and what can be done to design learning environments that engage different audiences and provide meaningful and significant learning.

To remain relevant, education has to reflect changes in the professional work environment, said Magaña. Work is increasingly multidisciplinary and collaborative, thus curricula, learning, and activities have to include approaches that reflect what students are likely to encounter after graduation. Much of this can be facilitated now by technology and by pushing students to work together toward a common good. Linkages would not just be with people from the health sector, but would also include nonhealth professions, such as architecture and engineering. However, to accomplish this, she said, the educational system must change along with professors' roles; faculty now need to concentrate on how to design learning environments and how to motivate, accompany, and coach students to facilitate learning.

A New Approach to HPE

When designing a new approach to HPE, Magaña stated that the educator also has to take into consideration changes in student populations in recent decades. There are now basically two kinds of students: adults re-

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turning to school for retraining, and technologically oriented young people eager to continue their formal training. She said this latter group is generally more comfortable with digital networks than a face-to-face discussion. They are usually accustomed to multisensory environments and have little patience. They tend to also be a more practical group and are ready to demand the fulfillment of their own needs.

Are educators creating environments that facilitate learning for all the varied students they are likely to encounter? Have they considered moving to certification of competencies that are not constrained by physical boundaries and maximize e-learning so for example, learning might be conducted through a massive open online course (MOOC), through another virtual university, or in the workplace? The important element across all the environments would be competency—a recommendation of the Lancet Commission report (Frenk et al., 2010). In the report, commissioners identified instructional and institutional reforms that along with enabling actions would lead to transformative and interdependent professional education. Recommendations from the report are noted in Box I-2. Magaña explicitly wondered what HPE is doing to nurture a culture of critical inquiry. She then reiterated that education has not kept pace with a changing society; while she realizes that money and political power are important elements to instigate change, it is still possible to propel HPE forward using the tools educators have available to them today.

The first tool accessible for educators is the curriculum. Making it less content specific and more about crosscutting competencies would improve the applicability of the learning, said Magaña. Every bit of information cannot be included in each curriculum. According to Densen (2011), it took 50 years—from 1900 to 1950—for medical knowledge to double. In 1980 and 2010, it took 7 years and 3.5 years, respectively—but in 2020, it is projected that knowledge will double every 73 days. Magaña said that to her, this means students have immediate access to information, so thinking about how to reduce the content of the curriculum while increasing experiential learning would provide more of the crosscutting competencies. This would create "thinkers" and "problem solvers" rather than "regurgitators."

The second available tool would make better use of other health and non-health professionals and professions in a more transdisciplinary or transprofessional manner. The third tool would be to realize that the epidemiology of disease has shifted from acute, often infectious episodes to more chronic disease. Magaña said that this calls for greater emphasis on health promotion and lifestyle choices that will deter the development of future diseases.

Being flexible with the curricula would facilitate what Magaña called a kaleidoscope view, meaning that it does not matter where the students enter

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BOX I-2
Recommendations from the Lancet Commission Report: Health Professionals for a New Century: Transforming Education to Strengthen Health Systems in an Interdependent World

1. Adopt competency-based curricula.
2. Promote interprofessional and transprofessional education.
3. Exploit the power of information technology for learning.
4. Adapt locally but harness resources globally in a way that confers capacity to flexibly address local challenges.
5. Strengthen educational resources, because faculty, syllabi, didactic materials, and infrastructure are necessary instruments to achieve competencies.
6. Promote a new professionalism that uses competencies as the objective criterion for the classification of health professionals.
7. Establish joint planning mechanisms in every country.
8. Expand from academic centers to academic systems, extending the traditional discovery–care–education continuum, strengthened through external collaboration.
9. Link together through networks, alliances, and consortia between educational institutions worldwide and across.
10. Nurture a culture of critical inquiry as a central function of universities and other institutions of higher learning.

SOURCE: Frenk et al., 2010, pp. 1951–1952, as presented by Magaña on April 24, 2015.

the system, but rather what skills they have when they enter. In this way, education is more personalized and emphasizes needed competencies of the learner rather than a tubular view that forces all learners to follow the same curriculum and have the same prerequisites regardless of past experiences and previously obtained competencies. A flexible curriculum would also consider the evidence around active learning that has been shown to be of greater benefit than traditional, more passive techniques of education (Melo Prado et al., 2011). In the end, students need to be engaged regardless of the learning platform used.

For these changes to occur, the faculty would need the competencies for educating in this manner. This new faculty would understand different forms of pedagogy, technology for knowledge transfer, and the role of the educator as focusing less on "teaching" and more on "student learning." Professors would concentrate on designing learning environments, motivating and coaching students, and accompanying them on their journey

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of learning. The emphasis would not be on academia and research for publishing papers, but instead on connecting with policy makers to push for real change.

Magaña concluded by encouraging the audience to take advantage of the workshop as a space where educators, students, and other stakeholders can come together to think through what the future holds and how changes in society affect HPE. In this way, faculty can prepare students to address current and future health challenges using the most effective learning tools and techniques for a given situation. By sharing what works and what does not work, others can learn from the successes and failures of others, which is necessary for promoting health and treating patients in this rapidly changing world.

SCOPE OF THE REPORT

An overarching theme that started with Susan Scrimshaw but perpetuated throughout the presentations was the notion that we are preparing learners for a health system that no longer exists. The tragedy, as described by Malcolm Cox, is that not only are we preparing people incorrectly, but we are also spending large amounts of money on education in a wasteful fashion. Throughout the workshop, many attendees expressed that the way learners are prepared needs to change in order to create a very different workforce than the current workforce. Cox also remarked on the relevance of Olsen's metaphor termed *punctuated evolution*. Olsen asked, how do you roll a square ball? And how do you get to the tipping point so it falls over? HPE is not yet at the tipping point, but that, according to Cox, is the real work of the Forum—to illuminate ideas on how to move education to where learners are prepared for the current and future health system.

Examples of how to make education more relevant were presented at the workshop and appear in Chapters 1 and 2 of this report. Many of the described models and programs involved partnerships inside and outside of academia. Francisco Eduardo de Campos, former National Secretary of Labor and Education Management in Health of the Ministry of Health, Brazil, talked about the similarities and differences among health care systems around the world and focused on his work in Brazil. Brazil's political commitment to primary health care has forced Campos and his colleagues to think creatively about how to respond to the call for universal health coverage. They instigated family health teams composed of a physician, nurses, dentists, and community health workers (CHWs), and redesigned the curricula for all the health professions so they are prepared to work within the new system of community-based care.

Susan Skochelak, representing the American Medical Association, moderated a panel of speakers who described unique curriculum designs and

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structures that get students out of the classroom and into the community. One of the speakers, David Asprey, also discussed how he and his colleagues went about designing a more cost-efficient curriculum. While he focused on combining curricula of physicians assistants and medical students, the concepts could be applied more broadly. Tied to these presentations were small table discussions led by Timi Agar Barwick from the Physician Assistant Education Association. These questions included

- Who are the educators of the future, and how will their roles be different from the traditional teacher?
- How will these evolving roles affect the educational process and the community?

Participants' responses to these questions appear in Chapter 2. The third chapter looks at a changing health workforce. The first section of Chapter 3 describes using a debate format to actively engage the audience on important topics for health professions educators. Deborah Trautman from the American Association of Colleges of Nursing managed the debate on work–life balance, where Richard Talbott (Association of Schools of the Allied Health Professions) and Richard Valachovic (American Dental Education Association) presented extreme viewpoints on whether or not health professional schools should adjust their curriculum and training to provide greater work–life balance for their learners. This issue was also contemplated by speakers representing perspectives from Nigeria and China.

The second debate was moderated by Holly Wise from the American Council of Academic Physical Therapy. This debate, presented by Liza Goldblatt (Academic Consortium for Complementary and Alternative Health Care) and Elaine Tagliareni (National League for Nursing), looked into the pros and cons of creating new worker roles for supporting health professionals versus expanding the jobs of health professionals to meet individual and community health needs. A perspective from Nigeria was again presented.

Later in this report, Andrew Pleasant—who joined the workshop through a collaboration with the Academies' Roundtable on Health Literacy—provided some remarks on globalization and challenges to HPE that he felt would be best dealt with through a health literacy framework. Clifford Coleman and Jennifer Cabe described how they each put health literacy into their health professional training programs and argued that health literacy should be the organizing framework of HPE. However, in Chapter 4 there were numerous presentations by veterinarians promoting One Health as the appropriate framework for organizing the health professions and their education. This education would broaden current curricula

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to integrate human health, animal health, and ecosystem health in a global structure.

It should be further noted that in an effort to create a smoother flow of the statements made at the workshop and captured in this report, not all of the text follows the chronological order in which the discussions took place or appear in the agenda found in Appendix A. The biographies of speakers can be found in Appendix D.

Appendix B includes the IOM and Society for Simulation in Healthcare Gaming Arcade and Showcase game descriptions. The Gaming Arcade took place during the April 23 evening session of the workshop, and showcased 26 games and technologies that educate health professionals. Appendix C is composed of abstracts that are written versions of the webcast presentations provided by some of the members of the Forum or their organizational affiliate. Each abstract is an example of an activity that exemplifies *envisioning the future of HPE*, and authors were given flexibility in defining what this means for their context and in determining the material to be presented.

REFERENCES

Densen, P. 2011. Challenges and opportunities facing medical education. *Transactions of the American Clinical and Climatological Association* 122:48-58.

Frenk, J., L. Chen, Z. A. Bhutta, J. Cohen, N. Crisp, T. Evans, H. Fineberg, P. Garcia, Y. Ke, P. Kelley, B. Kistnasamy, A. Meleis, D. Naylor, A. Pablos-Mendez, S. Reddy, S. Scrimshaw, J. Sepulveda, D. Serwadda, and H. Zurayk. 2010. Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. *Lancet* 376(9756):1923-1958.

IOM (Institute of Medicine). 2011. *The future of nursing: Leading change, advancing health*. Washington, DC: The National Academies Press.

Magaña Valladares, L. 2015. *The Lancet Commission Report: Where do we go next?* Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 24.

Marmot, M. 2006. Interview with Sir Michael Marmot. In *Unnatural causes: Is inequality making us sick?*, edited by Unnatural Causes. Cambridge, MA: PBS.

Melo Prado, H., G. Hannois Falbo, A. Rodrigues Falbo, and J. Natal Figueiroa. 2011. Active learning on the ward: Outcomes from a comparative trial with traditional methods. *Medical Education* 45(3):273-279.

WHO (World Health Organization). 2006. *The world health report 2006: Working together for health*. Geneva, Switzerland: WHO.

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1

Building the Health Workforce

Key Messages Identified by Individual Speakers and Participants

- Despite constitutional guarantees of health care in Brazil, there is no way that the government can assist everyone in tertiary and highly complex systems. The only solution is to strengthen a primary health care system, which can address 80 percent of the health care demand. (Campos)
- Despite the high quality of care, the amount of money being made downstream in all the procedures, all the emergency room visits, and all of the surgeries and hospitalizations cannot make up for the fact that for 20, 30, and even 40 years, Native Americans have suffered from the worst educational outcome, the poorest access to nutrition, social marginalization, racism, and many other causes that make up the social determinants and underlie why people are ill. (Kaufman)

HEALTH WORKFORCE ISSUES, HEALTH PROFESSIONAL EDUCATION, AND TECHNOLOGY

Francisco Eduardo de Campos, M.D., Ph.D., Ms.C.
Open University of National Health System of Brazil

Professor Francisco Eduardo de Campos is a public health specialist and physician who was the Minister of Health's Secretary of Human

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Resources following the democratization of Brazil. In that position, he led the proposal for unification of the Brazilian health system and coordinated the human resources group in the National Commission of Health Reform. From 2005 to 2010, Campos was secretary of management of education and the workforce for health and is currently the executive secretary of the Open University of the National Health Systems.

Campos began his keynote address by describing some of the changes affecting the health workforce. There is an aging population and there are proposals for universal health coverage; there are also calls for greater attention to the prevention and control of noncommunicable diseases by the United Nations General Assembly while the number of major epidemic outbreaks appears to be growing. These changes and calls for change are intensifying the quantitative and qualitative scarcity of health workers in the world. The World Health Organization (WHO) estimates the current workforce deficit to be at 7.2 million, but by 2035, that number is expected to rise to almost 13 million (WHO and GHWA Secretariat, 2013).

With the increasing desire and need for greater care to more people, Campos questioned how this would be paid for. For example, on average Brazil spends 10 percent of what the United States spends on health care. However, in breaking it down, the top 2 percent of Brazil's population spends as much as someone in the United States, leaving few resources for the rest of the population. The new Brazilian constitution contains four articles stating that health is a right in the country and a duty of the state. The government is now struggling to determine how to make this vision a reality.

Roughly 70 percent of the Brazilian population depends exclusively on the national health system, while about 30 percent are on private plans. As more people move from poor to middle class, they desire private insurance, although the National Health System in Brazil covers 100 percent of the costs of vaccines, emergency care, epidemiologic surveillance, and the like because it is in the constitution. Paradoxically, Brazil leads the world in publically funded organ transplantations and is second only to the United States in the number of these highly complex procedures that are performed yearly. The situation is similar for expensive medications that fall within the national health system liability and have led to litigations linked to the constitutional guarantee. But despite these constitutional guarantees to health care, there is no way that the government can assist everyone in tertiary and highly complex systems. The only solution, said Campos, is to strengthen a primary health care system, which can address 80 percent of the health care demand.

Currently in Brazil there are about 44,000 family health teams spread around the country covering roughly 65 percent of the population. Cou-

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pling this with the 30 percent who have private insurance, Campos believes that everyone is covered by the health system in Brazil.

Family health teams are composed of a physician, nurses, dentists, and community health workers (CHWs). Most teams employ six CHWs who are recruited locally by the municipalities. The system is quite decentralized in Brazil and is run by the municipalities that hire local workers to provide primary health care to populations in specific geographic districts that are assigned to them. Figure 1-1 shows the progress between 1998 and 2014 of providing family health teams to the population. The light grey points are municipalities without a primary health care team, and the dark grey points are the municipalities with family health teams.

This rise in the number of family health teams demonstrates Brazil's political commitment to primary health care. It is seen as a pathway that must be integrated with the entire network. There is a strong referral system at secondary hospitals, community hospitals, and tertiary hospitals that, in general, are the university hospitals in Brazil. While the system is in place, Campos said the challenge for the Brazilian leadership is human resources. Having a properly trained and motivated professional team that is willing

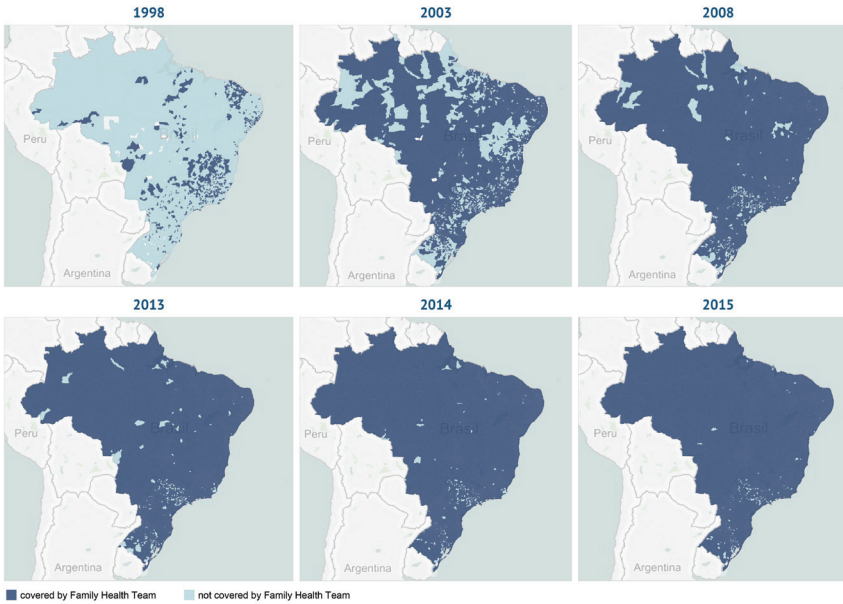

FIGURE 1-1 Timeline of family health teams deployment in Brazil, 1998 to 2015. SOURCE: Department of Primary Care, Brazilian Ministry of Health (MOH), 2015, as presented by Campos on April 23, 2015.

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to work in rural and remote villages was traditionally the main constraint of the strategy. However, talks with the Ministry of Health are aimed at reversing the situation. Some of the proposed policies would include expanding enrollments, changing curricula, improving employment, offering eHealth, providing continuous education, and hiring foreigners. For example, Brazil currently has 13,000 Cuban doctors. Though this is a major controversy, it was the Cuban workers who enabled Brazil to increase the number of teams from 33,000 to around 40,000.

Campos selected "changing curricula" and "continuous education" to describe in greater detail. Brazil used to have a conservative and traditional medical and professional education. As seen in Figure 1-2, this program is set up to consider three axes. The first axis is learning scenarios, the second is health concept, and the third is methodology. The first row is in red to metaphorically indicate what education should not be; it should not be centered on tertiary hospitals, be based on diagnosis and treatment, or be founded on teacher-centered lectures.

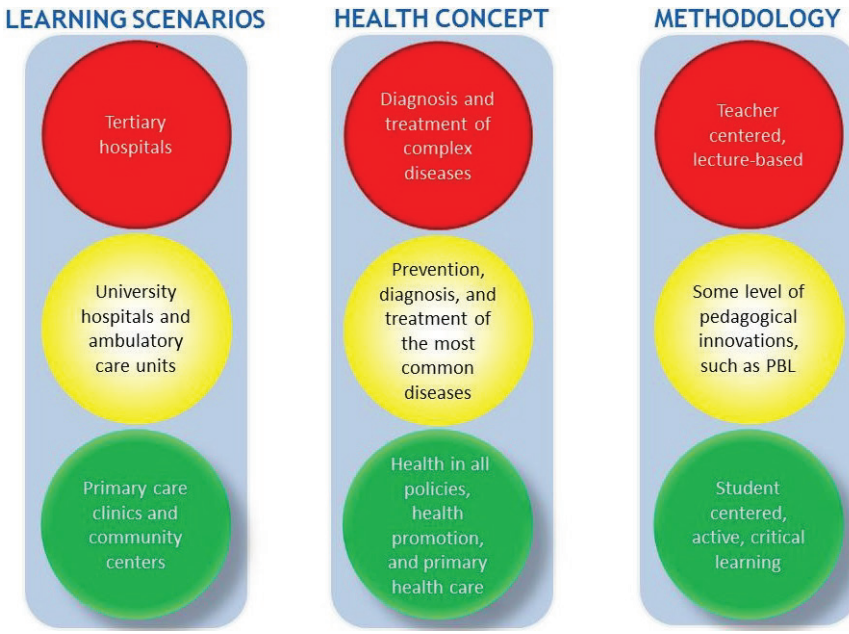

FIGURE 1-2 Three axes of a metaphorical approach to health professional education in Brazil.
NOTE: PBL = problem-based learning.
SOURCE: Campos, 2015.

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The yellow circles contain learning scenarios that can be brought in for the most common diseases and taught using somewhat innovative pedagogy. The green circles in the bottom row are what education is striving to be. This includes a focus on primary health clinics and community health centers, health policies that address the social determinants of health, and education that is student centered, active, clinical, and emphasizes critical thinking.

Ideally for Brazil, the red and yellow circles will be replaced by the green circles. To facilitate the shift, the Ministry of Health provided funding to all the schools in Brazil interested in changing their curricula. For example, funding could be sought by primary health care centers to obtain meeting space, upgrade facilities, or set up an Internet connection. At the end of his term, Campos reported that 365 colleges applied for resources from Ministry of Health to change their curricula.

Campos then discussed continuous education and an initiative he is responsible for in Brazil. The Open University of the National Health System has been set up by the federal government to offer continuous education. It is a consortium of public universities, based at Fundação Oswaldo Cruz (FIOCRUZ). It has the largest repository of open educational resources in Latin America and retains records of all health workers and their registered achievements. Open University was set up by the federal government through a presidential decree. It is a government-sponsored, interfederative and collaborative network of public universities in Brazil willing to participate in a program that goes beyond traditional graduate studies. There used to be scarce public support for continuous education in Brazil. As a result, much of the education is conducted by pharmaceutical companies, which according to one local newspaper, has become the main source of continuous education for doctors and a potential conflict of interest for them.

Currently the top-ranking federal universities of Brazil are participating in the program of continuing education of health professionals. There are roughly 2,000 educational tools and materials uploaded onto their platform that are accessible free of charge to everyone anywhere in the world. This is different than a massive open online course (MOOC). Examples of available courses offered at the university are

- Specialization in primary health care/family health (20,000)
- Other specializations: environmental health, mother and infant, aging
- Updates in home care
- Self-learning certified modules: dengue, influenza, chikungunya, malaria
- Equity issues: lesbian, gay, bisexual, and transgender people; indigenous; African descendants; and others

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They range from soft to strict certifications, online to offline opportunities, and profession-centered to more general courses. The total enrollment is close to 200,000 health professionals who can run the program on their mobile devices to maximize their educational time.

Campos described one course in more detail to demonstrate how the Open University is connecting to Ministry of Health policies. Six months ago, Brazil's Ministry of Health made the human papillomavirus (HPV) vaccination available to all girls free of charge. The minister asked health workers if they planned to make the vaccine available in their facilities, and they said doing so would require training of physicians and nurses on how to administer the vaccine. Open University responded by providing an online HPV vaccination course that grew in popularity with the rollout of the vaccine, and reached almost 13,000 health workers (see Figure 1-3). Some of those accessing the course worked in remote parts of the country that in the past would have needed several hours of flying time to reach a location where the course was offered.

In closing, Campos reiterated that well-educated, motivated, managed health workers are at the core of the health system, and for Brazil, primary health care is the pathway to universal access. But that is not where it ends. Primary health care must be networked with hospitals, with psychiatric care, and with dentists to fully function, and it must also be connected to all of the other networks in Brazil, said Campos. In addition, continuous education must be free from conflicts of interest and accessible to all in order to improve the availability and the quality of the health services, he said.

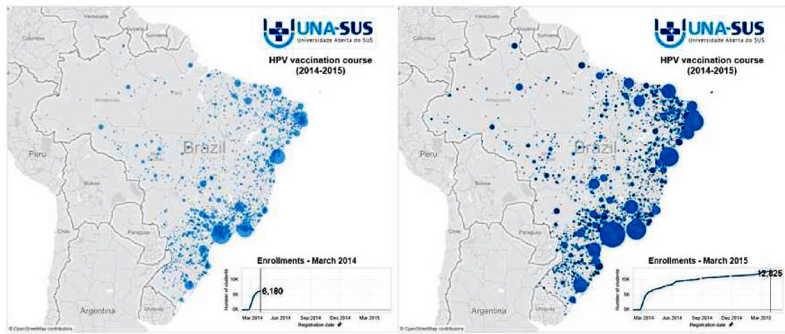

FIGURE 1-3 HPV vaccination course.
NOTE: HPV = human papillomavirus.
SOURCE: Campos, 2015.

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SOCIAL DETERMINANTS OF HEALTH: CHANGING THE CARE TEAM

Arthur Kaufman, M.D.
University of New Mexico

The Vice Chancellor for Community Health at the University of New Mexico, Arthur Kaufman, spoke about social determinants of health and changes his university is making to health teams. He illustrated his points through two examples. One drew upon ideas from the agriculture sector and the work of farmers, while the other took the lessons learned from Brazil's work with community health workers.

To set the stage, Kaufman asked the audience to consider a single health indicator—death from diabetes. Native Americans, who make up roughly 10 percent of New Mexico's population, have the highest mortality rates from diabetes despite having access to the best screening and treatment for diabetes (New Mexico Department of Health, 2010). One may ask how a population could have the best quality of care with the worst outcomes? The reason, said Kaufman, is that despite the high-quality care, the amount of money being made downstream in all the procedures, all the emergency room visits, and all of the surgeries and hospitalizations cannot make up for the fact that for 20, 30, and even 40 years, they have suffered from the worst educational outcome, the poorest access to nutrition, social marginalization, racism, and many other causes that make up the social determinants and underlie why people are ill. Social determinants include income, education, nutrition, housing, transportation, safety, social inclusion, and built environment. Despite our health system spending massive amounts of money on health care, Kaufman said that this system only accounts for 10 percent of reducing premature death (Schroeder, 2007). Kaufman raised the question of how to reallocate the 18–20 percent of the gross domestic product currently spent on health care toward upstream resources that actually improve health. As long as the current incentive system remains in place, he said, evidence produced that demonstrates the value of such a redirection of health service funds toward addressing social determinants will have little impact.

With a recognition of the financial and societal effects of the social determinants of health, the University of New Mexico embarked on creating a new vision:

> The University of New Mexico Health Sciences Center will work with community partners to help New Mexico make more progress in health and health equity than any other state by 2020. (UNM, 2015)

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This vison based success on how well "health" was achieved in the state. Kaufman acknowledged this was a risky proposition with fears the vision would not be achieved, but the institution moved forward regardless. As part of the plan, he and his colleagues adopted the 3/9/27 rule of effective public health messaging whereby communications like the vision statement would contain no more than 3 concepts, expressed within 9 seconds, in no more than 27 words. To translate the vision into action, Kaufman's group first traveled around the state gathering opinions from New Mexican citizens about the role of the university's health science center for improving citizens' health. It came as a surprise to learn that many were dissatisfied with the institution's performance. Main complaints included priority setting from the university's perspective instead of that of the community. Interest in the community by the university was often trigged by a grant with the disappearance of the university from the community when the grant ended, demonstrating little long-term commitment to the community. Citizens also said the university did not compare well to the state's agricultural college, which places full-time agricultural cooperative extension agents in every county in the state.

Extension is a program that provides informal education and learning activities to people throughout the United States, provided through U.S. land-grant colleges and universities (NIFA, n.d.). It applies knowledge from research to benefit agricultural producers, small business owners, consumers, families, and young people in an effort to improve lives. They help students graduate from schools with 4-H clubs, improve the quality of farming, and make agriculture more effective. In essence, they connect with people and communities, which was the model Kaufman and his colleagues wanted to duplicate.

The decision was made to create a parallel, University of New Mexico–run "health extension" system in New Mexico. A key role of the agents is to determine priority health issues for their community and to connect individuals with the university's health science center resources. In this way, the need drives the resources and not the other way around. For example, communities on the Navajo reservation grew tired of the constant turnover of doctors, nurses, and pharmacists. Their solution was to recruit and train locally so the health workers would be members of their community and would stay on the reservation to provide ongoing care to their neighbors. Through collaboration with the cooperative extension workers, the university's health extension agents were able to build such a program for educating, training, and placing local health professionals. This program has been scaled up and is available across the state.

Kaufman attributes the success of the health extension program to building and using connections with such local resources as state and junior colleges, community hospitals and health centers, civic organiza-

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tions, county health councils, and area health education centers. Another reason for their success is the community health agents themselves. These are frequently members of the community with a high school education but no training in health or health systems. Learning from other countries, Kaufman and his colleagues provided appropriate training to them making them part of the entire system of care. This gave agents tremendous respect by their communities that also translated into political power because agents have the ability to sway voters—a finding also expressed by Campos.

A second major development in addressing social determinants was the training and deployment of CHWs as an interface between the clinical health care system and the community. CHWs are paid by the university but are selected by their community. They are culturally and linguistically competent, live in the community they serve, are usually from underrepresented ethnic minority communities (such as Hispanic, Native American, and African American), are trusted members of the community, and have access to all the community's and university's resources to address local needs (Kaufman et al., 2010).

To get the program started and funded, Kaufman worked with health insurance companies who were focusing on managed care. This was now possible under the new U.S. health care law, the Patient Protection and Affordable Care Act, because for the first time, instead of managed care focusing on containing hospital costs, it was supporting upstream prevention efforts. The shift was mainly due to changes in reimbursement incentives through "capitation" (a system of payment for a person rather than for a service). With this system, providers who keep their patients and communities healthy and out of the hospital receive more of their per person payments.

The university's efforts to partner with health insurers created a 4:1 return on investment for the insurers through reduced emergency room use, fewer hospitalizations, and lower costs of medications. This program has now expanded to all 33 counties in New Mexico and is a model being replicated in 10 other U.S. states. But in most places across the United States, community health workers are employed to work with the top 5 percent of users of the health care system, known as the "hot spotters," who account for more than half of the health care spending in any enrolled population. By targeting these few individuals, often using health literacy with outreach from community health workers, it is possible to decrease hospitalizations and costs for people with severe disease. While the intervention does save money, it does not address population health or the underlying causes of disease. It does not prevent patients from becoming "hot spotters."

Kaufman and his colleagues adapted the hot spotters model to take into consideration the entire population. They are now using CHWs in a project working with 20,000 capitated Medicaid recipients in New Mexico

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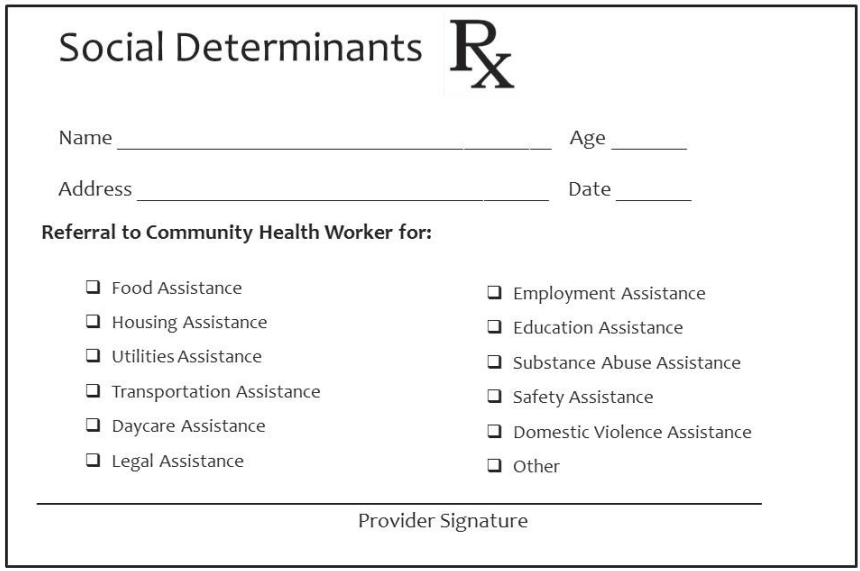

FIGURE 1-4 Social Determinants Rx.
SOURCE: Kaufman, 2015.

for chronic disease management and for prevention and wellness interventions for all enrollees. To identify risk for adverse social determinations in the general Medicaid population, Kaufman's group developed a "social determinants prescription pad" as a screening tool that could be part of the electronic medical record (as depicted in Figure 1-4).

Using this method, the CHWs have uncovered major adverse social determinants in at least half of the population walking into their clinics and health centers. The most common social determinant is not being able to pay for utilities, followed by the need for assistance with income, education, housing, and food. What many do not realize is that there are programs to assist patients with these needs. These are the sorts of issues the CHWs can address along with all the other social determinants, as well as patient medication compliance.

Kaufman closed by going back to the University of New Mexico Health Sciences Center's vision to make significant progress in health and health equity. Using data from the United Health Foundation (2015b),[1] it appears that New Mexico has improved its ranking since 2012 (see Table 1-1). The

[1] The database includes data on behaviors, community and environment, policy, and clinical care in order to generate reports that provide an overall sense of the nation's health. To access the database, visit americashealthrankings.org (accessed July 6, 2015).

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TABLE 1-1 U.S. Annual Health Ranking by State

2012 (ranking by state)	2013 (ranking by state)	2014 (ranking by state)
30 Illinois	30 Illinois	30 Illinois
31 Florida	31 Delaware	31 Texas
32 Delaware	**32 New Mexico**	32 Florida
33 Michigan	33 Florida	**33 New Mexico**
34 North Carolina	34 Michigan	34 Michigan
35 Texas	35 North Carolina	35 Delaware
36 New Mexico	36 Texas	36 Missouri

SOURCE: Kaufman, 2015, using data from United Health Foundation, 2015a,b.

change from 2012 to 2013 was particularly striking as New Mexico had the fourth highest jump in ranking compared to the other 49 states. And while Kaufman does not know whether his group will reach the 2020 goal set forth in their vision, he does know that the contribution of the university is making a small but significant difference in improving the lives of those negatively affected by the social determinants of health.

REFERENCES

Campos, F. 2015. *Health workforce issues, health professional education, and technology.* Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 23.

Department of Primary Care, Brazilian MOH (Ministry of Health). 2015. *Histórico de cobertura da saúde da família.* http://dab.saude.gov.br/portaldab/historico_cobertura_sf.php (accessed August 20, 2015).

Kaufman, A. 2015. *Social determinants of health: Changing the care team.* Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 23.

Kaufman, A., W. Powell, C. Alfero, M. Pacheco, H. Silverblatt, J. Anastasoff, F. Ronquillo, K. Lucero, E. Corriveau, B. Vanleit, D. Alverson, and A. Scott. 2010. Health extension in New Mexico: An academic health center and the social determinants of disease. *Annals of Family Medicine* 8(1):73-81.

New Mexico Department of Health. 2010. *Racial and ethnic health disparities report card.* Santa Fe: New Mexico Department of Health.

NIFA (National Institute of Food and Agriculture). n.d. *Extension.* http://nifa.usda.gov/extension (accessed July 6, 2015).

Schroeder, S. 2007. Shattuck lecture. We can do better—Improving the health of the American people. *New England Journal of Medicine* 357(12):1221-1228.

United Health Foundation. 2015a. *America's health rankings.* http://www.americashealthrankings.org (accessed August 12, 2015).

United Health Foundation. 2015b. *America's health rankings: A call to action for individuals and their communities.* Minnetonka, MN: United Health Foundation.

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Envisioning the Future of Health Professional Education: Workshop Summary

UNM (University of New Mexico). 2015. *HSC vision, mission and core values*. http://hsc.unm.edu/about/mission.shtml (accessed August 11, 2015).

WHO (World Health Organization) and GHWA (Global Health Workforce Alliance) Secretariat. 2013. *A universal truth: No health without a workforce. Third global forum on human resources for health report*. Geneva, Switzerland: WHO.

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2

Curriculum Redesign and Restructuring

Key Messages Identified by Individual Speakers and Participants

- Many programs could decrease costs by minimizing duplication of efforts. (Asprey)
- A major obstacle to getting started [with curricular redesign] was identifying faculty with the appropriate training and background in health system science to implement the program. (Baxley)
- It is important for a patient-centered health care delivery system to be supported by health care professionals working in teams that include families, communities, and other resources. In this way, the whole becomes interdependent and greater than the sum of its parts. (Wolpaw)
- We need to be listening to the people in the communities—patients, families, community leaders, and organizations—and bring forth a new vision particularly related to culture and community needs and assets, so the experiences of the health professions, while they are going through their education, is authentic. (Mancini)

Susan Skochelak heads the Accelerating Change in Medical Education initiative at the American Medical Association (AMA). This initiative

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funded 11 curricular innovations at medical schools.[1] Grantees were asked to transform medical education to prepare students for tomorrow's health care environment through bold, rigorously evaluated innovations. Too often, said Skochelak, educators' reforms stay within the same curricular structure. What she encouraged in her grant recipients was to introduce real reform to health professional education (HPE) that goes beyond "tinkering around the edges." She sought radical, fundamental dramatic changes in health care that started with curriculum redesign.

Two of the four panelists, Therese Wolpaw and Elizabeth Baxley, introduced by Skochelak in the session on models of partnerships inside and outside of academia, were the AMA grant recipients. And while all the speakers are part of programs that address interprofessional health education, the focus of this session was on curriculum structure and design. Each speaker was asked to envision health care education for a future workforce.

A MODEL FOR EDUCATIONAL EFFICIENCIES

David Asprey, Ph.D., PA-C
University of Iowa

David Asprey's presentation described the importance of educational efficiencies. He began by recognizing that educating health professionals is a time- and resource-intense activity. A lot of energy goes into establishing and maintaining human resources, facilities, and finance systems in order to produce a workforce that is believed to be ready to meet the needs of its nation. Asprey also acknowledged that many programs could decrease costs by minimizing duplication of efforts (see Box 2-1). This is particularly critical as education attempts to better model the collaborative nature of today's health care with its emphasis on efficiency and improved outcomes through team-based care.

The example Asprey used to describe how such efficiencies might be realized in education was drawn from the University of Iowa's Department of Physician Assistant Studies. Because the training model for physician assistants (PAs) is similar to the training model for medical doctors, it appeared a natural fit to combine curricular efforts with the university's medical school. Over time, both curricula were modified and revised so in the fall of 2014, a curriculum was implemented with very few unintegrated courses for years 1 and 2. The red boxes in Figure 2-1 are the first three semesters of the 4-year medical school curriculum where PA students and medical students now take those courses together.

[1] For more information about the Accelerating Change in Medical Education initiative at the AMA, visit changemeded.org (accessed July 7, 2015).

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BOX 2-1
Why Is Educational Efficiency Important?

- Education of health professionals is a time- and resource-intense activity.
- Combined curricular activities can reduce duplication of effort and resources.
- Health care is a team effort. Educational efficiency reduces training in isolation (silos).
- There are demonstrated benefits from interprofessional team care, and value in learning about, from, and with each other's professions.

SOURCE: Asprey, 2015.

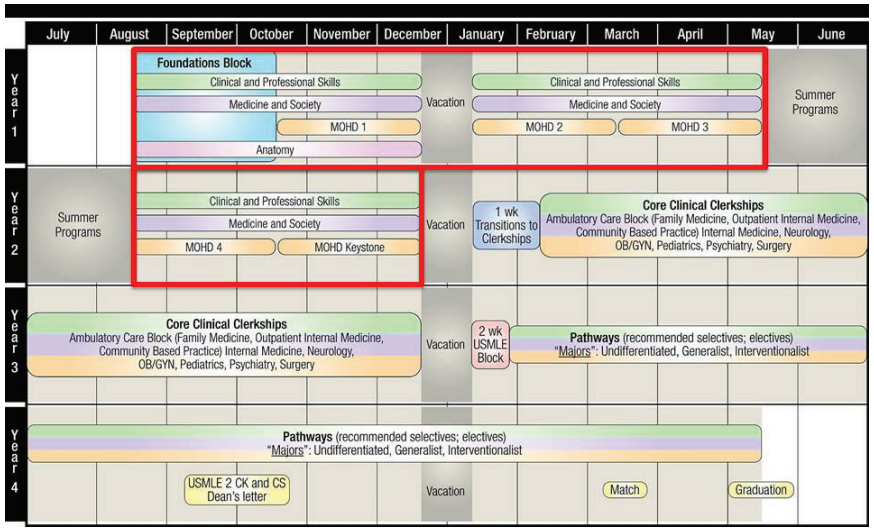

FIGURE 2-1 Carver College of Medicine: Mechanisms of health and disease curriculum.
NOTE: CK = Clinical Knowledge; CS = Clinical Skills; MOHD = Mechanisms of Health and Disease; OB/GYN = obstetrics and gynaecology; USMLE = United States Medical Licensing Examination.
SOURCE: Asprey, 2015, courtesy of Carver College of Medicine, Office of Student Affairs.

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Part of their newly integrated program involved "learning communities" where students from both schools and all years of education are assigned to one of four learning communities. These groups are staffed by a faculty director, a curriculum/community manager, and support staff, but it is the students themselves who initiate and provide leadership for community-engaged service activities (UI Carver College of Medicine, 2014). Such collaborative activities expose students to the other health profession through experiential, interprofessional learning and sharing.

Students' didactic co-learning decreased course duplication and maximized resources while the combined *learning communities* provided opportunities for learning from and with the other profession. Asprey considered this a success, but others raised concerns initially about the program. These concerns and Asprey's responses are listed in Table 2-1.

In closing, Asprey described some lessons learned. As with any interprofessional intervention, leadership was crucial to the success of his program. Asprey described supportive deans that set the tone for the institution. And while the University of Iowa chose to create a total emersion curriculum, Asprey does not believe that is the correct decision for all institutions seeking to create efficiencies through curriculum redesign. For many years, their program was a hybrid version where particular courses were selected for educating the two professions together. This provided some cost savings and some opportunities to bring different students together. Asprey emphasized the value of *learning communities* for IPE. These can be especially useful for engaging a variety of different professions whose curricula are impossible to match. And finally, Asprey encouraged others

TABLE 2-1 Concerns Raised and Asprey's Responses

Concerns	Asprey's Response
A loss of professional identity among the students	This is a common misconception about interprofessional education (IPE) that Asprey counters by emphasizing that each profession has the appropriate role modeling and stresses unique aspects of each profession.
More frequent student requests to change their field of study to another profession	Students are already asking to change their degree programs. Asprey has not witnessed any increase in these requests.
Students with different backgrounds and academic preparations will not be able to perform at the same level	Both programs admit qualified candidates who can handle the course load; this has not been a problem.
Accreditation will be an obstacle	Many accrediting agencies require IPE activities. It is up to faculty to create purposeful curricula for their students.

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to look at the comparative advantage of the facility they are working in to identify interprofessional opportunities that make the most sense in terms of the unique structure of their institution.

DEVELOPING FACULTY SKILLS FOR DESIGNING CURRICULA

Elizabeth G. Baxley, M.D.
East Carolina University Brody School of Medicine

Elizabeth Baxley is the senior associate dean for Academic Affairs at East Carolina University Brody School of Medicine. She grounded her remarks on faculty development by explaining that educators have not kept pace in implementing what she referred to as the "new health system competencies." These competencies would include such curricular topics as patient safety, quality improvement, team-based care, and population health system science. As 1 of the 11 AMA grant recipients under their Accelerating Change in Medical Education initiative, Baxley and her Brody colleagues had the opportunity to carry out their ideas. The outcome of their radical thinking was the Redesigning Education to Accelerate Change in Healthcare (REACH) program.

The REACH program sought to integrate longitudinal education in patient safety, quality improvement, team-based care, and population health into the core medical school curriculum (AMA, 2014). It also emphasized student development of interprofessional and leadership skills. Baxley emphasized the importance of integration when developing the REACH program. She and her colleagues vertically integrated their curriculum throughout 4 years of students' education to purposefully avoid creating a siloed curriculum. But she also recognized the desire from a subset of her students to better understand the broader health care system, which prompted the project team to create a separate distinction track for advanced training in leadership development called LINC, for *Leaders in Innovative Care*.

It became quickly apparent that a major obstacle to getting started was identifying faculty with appropriate training and background to implement the program. As a result, the first year of the 5-year initiative was devoted to faculty development. This is the opposite of how curriculum change typically takes place. Usually, a curriculum is designed by a small group of educators then expert faculty is recruited and provided training on how to teach the material. Baxley's group flipped this process. They selected a core group of faculty members to be part of the school's year-long professional development program known as the Teachers of Quality Academy (TQA).

Through the TQA, faculty developed their skills for designing curricula, and for implementing new education and practice designs around these new health system competencies. But much of their time was devoted to

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learning the principles and practices of patient safety, quality improvement, team-based care, and population health themselves. Figure 2-2 depicts some of the online prework they completed using Institute for Healthcare Improvement (IHI) Open School material. This was followed by six 2-day interactive learning sessions. In between each session, the TQA members worked in teams to develop and carry out a quality improvement project in the health care system using their newly acquired knowledge. Following this, the TQA members participated in a three-course credential program of graduate courses provided by East Carolina University's College of Education. This was designed to provide faculty who had not had major roles in curriculum design, implementation, and evaluation an opportunity to learn how to "do" the process of designing educational programs.

Twenty-eight of the original 39 TQA enrollees completed the entire program. The graduates included faculty from medicine, nursing, public health, and allied health who were each nominated by their leadership. This ensured Baxley that her participants—who ranged from senior residents to senior faculty from health care and from education—would have their leadership's support throughout the year-long training.

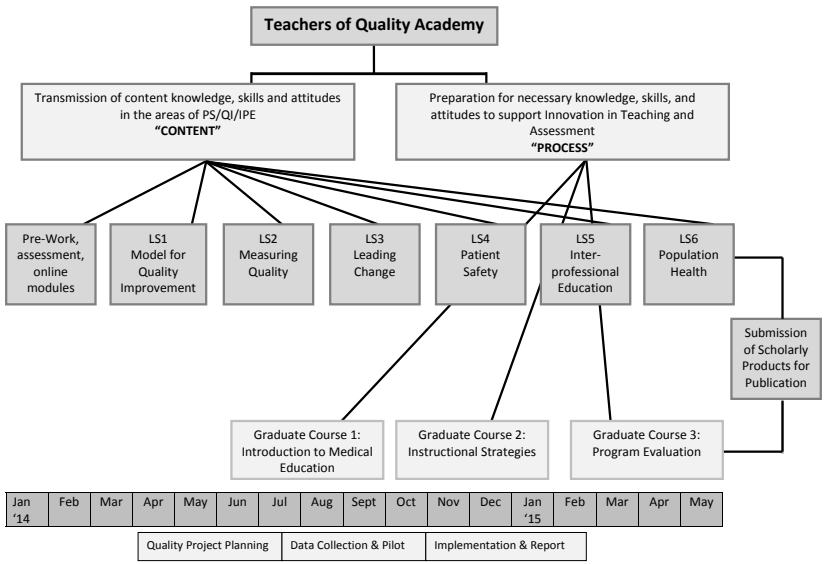

FIGURE 2-2 The Teachers of Quality Academy faculty.
NOTE: IPE = interprofessional education; PS = patient safety; QI = quality improvement.
SOURCE: Baxley, 2015 (copyright Elizabeth G. Baxley, M.D., East Carolina University).

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Members worked in teams to develop health care quality improvement projects with peer coaching and support for learning and applying the new competencies in an interprofessional environment within their relevant clinical discipline or environment. In addition to this team-based work, there was an online distance educational program created by the university's college of education on curricular design and evaluation. Baxley was amazed at how traditional silos were crossed as individuals began learning from each other and sharing and challenging ideas through discussion boards and small-group interactions.

Changes in the clinical environment were the first effects to be realized. These included a drop in re-admission rates, reductions in unnecessary radiation exposure, and improvements in handoffs within the health care system and between the acute care and outpatient systems. In all, 28 quality improvement efforts continued beyond the length of the TQA. Within education, the TQA participants have a much greater appreciation and understanding of educational program planning, which led to the development of new curricular products and new partnerships for quality improvement. Eight of these examples that showed clinical or educational improvements have already been presented at national meetings.

Baxley noticed that as the year went on there was a greater reliance on peers as educators, which gave her hope that the established relationships would be sustainable beyond the year of training. She also identified some key lessons learned from her experience setting up and running the TQA (see Box 2-2). But probably the greatest lessons involved understanding the amount of hands-on mentoring that was required and the value of asynchronous communication for improving peer-to-peer exchanges for

BOX 2-2
Key Lessons Learned from the Teachers of Quality Academy Program

- Teaching while practicing while learning is particularly hard with increasing clinical demands.
- Cohort selection requires establishment of a clear contract with fellow and sponsor for time and effort.
- Design, cognitive preloading, and ongoing mentoring are critical features.
- Use of an asynchronous platform enhanced communication.
- Interprofessional faculty enhanced the team approach to learning and teaching partnerships, and stronger academic teams emerged.

SOURCE: Baxley, 2015.

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breaking down interprofessional barriers and moving the group toward greater reliance on peer support.

STUDENTS AS PATIENT NAVIGATORS AND COORDINATORS PROGRAM

Therese Wolpaw, M.D., M.H.P.E.
Pennsylvania State University College of Medicine

Therese Wolpaw is the vice dean for educational affairs at the Pennsylvania State University (Penn State) College of Medicine. In setting the stage for her presentation on students as patient navigators, she emphasized the importance of a patient-centered health care delivery system supported by health care professionals working in teams that include families, communities, and other resources. In this way, she said, the whole becomes interdependent and greater than the sum of its parts.

It is within this supportive environment that Wolpaw described her curriculum redesign that bolsters and strengthens the pillars of the humanities and the system sciences. Her goal was to help students experience the health care system through the patients' eyes. To do this, she needed to start with students the moment they walked through her door.

The curriculum design she and her colleagues developed was called Systems Navigation Curriculum (SyNC). As shown in Figure 2-3, it is composed of two parts that connect conceptual classroom work with experiential learning.

The in-class, 18-month systems course takes place weekly throughout

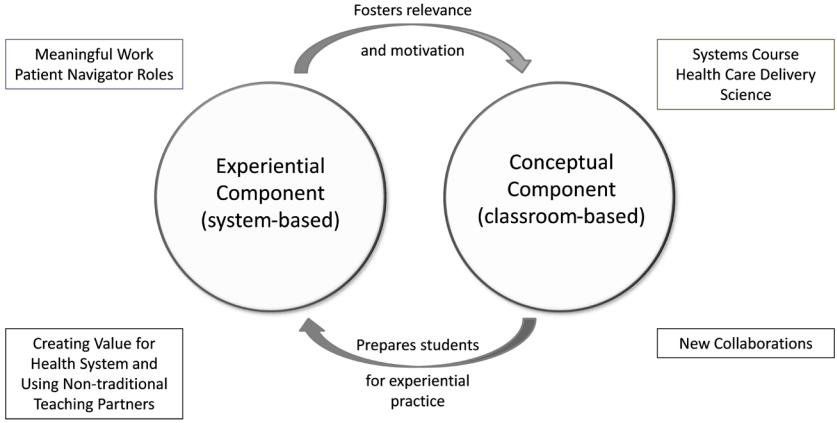

FIGURE 2-3 Penn State's Systems Navigation Curriculum (SyNC).
SOURCE: Gonzalo et al., 2015, as presented by Wolpaw on April 23, 2015.

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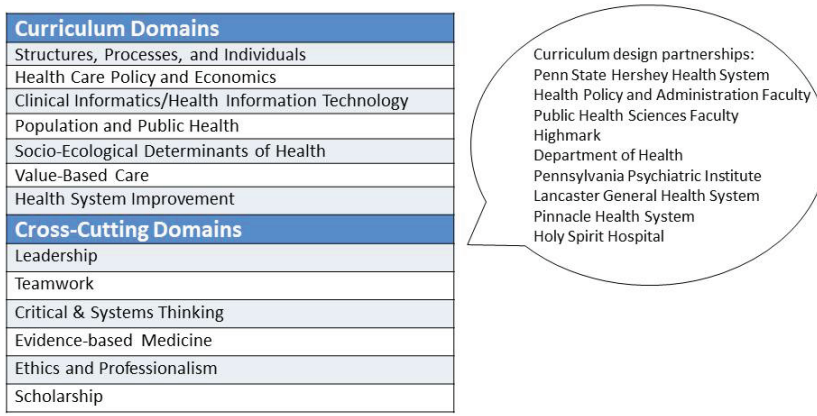

FIGURE 2-4 Systems course health care delivery science.
SOURCE: Gonzalo et al., 2015, as presented by Wolpaw on April 23, 2015.

the first 2 years. While it includes large-group framing sessions, most of the learning takes place through facilitated small groups. For the experiential learning component, students are placed in health systems around central Pennsylvania as patient navigators. These educational components occur simultaneously so students are learning concepts in the classroom that can be immediately applied in their role as patient navigators. As patient navigators, the students experience the value and the problems with the health system. Their observations are brought back to the classroom for more in-depth exploration in small-group settings.

Figure 2-4 shows the classroom component of the curriculum that is a systems course in health care delivery science. It was a challenge initially to determine the content of a course so new that it had no previous model upon which to build. This course is made up of 13 domains; 6 of these cut across all learning and include areas such as leadership and teamwork. Wolpaw and colleagues were able to identify partners outside of the educational system to participate in the course. For example, the Penn State Hershey Health System administration is a partner as well as the Department of Health.

For the experiential piece of the curriculum, students go into the community and work as patient navigators. They learn the skill and art of guiding patients to overcome barriers that are imposed by a fragmented health care system. These barriers are numerous and might involve a variety of issues such as:

- literacy,
- cultural differences,

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- communication,
- social isolation/networks,
- financing health care,
- appointments and follow-up, and
- transportation.

Students are placed at 24 sites in 9 different health systems throughout central Pennsylvania. They are in Lebanon Valley Clinic, which is a clinic for the noninsured, and the Pennsylvania Department of Health. Students are in the Pinnacle Heath System in Harrisburg where students experience care coordination for a variety of health complications ranging from heart failure to spinal disorders to kidney disease. Students are exposed to care settings in the Penn State Hershey system such as the psychiatric institute, family medicine clinics, bundled payment clinics, weight loss clinics, and cancer clinics. In 2015, students will also be placed at the Veterans Affairs Medical Center and the Penn National Racetrack assisting migrants. Before serving as patient navigators, students are given the card shown in Box 2-3 to orient them to their role as patient navigator and to outline the skill set they will need to develop.

What is most remarkable about this curriculum, Wolpaw said, are the teachers. These are nontraditional teaching partners, both inside and outside of academia, including care coordinators, patient navigators, nurses, and case managers. This provides students an opportunity to see and experience patient care through many different kinds of providers within the interprofessional health care team. To orient students in their roles as patient navigators, the Penn State program brought patient navigators into the classroom. In addition, students work with standardized patients who take on the role of high-utilizer patients. The students have an opportunity in the classroom to interview these standardized patients then go to a large group setting, where a real patient navigator interviews that same standardized patient. The students have the opportunity to compare and contrast their interview with someone who has much greater experience. Students and patient navigators both write the story of the patient they interviewed so once again, students can compare and contrast their work with someone who possesses much greater experience than themselves. Wolpaw expressed her belief that the model also has global possibilities. Penn State has a partnership with Mountcrest University in Ghana. The founders are very committed to creating humanistic physicians to better serve the people of Ghana. Through their partnership, faculty from both institutions have made visits to the other's university to enhance shared learning.

In her opinion, this curriculum will stimulate students to be change agents in decreasing barriers around access to care. The students, by partnering with patients and service extenders, gain a better understanding of the health care system and how it might be changed. Over time, this

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BOX 2-3
SyNC Patient Navigator Cards

Building the Patient Story

Life story: Can you tell me a little about yourself? I'm interested in your story—growing up, family, work, hobbies, things like that. What is most important to you?

Illness experience: What has this illness been like for you? What has been hardest? What has helped you? What are you hoping for?

Explanatory model: I am interested in hearing what you are thinking about your medical problem. What do you think is going on? What do you worry about the most?

Navigator Cycle

Getting and building the story
- Listening
- Seeking out the backstory

Making a diagnosis
- Identifying challenges and barriers
- Contexts: individual/family, social network, community, society
- Targets: disabilities, housing, support, transportation, finances, insurance
- Asking why

Telling the story
- Communicating with the interprofessional team
- Navigator hand-offs

Making a difference
- Creating and implementing a plan
- Empowering the patient—shared decision making and accountability

Reflecting
- Identifying boundaries: What is your role? What are your limitations?
- Critiquing personal assumptions, biases, and learning needs

SOURCE: Wolpaw, 2015, courtesy of Penn State College of Medicine System Navigation Program.

will lead to more thoughtful resource use and increased patient access to services. But the most compelling aspects of the curriculum to Wolpaw are the changes she witnesses in her students. Students feel empowered to assist patients in navigating a fragmented health care system and to take a leadership role in improving the system. She believes the creation of humanistic,

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systems-thinking medical students will lead to physicians who are integral members of a well-functioning, patient-centered, systems-oriented health care team.

VALUE IN PARTNERSHIPS

Timi Agar Barwick from the Physician Assistant Education Association facilitated two table discussions that drew individual opinions and thoughts from participants at the workshop. The questions she presented delved more deeply into the topic of "new partnerships." Each table discussion was interprofessional[2] and drew ideas from a variety of perspectives that informed all those who participated; however, the comments noted in Tables 2-2 and 2-3 are those of the individual respondent and should not be considered a group consensus.

TABLE 2-2 Educators of the Future

Respondent	Affiliation	Who Are the Educators of the Future, and How Will Their Roles Be Different from the Traditional "Teacher"?
Mary (Beth) Mancini	Society for Simulation in Healthcare	Everyone "We need to be listening to the people in the communities, patients, families, community leaders, and organizations, and how we actually bring a new vision particularly related to culture and community needs and assets, so that the experiences of the health professions, while they are going through their education, is authentic. Also, we need to think about this community educator as both dealing with the individual health profession student and ultimately the health professions academy. Unless the academy changes, we will not have true interconnection between the academy and the community. If we do not educate the educators, we will never be able to maximize the ability for the community to be the faculty and the educators of our students of the future."

[2] The participants at the workshop included representatives from allied health fields; communication sciences; complementary and alternative health; dentistry; medicine; mental health counseling; nursing; nutrition and dietetics; occupational therapy; optometry; pharmacy; physical therapy; physician assistants; psychology; public health; social work; speech, language, and hearing; and veterinary medicine.

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TABLE 2-2 Continued

Respondent	Affiliation	Who Are the Educators of the Future, and How Will Their Roles Be Different from the Traditional "Teacher"?
Andrew Pleasant	Canyon Ranch Institute	Everyone "It is going to include people you might not suspect, like engineers and IT [information technology] professionals and business administrators and architects to build not only a health workforce, but a health city for people to live in. . . . It also extends into the community so that people, formerly known as patients, will be teaching health professionals how to do their job. This will better integrate learning and service throughout the entire curriculum."
Christopher Olsen	University of Wisconsin–Madison	The interprofessional team across disciplines "By doing that, we will, in the individual profession, avoid recreating wheels and the idea that we need a flatter world view culturally. We are all learners. An additional aspect is the role of technology that might include new platforms like Google Glass, Apple Watch, online simulations, and crowdsourcing of patient input through virtual connections."
Timi Agar Barwick	Physician Assistant Education Association	Knowledge management educators and quality-minded professionals "Knowledge management educators are people who can teach students how to get knowledge efficiently and then how to use it in terms of their decision making. Quality-minded professionals are those who focus on quality or quality improvement and how such concepts can be applied across curricula."

continued

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TABLE 2-2 Continued

Respondent	Affiliation	Who Are the Educators of the Future, and How Will Their Roles Be Different from the Traditional "Teacher"?
Deborah Trautman	American Association of Colleges of Nursing	A learning community that includes patients, community members, and health system users "In an effort to create lifelong learners, educators of the future are going to form learning communities that include patients and other individuals in the community and in the health system. It will take in many more perspectives than what we currently have. The radical change will be to bring the education process out into the community. The tactics and strategies for accomplishing this will continue to evolve to be more technology focused and more available in response to the 24/7 environment we live in. Educational leaders will also change, moving from a faculty-guided system to one that emphasizes learner-guided education. Faculty will be the facilitators of learning similar to what we have already seen with the flipped classroom. We will be moving from the 'sage on the stage' to a 'guide on the side.' Also, education will be more experiential and will follow health system paradigm shifts from a disease management, silo-based care system to one that focuses on a person's wellness through collaborative and team-based efforts."

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TABLE 2-2 Continued

Respondent	Affiliation	Who Are the Educators of the Future, and How Will Their Roles Be Different from the Traditional "Teacher"?
Susan Skochelak	American Medical Association	Selves "There is a terrifying and brave new world of self-education that includes *Wiki* and peer education, which is the dominant force now and will continue to be dominant. While this is probably a good thing, it puts faculty in a new position of needing to understand how best to deliver education that maximizes student learning. What has to be taught face-to-face and experientially learned versus taught online? By understanding these components, one can begin to differentiate between what faculty can offer in all the new educational modalities that continue to evolve, and what must remain core to the education of health professionals."
Elizabeth Baxley	East Carolina University	Everyone previously mentioned plus community leaders and nonhealth professionals "While interprofessional learning across the health professions is valuable there are also benefits from learning with those outside of the health professions, like industrial engineers. In addition, people in communities are important educators. The question is how do we engage with communities and their leaders particularly around issues of language and cultural concordance? For example, how might we better work with the Hispanic community and with community advocates? A word of caution is that we have to be very cognizant not to use community members solely for the benefit of our students. Goals set by community leaders are of equal importance to the university's. These need to be set in order to avoid the perception that universities only reach out to communities when they have a grant or are changing a curriculum. By working together, mutual benefits can be realized."

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TABLE 2-3 Impacts of Evolving Roles

Respondent	Association	How Will These Evolving Roles Impact the Educational Process and the Community?
Mary (Beth) Mancini	Society for Simulation in Healthcare	A healthier community "Numerous new educators of the future have been mentioned, including quality professionals, people in communities, peers, self-learners directing their own education, and knowledge workers teaching how to work with knowledge system engineers. The ultimate value of all work in this area is in creating healthier communities although the impact on the education process would also be significant. This would involve creating true partnerships that place more of the power and influence within the community and less within the academic setting."
Andrew Pleasant	Canyon Ranch Institute	A paradigm shift to thinking of people (formerly known as patients) and communities as equal partners "Being 'people-centered' and believing that communities are equal partners in education would diminish the use of models that portray community members as dependent and needy so that people are not depicted as being a deficit to the health care system or lacking in something the health care system values. Such an approach could realign the systems that are perhaps best thought of as a public good."
Christopher Olsen	University of Wisconsin–Madison	Shifting the focus from reducing disease to improving wellness "By engaging *with* communities, we can move the system from a focus on reducing disease to a focus on improving wellness around issues such as food, transportation, the built environment, and the diversity of the health workforce. And in terms of impacts on the educational process, these shifts will necessitate changes in leadership, educational governance and accreditation processes."

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TABLE 2-3 Continued

Respondent	Association	How Will These Evolving Roles Impact the Educational Process and the Community?
Timi Agar Barwick	Physician Assistant Education Association	More effective use of resources "Broadening the competency base of faculty and providers through the inclusion of 'new educators' could expand perspectives and adjust the roles of traditional teachers. This would call for more effective utilization of resources that could add value to the education enterprise and to the community."
Deborah Trautman	American Association of Colleges of Nursing	Improve social cohesion for improved health and wellness "Health literacy and the educational process are essential elements to improving social cohesion that is based on solidarity, equity, compassion, and caring for others. The impact is improved health and wellness where *health* is the state of complete physical, mental, and social well-being and not nearly the absence of disease or infirmity."
Susan Skochelak	American Medical Association	Greater financial support to communities and patients "Changing the financial model so dollars are spent on new ways of teaching. That means getting support into the community, to the patients, and to the newly designed faculty. It also means financially supporting learning and interventions that address upstream determinants of health that could move communities toward more positive changes."
Arthur Kaufman	University of New Mexico	A change in the power balance "Taking inspiration from the Federally Qualified Health Centers (FQHCs), where at least 51 percent of academic health centers' boards and advisory committees must be consumers of services at their clinic, the power would shift away from campus to communities. This would bring academic centers closer to communities and investment dollars more in line with community needs. Changing the power balance would create an effective learning environment."

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REFERENCES

AMA (American Medical Association). 2014. *AMA MedEd update, February, 2014: Faculty trained to teach team-based care to physicians of tomorrow*. http://www.ama-assn.org/ams/pub/meded/2014-february/2014-february-top_stories3.shtml (accessed July 7, 2015).

Asprey, D. 2015. *A model for educational efficiencies*. Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 23.

Baxley, E. 2015. *Faculty development for improving system teaching and curriculum design*. Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 23.

Gonzalo, J. D., P. Haidet, K. P. Papp, D. R. Wolpaw, E. Moser, R. D. Wittenstein, and T. Wolpaw. 2015. Educating for the 21st century healthcare system: An interdependent framework of basic, clinical, and systems sciences. *Academic Medicine*.

UI (University of Iowa) Carver College of Medicine. 2014. *MD program: Learning community FAQ*. http://www.medicine.uiowa.edu/md/communitiesfaq (accessed July 7, 2015).

Wolpaw, T. 2015. *Students as patient navigators and coordinators program*. Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 23.

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3

A Changing Health Workforce

Key Messages Identified by Individual Speakers and Participants

- Educators have only a certain amount of time to deliver a curriculum that provides students with the knowledge and experience they need to become competent, practicing providers. The focus should not be solely on designing a balanced work–life curriculum, but rather on finding the most effective pedagogy that maximizes opportunities and available technology. (Talbott and Valachovic)
- Task shifting/sharing or task-specific role training represents a departure from traditional delivery models that depend on specialist workers. Such shifts in responsibilities could also expand access of services—from preventive and wellness interventions to health care treatments—to more individuals and communities in response to a changing world with changing societal needs. (Wise)
- Processes and programs that best serve the target population or person, keeping in mind safety and quality, would build a less fragmented system through a team-based or collaborative approach. (Goldblatt and Tagliareni)
- Health literacy is one mechanism for rebalancing the power structures between health and wellness professionals, health systems, and society and is the currency for identifying solutions to society's problems. (Cabe, Coleman, Pleasant)

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ENVISIONING THE NEW WORKFORCE: FRAMING ISSUES THROUGH DEBATE

Continuing on the theme of partnerships, Christopher Olsen from the Association of American Veterinary Medical Colleges (AAVMC) and the University of Wisconsin–Madison remarked about the wide variety of disciplines that have come together to discuss and debate issues of great importance to educators across the health professions. His intention in planning the agenda was to select crosscutting themes that resonated with all health professional educators in a transdisciplinary manner. In addition, Olsen wanted the material to be presented in a format that would engage the audience and demonstrate potentially useful pedagogy. Keeping with his intentions, two issues of mutual concern were identified by the workshop planning committee and illuminated using a debate structure.

The First Debate

The first debate was moderated by Deborah Trautman from the American Association of Colleges of Nursing (AACN) and pitted Richard Valachovic from the American Dental Education Association (ADEA) against the formidable challenger Richard Talbott representing the Association of Schools of the Allied Health Professions. They each argued one side of the debate proposition that read: "Health professional schools should adjust their curriculum and training to provide greater work–life balance for their learners." Talbott argued *for* while Valachovic argued *against* the proposition.

Trautman set the stage for the debate by acknowledging that living and learning environments have become increasingly complex with many more interconnections. The health professions, as with others in higher education, are committed to creating an academic environment that is conducive to learning and attractive to students who will become the backbone of a future health workforce. Because of certain generalized personality traits exhibited in employees, employers and educational institutions that offer greater work–life balance may be particularly luring to the younger generation, known as millennials. However, whether this produces the strongest health workforce remains an issue of considerable controversy.

Some of the dispute is believed to be caused by generational differences that exist between millennials (people born between the years 1982 and 2005, also known as Generation Y) and their older teachers, mentors, and employers. According to Eckleberry-Hunt and Tucciarone (2011), millennials have certain distinguishing characteristics that set them apart from previous generations and create challenges as well as opportunities. This group is entrenched in technology. They are consummate multitaskers and

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bore easily because they understand how to maximize and leverage new technology platforms. Many of them came of age during or were born after the September 11, 2001, attacks in the United States. Their era is marked by globalization, teamwork, and free expression through social media. They share a strong commitment for a balanced lifestyle and equality on the job, which has led some to describe them as lazy, unmotivated, selfish, and at times unprofessional with their inappropriate use of technology.

Box 3-1 lays out the arguments proposed by the two debaters that, according to them, do not necessarily reflect their true opinions.

BOX 3-1
Arguments *For* (Talbott) and *Against* (Valachovic) the Debate Proposition: Health Professional Schools Should Adjust Their Curriculum and Training to Provide Greater Work–Life Balance for Their Learners

Arguments *For*

1. The value of a work–life balance
   - "Decrease in work–life balance has been linked to higher unwanted turnover, lower physical and psychological well-being, lower productivity, greater stress-related ailments, and the like. The waste is immeasurable" (Rao and Indla, 2010, abstract).
   - There is evidence on the negative public health impact of a poor work–life balance (Lunau et al., 2014).
   - "People with higher education were more often found to have a strong work–life conflict (time and strain based).... A negative relationship between work-life conflict and health satisfaction over time was found. People reporting strong work–life conflict at every wave reported lower health satisfaction than people with consistently weak work–life conflict" (Knecht et al., 2011, abstract).
   - Work–life imbalance worsens stress and anxiety. This begins in school and cuts across all health professions and across national borders.
2. Examples of health professional students' stresses and impacts
   - Social work: A survey of 68 undergraduate and graduate social work students showed that about 34 percent of students indicated high levels of depressive symptoms and were at high risk of clinical depression, 6 percent met criteria for posttraumatic stress disorder, and 3 percent were highly likely to have a dissociative disorder (Horton et al., 2009).
   - Nursing: Nursing students are particularly vulnerable to stress citing clinical practice as one of the most anxiety producing components in nursing programs. Stressors include lack of experience, fear of making mistakes, having difficult patients, discomfort at being evaluated, and concern over possibly harming a patient by giving them wrong information or medication

continued

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BOX 3-1 Continued

(Sharif and Masoumi, 2005). One study showed that one-third of nursing students experience stress that is severe enough to induce such mental health problems as anxiety and depression (Pryjmachuk, 2004).

- Medicine: "According to a 2006 Mayo Clinic study, students enter medical school with mental health profiles similar to their peers from college. But they begin to show higher rates of mental distress as they progressed through medical school. The same study found that the most depressed students often are the least likely to reach out for help because of stigma related to mental illness" (AAMC, 2013).
- Test anxiety affects all students and educational anxiety and depression cuts across borders. High rates of anxiety and depression related to academic performance has been recorded in Beirut, Europe, Greece, India, Malaysia, Pakistan, the United Kingdom, and the United States. In China there is tremendous anxiety around the risk of failure for all students (Saravanan and Wilks, 2014).
- How are students coping with stress? Studies have shown significant changes in health habits of students in response to the stresses and time constraints of high-intensity education. This includes increases in alcohol consumption and decreases in exercise and socialization. "The changes in health habits were predictive of both emotional and academic adjustment, with students who decreased in positive health habits, particularly socialization, being more depressed at finals" (Ball and Bax, 2002, abstract).

3. What are the risks of a work–life curriculum imbalance and the potential benefits of work–life curriculum balance?
   - Burnout, due to the rigors of school combined with any or all other personal commitments, has been shown to start in school (Dyrbye et al., 2006).
     - Providing a greater work–life balance will prevent education-initiated professional burnout.
     - These students are tomorrow's workforce. They are needed to take care of today's aging population.
     - An unengaged health provider (and trainee) can be dangerous.
   - Provide lifelong coping mechanisms.
     - This generation learns through demonstration. Providing students with greater work–life balance speaks volumes regarding its importance for their physical and mental well-being.
   - Create the next generation of faculty and role models.
     - Being trained in a balanced environment will provide a positive introduction to the health professions.

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4. Globally, as of 2010 approximately 273 million (4.5 percent of the population) had an anxiety disorder (Vos et al., 2012).
    - Providing the next generation with curricula and training that includes greater work–life balance for their learners will ensure a physically and mentally strong health workforce to provide care and to demonstrate to the next generation how to cope with the stress and rigors of education and future work.

Arguments *Against*

1. Generation Y is just one cohort passing through history. Generations before them did not necessarily share their perspectives on life. Educators tend to view Generation Y as lazy, unmotivated, and selfish, and this view is shared in the business world. Generation Y counters that they simply want work–life balance. In other words, work does not come first. Millennials do not look at an organization to see how they will fit into it; rather, they look at how that organization will fit into their lives. These are relatively selfish, almost narcissistic, views for people professing to devote their careers to the care of others.
2. The acceleration in knowledge has never been greater than it is today, and there is no reason that we should not expect it to accelerate even more over the next 40 years of Generation Y's professional lives. Previous generations of health professionals were able to develop a command of knowledge about their field during their entry-level education and postgraduate training and continuing education that served them and their patients well over their careers. The current explosion of knowledge means that this will no longer be the case. This leads us to require our current students and residents to be able to develop competencies in contemporary health sciences, and to prepare themselves as critical thinkers and lifelong learners. If anything, this will mean more time and effort devoted to learning during their education and training.
3. Graduating student debt in the health professions has never been higher. Adding more time to the curriculum for work–life balance would only increase the level of debt and diminish total earnings over the professional lives of these students.
4. Limiting the time devoted to patient care by students and residents affects the safety of current and future patients. There are no rigorous studies that show that restricting student and resident work hours increases patient safety. In fact, there are studies that show that limiting the time that learners devote to patient care reduces their ability to follow a hospital patient over the length of his or her stay.

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Debaters' Comments

Valachovic said he believes that educators have only a certain amount of time to deliver a curriculum that provides students with the knowledge and experience they need to become competent, practicing providers. The focus, he said, should not be solely on designing a balanced work–life curriculum, but rather on finding the most effective pedagogy that maximizes opportunities and available technology. Talbott agreed and added that numerous structural changes to how students learn were mentioned previously by speakers (i.e., greater community engagement). These changes could be part of the solution for bridging the generational workforce gap.

United States–Nigeria Comparison

Following the debate, Emilia Iwu, a U.S.-based Nigerian nurse working on her doctoral degree in nursing at Rutgers University, provided her perspective that compared and contrasted work–life balance in Nigeria versus North America. The culture and context are different, she said. In Nigeria, students work very hard with the understanding that they will be able to relax in the future. Delayed gratification is a well-accepted way of life in Nigeria. In Nigeria, younger students tend to enroll full-time while pursing college education, while students in North America often work while attending school. She could understand the need for a work–life curriculum for older adult professional students who combine employment and university education, and how they would benefit from such strategies. She also acknowledged the dilemma between the need to acquire the necessary knowledge and skills to deliver upon graduation and the risk of overloading the curriculum.

Another difference Iwu identified is the limited access Nigerian students and professors have to technological resources. In North America, access to stable Internet and e-learning platforms are readily available. In Nigeria, most of the teaching is done face to face and is paper based, and students' technological capabilities are not fully tapped. One cross-cultural challenge Iwu has observed is the pressure of an overburdened curriculum.

Perspective of a Chinese Physician and Educator

Xuejun Zeng, a medical doctor and educator at Peking Union Medical College, provided her views of the work–life balance in China from a provider's and educator's perspective. Learning how to balance life and work are major challenges for Chinese physicians, often times resulting in a lack of balance between work and life.

Some students are opting not to go into medicine because of the over-

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whelming pressure associated with the profession. Many Chinese health care workers have joined teams as a way of overcoming some of the work-related stresses. Regardless of the coping mechanisms, Zeng was clear that certain pressures are inherent in medicine and must be expected. She believes that students understand this when opting to go into medicine. In some ways, students enjoy the hard work that goes along with their studies and experience inner growth when taking care of patients, she said. Often times, young physicians are guided by attending doctors as they learn how to manage time, find their role on a team, and communicate with patients and their families.

Zeng believes that obtaining these competencies improves students' ability to better balance their life with their work. She added that role modeling plays an important part of their personal development. But she is also aware of a lack of social and emotional support from peers and the stress this can create, particularly for junior physicians. And while it makes sense to her that she and her colleagues should pay attention to mental health issues among their colleagues and students, it is hard to adjust the traditional attitude of working hard in her profession. Diligence is still greatly valued in China.

Zeng has started a train-the-trainer program for junior attending physicians on how to educate and better support students and residents during their clinical work, the time of greatest stress and the least opportunity for balance.

The Second Debate

Holly Wise from the American Council of Academic Physical Therapy moderated the second debate that addressed whether or not new task-specific roles should be the strategy for health professionals to meet individual and community health needs. Wise explained the debate issue in terms of tasks.

There are task-specific roles and there is task shifting that began as a cost-effective way to address chronic workforce shortages. Task shifting involves scaling up the health workforce through the rational redistribution of tasks among health teams, said Wise. Specific tasks are moved where appropriate from health workers with more in-depth training to health workers with less training or possibly to community members or others who receive training in one specific area in which they are needed to work.

In the end, the purpose of task shifting is to make more efficient use of the available human resources. It should not be associated with second-rate services. On the contrary, task shifting could be a means of improving the overall quality of health by moving the bulk of culturally appropriate human resources closer to the communities they serve, as is the case with

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community health workers. Task shifting, that some term *task sharing*, could also save money if less expensive health professionals are used for routine care while the more expensive health professionals focus on issues they are uniquely qualified to address. In 2006, the World Health Organization (WHO) launched a task-shifting plan that involved retraining health workers for specific roles in response to the HIV/AIDS crisis and the workforce shortages in areas around the world. There have been other instances where people with chronic conditions such as asthma or diabetes have been trained to manage their own care; then, with additional training, the same people become peer navigators offering valuable services to health teams.

In essence, task shifting or task-specific role training represents a departure from traditional delivery models that depend on specialist workers. Such shifts in responsibilities could expand access of services—from preventive and wellness interventions to health care treatments—to more individuals and communities in response to a changing world with changing societal needs.

With the explosion of information technologies and the growing access to personal health data against a backdrop of low health literacy levels, there is great potential for new configurations of health workers. For example, information technology (IT) workers could be hired to obtain online medical histories and perform other basic tasks involving virtual communication with patients or clients. Such task shifting and role-specific training could be proposed as an efficient approach to scaling up the health workforce that could reduce costs in certain circumstances, although it would require new resources and infrastructure. It would require a system of checks and balances involving credentialing, regulation, and legislation, just to name a few of the challenges. Quality assurance mechanisms need to be put in place to protect the people receiving the care as well as the health workers themselves, said Wise. Key elements must be in place to ensure that this strategy is safe, efficient, effective, equitable, and sustainable.

These comments provided the context in which the debate arguments were made. As seen in Box 3-2, Liza Goldblatt, representing the Academic Consortium for Complementary and Alternative Health Care, spoke in favor of creating new task-specific roles while Elaine Tagliareni from the National League for Nursing spoke in opposition of the proposition.

Debaters' Comments

Goldblatt believed the best strategy would be to expand the reach of health providers into communities by including local workers into the health care team. The precise mix of team members would be situation dependent and would vary with the environment. Processes and programs that best serve the target population or person, keeping in mind safety and

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BOX 3-2
Arguments *For* (Goldblatt) and *Against* (Tagliareni) the Debate Proposition: The Creation of New Task-Specific Roles Should Be the Strategy for Health Professionals to Meet Individual and Community Health Needs

Arguments *For*

1. This is already happening in Brazil under Francisco Campos and in New Mexico as noted by Arthur Kaufman, so there are models to draw from throughout the world.
2. Better use of health workers with defined skills will maximize the limited time of health professionals and improve the financial resource allocation so expensive professionals perform interventions they are uniquely qualified to do, as well as being part of a health care team approach. The health workers would serve as liaisons between the individual and the team to help relieve some of the burden of the health professionals.
3. Health workers would be drawn from the communities they serve and thus would ensure culturally sensitive care is provided. In the United States, with more than 75 percent of the health care dollars being spent on people with largely preventable, chronic conditions (Gerteis et al., 2014), more health coaches and other local community members who specifically focus on lifestyle issues are imperative for ensuring compliance through frequent follow-up. A collaborative, team-based person/patient-centered approach would include these workers.
4. Greater employment of community workers would improve the local economy.
5. More efficient care through the targeted use of technology for communication.

Arguments *Against*

1. Case study: *Health Affairs*, March 2015 (Aronson, 2015)
   - Story of Eva: Fragmented care, no coordination of services, limited effectiveness of clinical practice by task-oriented health care professional.
   - One year later: Three caregivers managing her care with only one specialist. What made the difference? Integration of services, ability of key staff to manage comprehensive care.
   - Conclusion: Comprehensive realignment of the current workforce and modification of traditional roles for both providers and patients.
2. Why? Changing role of consumer and health care workforce.
   - Rise of consumerism and more use of Internet and patient assuming the role of authority for treatment alternatives.
   - Evolving role of health care workforce with emergence of informatics and collaborative practice: Health care is now an information-intense activity; this role belongs to all health care workers.
3. Challenge: There is a flux in the current roles of both patients and providers as they both increase the scope of health-related information.

continued

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BOX 3-2 Continued

4. International and national models of retraining existing workforce to accelerate the process.
   - WHO—Scaling up HIV services: "Treat, Train, and Retain" Plan to strengthen and expand the scope of current workforce.
   - Helping Babies Breathe Global Development Alliance in Tanzania: training existing midwife workforce specifically on facilitating breathing and decreasing maternal hemorrhage. There has been a 47 percent decrease in neonatal mortality since 2009 due to this specific intervention (Msemo et al., 2013).
   - Banner Health in Arizona: Retraining medical assistant, already in the system, to free up physicians and nurse practitioners from traditional roles (i.e., inform about normal labs results); shifting tasks across teams.
5. Raising the visibility of solutions.
   - At a time when the world is facing a shortage of health workers, the focus needs to be on policy and programs to bolster the global health workforce. Think globally and act locally to build clinical practice that retrains and re-delegates functions within the system.

quality, would build a less fragmented system through a team-based and collaborative patient/person-centered approach. Goldblatt strongly feels that this approach should promote health and well-being in addition to improving the treatment of diseases and conditions and should draw on resources that uniquely benefit the local community.

Tagliareni agreed that it is a hybrid, but when she thinks about the solution, she feels collaborative practice is where the focus needs to be; instead of emphasizing sharing tasks, the focus should be on the competency a person or patient requires from the team. In this way, roles will shift as modes of practice take precedence over single tasks. That means health practitioners have to understand they do not "own" their role but that it is defined by the context and function of the team and the work ahead of them.

Perspective of a Nurse from Nigeria

Emilia Iwu again provided her perspective on the debate topic—this time as a nurse practitioner working in Nigeria. She began her remarks by telling the participants that Nigeria is among the sub-Saharan African countries that adopted task shifting as a model of care provision. Task shifting is

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currently referred to as *task sharing* because of misconceptions that created a threatening environment as health care workers feared they would lose their traditional responsibilities entirely. Some role recipients were afraid of task dumping. Therefore, *task sharing* is a more representative term that describes the team work involved.

Task sharing is not a new concept, said Iwu. It has been in use since the precolonial and colonial era, when lay workers were trained to perform task-specific roles as dispensaries and health posts. However, the term *task sharing* is fairly new and has many advantages. As a result of task sharing in Nigeria, nurses, midwives, and community health workers have improved access to antiretroviral treatment. With appropriate training, peer educators and community volunteers assist with HIV treatment support. These roles motivate and empower new cadres of workers and encourage their participation in health service delivery, especially in communities. They often work in hard to reach areas, thereby improving access to services, bringing care closer to clients' homes, and significantly reducing travel time for many consumers. Task shifting has saved many lives. It could involve training and use of new health workers or retraining and expanding the roles of existing workers. Examples include *Life Saving Skills*[1] and *Helping Babies Breathe*,[2] described by Tagliareni in maternal child health services. In these situations, nurses and midwives received training on evidence-based interventions that ultimately decreased neonatal mortality. In Nigeria, similar programs in addition to prevention of HIV transmission from infected mothers to their infants involve expanded roles for nurses and midwives. According to Iwu, when collaboration and teamwork truly exist, task sharing that engages a multidisciplinary team of health workers is a perfect mix. It is cost-effective both in the short term and the midterm.

Despite the potentially positive impacts, said Iwu, there are some drawbacks. Regulatory issues and service structure often lag behind role creation and transition. This underscores the importance of advocacy for appropriate and timely regulatory changes from the onset. Lack of commensurate compensation for new roles, nonabsorption of the nontraditional, and new cadres of service providers often complicate implementation of task sharing if not tackled proactively. Unrealistic professional restrictions that limit the scope of practice and training for some health workers prevents maximum participation in patient care. Restrictions on maximal training limits their capacity to prevent health emergencies in the presence of obstacles for timely referral or patient access to the next level of care. Adequate training

[1] For more information about *Life Saving Skills*, visit http://www.midwife.org/Life-Saving-Skills-LSS (accessed August 20, 2015).

[2] For more information about *Helping Babies Breathe*, visit http://www.helpingbabies breathe.org (accessed July 6, 2015).

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and access to mentoring providers are crucial elements. Another challenge, Iwu said, is sustainability; creating roles for health workers through parallel structures that are not integrated into existing health systems halts services when external funding is no longer available.

In general, incorporating new cadres of workers into existing civil service structures could be a difficult task. Policy makers need to be engaged at the initial planning stages, said Iwu. Collaboration with the appropriate leadership and stakeholders ensures support and facilitates policy changes. These provide the enabling environment for effective task-sharing implementation and scope-of-practice modifications.

Iwu was reluctant to commit to a debate side, but she did provide the global context in which these issues could be further considered.

GLOBALIZATION AND CHALLENGES TO HPE

Andrew Pleasant is the senior director for Health Literacy and Research at Canyon Ranch Institute (CRI) in Tucson, Arizona. He moderated the session that focused on health literacy which, according to CRI, "allows the public and personnel working in all health-related contexts to find, understand, evaluate, communicate, and use information to make informed decisions about health" (The Centre for Literacy, n.d.; CRI, 2011). This is what CRI board president Richard Carmona described as the currency for his success as the 17th surgeon general of the United States. Carmona (2003) states that health literacy could save lives and money, as well as improve health and well-being. Pleasant framed his remarks around health literacy as the "currency of a globalized health professional education."

In his introductory remarks, Pleasant began by describing how health and literacy come together to create health literacy. He described health as not just the absence of disease but as a resource for life. He labeled literacy as reading, writing, speaking, listening, and numeracy as well as being able to apply those skills. The power of literacy begins to be revealed, he said, when people (usually but not always at a younger age) transition from *learning how to read* to *reading to learn*. That is an important transition during which people begin to use skills to not only inform themselves but also to change the world.

Pleasant referred to some of the origins of health literacy that began within a traditional health and medical context. An example used was a medication instruction to take one pill three times daily. One problem with this medication instruction is the lack of specificity so that instead of spreading out the dose, all three pills might be taken in the morning hours—leading to potentially dangerous situations. Another example highlighted the use of technical terms such as *sodium*, *trans fats*, and *radiography* that are unknown or unfamiliar to most people, especially those at the lowest

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literacy levels. Providing practical information in more common terms like *salt*, *fat*, and *X-rays* would be a universal precautionary approach to health literacy.

According to Pleasant, health literacy is one mechanism for rebalancing the power structures between health care systems and society. He explained his remark by highlighting the complexity of health insurance language, forms, and bureaucratic structures and requirements that he feels could be easily simplified to lower barriers to the public's understanding of health and health care navigation. Chronic disease prevention and treatment are other areas where people could grasp concepts and use information to make informed choices more easily if instructions were expressed in terms that are more readily understood. Pleasant noted the link between low health literacy and poorer health outcomes, and said that the cause for this is not necessarily the fault of the individuals but rather a result of complex systems and judgments made in those systems about people with low health literacy. For example, he said, people with lower health literacy have been shown to be less likely to receive referrals for kidney transplants given the same medical condition as those with higher health literacy (Grubbs et al., 2009). And people with low health literacy are also more expensive to health systems, he said, because they present later and in worse health conditions than their more health literate counterparts (IOM, 2004). In this regard, Pleasant concluded that health literacy is the strongest social determinant of health.

According to data in the report by Kutner et al. (2006), 53 percent of adults in the United States have intermediate health literacy, 36 percent have basic or below basic health literacy, and only 12 percent were considered proficient. While Pleasant reiterated the correlation between low health literacy and poor health, he also highlighted that there are outliers on either side—those who have low health literacy but excellent health and vice versa—who are just now beginning to be studied. A similar pattern to the United States is seen in Europe. The European Health Literacy Survey (HLS-EU) (2012) found that roughly 47 percent of respondents had inadequate or problematic health literacy scores, and the roughly half remaining were either intermediate (36 percent) or proficient (17 percent). Pleasant also pointed out that while the bulk of health literacy studies have focused on the deficit model (lower health literacy producing poorer health outcomes), a paucity of studies have examined the area of how higher health literacy actually produces better health outcomes.

Pleasant then shared his "roadmap for behavior change" that builds a logic model based on a foundational awareness of:

- Fundamental literacy: If your language fails, you fail.
- Scientific literacy: If you remove the science, you fail.

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- Cultural literacy: If you ignore culture, you fail.
- Civic literacy: If you do not engage and empower people, you fail (Zarcadoolas et al., 2006).

When all of these elements are addressed, it is then feasible and fruitful to help people find, understand, evaluate, communicate, and then use information. Pleasant described this as his logic model of health literacy that is used at CRI for applying their theory of behavior change. The first step in his model is the ability for people to *find* information. The next step, he said, involves assisting and supporting people in *understanding* that information and then *evaluating* the practicality of that information based on one's personal life situation and lived environment. Pleasant believes that health literacy extends further to helping people *communicate* to others in their lives what they have understood and evaluated. He remarked that from his experience, this communication begins to build social support for the informed decisions and potential future changes in behavior. Finally, he said, people can *use* their health literacy to inform decisions about their health in order to make and sustain behavior changes. Pleasant pointed to numerous examples of programs around the world that have started to put health literacy into their training programs (IOM, 2013). Some of the examples were presented at the workshop by Clifford Coleman and Jennifer Cabe.

Integrating Health Literacy into Health Professional Education

Clifford Coleman, M.D., M.P.H.
Oregon Health & Science University

Cliff Coleman works at a Federally Qualified Health Center (FQHC) clinic at the Oregon Health & Science University. Coleman is a nationally recognized expert in the field of health literacy. His teaching and research activities focus on workforce training to improve the clinical and public health response to low health literacy. He began with a quote from the composer John Powell who said, "Communication works for those who work at it." According to Coleman, what educators and providers have learned from studying health literacy over the past decade is that health professions schools have not been addressing health literacy in the correct manner. This provides a tremendous opportunity to transform health professions education to dramatically improve care and outcomes.

The Institute of Medicine (IOM) recognized this issue in a 2004 report noting that health professionals lacked adequate education around health literacy and called for better training in this area (IOM, 2004). Although the U.S. educational system has responded slowly to this recommendation,

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there has been some movement in recent years. Coleman confirmed this in his 2011 literature review (Coleman, 2011). He also identified a trend in the health literacy curricula of the health professions that fell into three categories. The first is the typical and most common way institutions have approached health literacy training, which is through stand-alone lectures or one-time workshops. The second is somewhat less common, which is to educate using a series of instructional workshops or didactic series. And the third is merely suggested by the literature, which is to integrate a health literacy curriculum for health care professionals. Such a program would infuse health literacy into education through multiple topics in a seamless manner that may not be overtly apparent. This is what Coleman and his colleagues are undertaking at Oregon Health & Science University.

At roughly the same time as the literature review, Coleman and Appy (2012) looked into how U.S. medical schools were addressing health literacy in their curricula. Of the 133 allopathic schools surveyed, 63 responded and 44 of them acknowledged the topic in their required curricula. However, the average amount of time devoted to health literacy education was approximately 3 hours over the course of a 4-year curriculum.

More recently, Coleman studied family medicine residencies in the United States. There was a 31 percent survey response rate (137/444) to his survey, with 58 programs indicating inclusion of health literacy in their required curriculum (Coleman et al., n.d.-b). On average, residents received about 2 to 5 hours of instructional time over the typical 3 years residency program. What was most interesting to Coleman was that almost every one of the residency directors who responded with comments said that better training around health literacy would significantly improve the clinical care their residents could deliver.

After considering the results of his surveys, Coleman then went back to the findings from his earlier literature review. What he uncovered was that health literacy curricula were being held back by a lack of competencies. Health professions educators were unsure what to teach their students and learners about health literacy. To respond to the need, Coleman, Hudson, and Maine (2013) published a consensus report that looked across all health professions and identified 62 health literacy competencies trainees should have before graduation. In addition, 32 best practices were identified out of this study (see Table 3-1).

While this study did identify a broad set of health literacy competencies important to a wide array of health professions, the total number of competencies was too large for practical purposes. His solution was to prioritize the long lists of competencies, which he and colleagues are undertaking in a follow-up study that is not yet published.

Coleman then addressed data on the effectiveness of health literacy educational interventions. It appears that learners do improve their self-

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TABLE 3-1 Results: Competencies and Practices Accepted by Delphi Round

Item Type	Round 1	Round 2	Round 3	Round 4	Total
Knowledge	19/24	5/5	–/–	–/–	24/24
Skill	21/28	2/4[a]	2/3[b]	2/3	27/29
Attitude	11/11	–/–	–/–	–/–	11/11
Practice	27/32	4/5	1/2[c]	0/1	32/33
Total	78/95 (82.1%)	11/14 (78.6%)	3/5 (60%)	2/4 (60%)	94/97 (96.9%)

[a] Three skill items were sent out with incorrect wording in Round 2 and were rated again in Round 4.

[b] One skill item divided into two separate items for Round 3.

[c] One practice item added in Round 3.

SOURCE: Coleman et al., 2013, as presented by Coleman on April 23, 2015.

perceived knowledge about and intentions to use health literacy best practices (Coleman and Fromer, 2015; Mackert et al., 2011). However, those intentions appear to be short lived based on Coleman's study of medical students at Oregon Health Sciences (Coleman et al., in press). Looking at more advanced trainees, their knowledge persisted over time, but they reported not implementing what they learned. The same cycle occurred following supplemental health literacy training (Coleman et al., n.d.-a). This led Coleman to assume there is something about the system that is not supporting the adoption of health literacy practices. It led him to radically transform their medical school curriculum that was based on five guiding principles as follows:

- Moving from systems-based to case-based curriculum
- Organized in seven blocks of related systems
- Clinical and science "threads" run longitudinally
- Compressing preclinical curriculum to 18 months
- Competency driven

The main change was to thread health communications longitudinally throughout the curriculum so important issues like health literacy are continuously reinforced. For health literacy, Coleman and his colleagues drew ideas from Kaiser Permanente in developing their own "habits model." The model tracks four domains during multiple simulated patient encounters taking place during the preclinical curriculum. These include

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- Habit 1: Make a positive connection.
- Habit 2: Establish an agreed upon agenda.
- Habit 3: Facilitate understanding.
- Habit 4: Confirm understanding.

To operationalize these habits, students practice with standardized patients every 2 weeks. It is at these encounters where students demonstrate their growing skills and knowledge within these four domains. Habit two involves negotiating a shared agenda at every encounter. Habit three includes providing need-to-know information up front, trying to limit the amount of information provided to the most important, and avoiding medical jargon in conversations with patients. Habit four asks students to elicit questions in a patient-centered manner and then use a teach-back[3] technique to be sure the student communicated clearly.

Coleman then gave the floor to Jennifer Cabe to expand the health literacy discussion and revisit integrating health literacy into health professions' curricula.

Applying Best Practices of Health Literacy

Jennifer Cabe, M.A.
Canyon Ranch Institute

Jennifer Cabe is executive director and a board member for CRI, a nonprofit, public charity focused on advancing health literacy and improving prevention using integrative approaches to health. She is also a member of the faculty at the Ohio State University (Ohio State) College of Nursing. Cabe previously worked in the Office of the Surgeon General, where she was responsible for the development and implementation of health literacy and communication initiatives in partnership with health professionals, advocacy groups, policy makers, community leaders, and the public. In her presentation, Cabe described three programs. The first is the new Bachelor of Science in Health and Wellness Innovation degree at Ohio State; the second is the CRI Life Enhancement Program (CRI LEP); and the third is the CRI Theater for Health program.

Bachelor of Science in Health and Wellness Innovation

This new bachelor's degree offered by the Ohio State College of Nursing is designed to meet a variety of community needs as well as the interests

[3] According to the Agency for Healthcare Research and Quality (AHRQ), the teach-back method verifies that patients understood directions before leaving the provider's office.

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FIGURE 3-1 Bachelor of Science in Health and Wellness Innovation.
SOURCE: Cabe, 2015, courtesy of Canyon Ranch Institute.

of the health care delivery system and those individuals who wish to work in that system but not necessarily in the existing, traditional models. As seen in Figure 3-1, the program is made up of six learning goals that focus on integrative health, prevention, health literacy, and health coaching, all under the rubric of innovation. Cabe believes that part of the popularity of the program is due to students seeing career opportunities in wellness, thanks in part to requirements under the Patient Protection and Affordable Care Act mandating a focus on wellness for large employers and some government entities. This program will build a workforce so organizations can improve their employees' health outcomes and productivity through wellness activities.[4]

[4] For more information on the CRI partnership with Ohio State, visit http://www.canyonranchinstitute.org/partnerships-a-programs/partnerships/ohio-state-university-college-of-nursing (accessed September 8, 2015).

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CRI Life Enhancement Program

Since 2007, CRI has partnered with a variety of U.S. health care delivery organizations in implementing the CRI LEP. The program takes a multidisciplinary, integrative approach to educating partners about how to transfer evidence-based, best practices for preventing, diagnosing, and addressing chronic disease in underserved communities. Their methods are grounded in the best practices of health literacy as described previously by Andrew Pleasant. CRI LEP partners include FQHCs, small rural hospitals, large health and hospital systems, and clinics. All CRI LEP partners serve low-income populations at high risk for chronic disease.

The program focuses on seven core elements:

1. Behavior change
2. Integrative health
3. Nutrition
4. Physical activity
5. Sense of purpose
6. Spirituality
7. Social support and follow-up

One week of training takes place in Arizona at Canyon Ranch Health Resort then the CRI LEP Core Team (the Core team), comprised of the partner's health and wellness professionals, receives on-site training in their community from CRI staff. Local partners and CRI create innovative solutions tailored to the community to address the existing social determinants of health. For example, how might local organizations help their community members with resolving unemployment or underemployment, poor access to fruits and vegetables, and food shortages? The multidisciplinary core team provides at least 40 hours of group sessions and four 1 hour one-on-one consultations for each CRI LEP participant in the areas of integrative health, behavioral health, nutrition, and exercise. To maximize training, each organization must have classrooms and space to engage in fitness activities. CRI collaborates with partners to find funding for, design, and build innovative additions such as teaching kitchens, fitness centers, walking groups, exercise classes, and gardens.

Core team members experience a hands-on, experiential training, including a simulated participant exercise with someone who is trained by CRI to portray a typical participant from the community. This exercise aims to help the team member learn about the participant's needs and help the participant identify a series of *small step* behavior changes that can improve his or her health and well-being. A critical component of the simulated participant exercise and of the program itself is what Cabe referred to as

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the *hand-off*. This is when the Core team member recommends a Core team professional (e.g., an integrative health expert, a behavioral health expert, a nutritionist, an exercise specialist, or an expert in spirituality) to the participant. The decision is based on the health professional's and the participant's mutual assessment of the participant's needs. The *hand-off* also requires each health care professional to provide the team members with an in-depth understanding of each participant's needs and health status.

Much of the focus here is on building the team. For CRI, team building involves the health professionals understanding and engaging with the work of other professions on the Core team as well as learning how to support the other core team members during challenging times—all with the focus on providing optimal care for their patients and communities. After partners complete the 12-week program and demonstrate their ability to support themselves, the CRI team's work is complete but not over. The established partnership continues through CRI coaching the core team members via in-person and virtual connections as long as the partner offers the CRI LEP.[5]

CRI Theater for Health Program

The CRI Theater for Health program started in 2010 as a partnership between CRI and The Clorox Company to advance health literacy and improve household hygiene through the arts in two impoverished communities on the outskirts of Lima, Peru (CRI, 2011; Pleasant et al., 2014). This effort extended the work of Brazilian Augusto Boal (1993), who originated Theatre of the Oppressed—an approach that uses theater to promote social and political change by actively engaging audiences in exploring real situations through the arts (Sullivan et al., 2008). Pleasant and Cabe of CRI and Andre de Quadros of Boston University College of Fine Arts built on the work of Boal to create *Theater for Health* program in Peru.

In the Lima communities, the overall objective of the program was to decrease the spread of disease from *E. coli* and *Listeria* using a series of telenovela-style live performances. The shows were held every weekend in outdoor spaces in the communities for 12 weeks and built stories and plots of romance and intrigue around characters as a way of maintaining the audiences members' interest in the production. Local actors encouraged community attendance and involvement at the shows by engaging them in developing solutions to real-world health issues in the com-

[5] For more information on the CRI LEP, visit http://www.canyonranchinstitute.org/partnerships-a-programs/cri-life-enhancement-program/cri-lep-overview (accessed September 9, 2015).

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munity, question-and-answer sessions, and providing rewards for their participation.

This creative process started with formative research with the communities. The research findings were included in an intensive 2-week workshop held in Lima that involved the interdisciplinary team of local actors, directors, and stage personnel; scientific experts from Peru and the United States; and team members from both countries with academic and professional backgrounds in arts, public health, health literacy, and communication. This process educated the artists about the science of household hygiene, and educated the scientists about the process of using the arts in an interactive manner to address health issues. Through this process, the ideal local individual was identified to transform the role of the "Joker," in Boal's terms, into a source of valid scientific information for the community members before, during, and after each performance.

Artistic and scientific team members also collaboratively drafted four episodes during that preparatory workshop before the program implementation began, and the other eight episodes were drafted as the program was being implemented. The overall story line was adjusted on a weekly basis to incorporate participating community members' input and reactions to the previous episodes. After initial drafting, each script was reviewed for language appropriateness, content accuracy, and cultural relevance. In fact, every episode was subject to continual refinement up to the moment of presentation in the community, and input from participating community members was also incorporated on a weekly basis. This input was received during the opportunities for participating community members to interact during each performance and through 20 qualitative interviews conducted with randomly selected audience members after each performance. This created a continuous quality improvement process that incorporated perspectives and information from the interdisciplinary team of scientific experts *and* artists who trained together, as well as community members. The approach ensured continual engagement of the interdisciplinary team and the community in order to enhance the diffusion and adoption of improved household hygiene behaviors.

According to Cabe, the program was a success for many reasons, including the fact that more than half the families from the Peruvian communities reporting changes in their families' hygiene behaviors, and a documented decrease in the percentage of positive *E. coli* and *Listeria* samples in household food preparation areas.

Understanding and Serving a Globalized Community

Susan Scrimshaw—who was on the IOM committee that produced the 2004 report on health literacy—commended Pleasant on mentioning *culture*

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in his roadmap for behavior change. One issue in developing the culture piece, she said, is that words have different meanings. Even the same word can have a different meaning in different languages. For example, the word *stress* in the Latin American culture means something very different than the term used in English-speaking nations. And in Brazil where Portuguese is the predominant language, the word *trauma* relates more to emotional stress versus being physically hit as it is typically referred to in English. To Scrimshaw, the challenge within health literacy is the cultural piece.

Pleasant then asked the group to reflect upon whether health professionals are being prepared to function and serve in a globalized community. In responding, Lemmie McNeilly from the American Speech–Language–Hearing Association stayed with the cultural theme. Given the variety of cultures around the globe, she said, it would be impossible to truly educate anyone to function competently to practice globally and understand all cultures and all languages—yet it is very important that health professionals recognize and celebrate cultural differences. This would involve demonstrating sensitivity to cultural differences, understanding the value of differences, and being educated to use members of the community as interpreters of both the language and the culture, she said. In this way, the provider is able to validate an individual's values, beliefs, and practices, and is less likely to make assumptions about individuals from other cultures. McNeilly also said it is important not to overgeneralize and assume that a person from a particular culture espouses all of the beliefs and practices associated with that culture.

Michelle Troseth from Elsevier and also representing the National Academies of Practice commented on the importance of cultural competence in preparing health professionals to work in a globalized community that brings the focus back to the individual and the patient. But with the advent of new technologies like the electronic health record, the focus on the person risks being lost. There need to be some common practices across all the professions, she said, to ensure that perspective remains central. One of these practices could involve a shared core competency about health literacy and the teach-back method, which in her opinion would be relatively easy to accomplish.

The teach-back method also resonated with Joanna Cain from the American Board of Obstetrics and Gynecology and the American College of Obstetricians and Gynecologists. She proposed asking the community how they would like their health professionals prepared for work with their community. One possibility would be to have what Cain termed as a "checkout" designed by the communities themselves. The health provider would develop half a page and the checkout person would have the other half to record all the things the health provider missed, misunderstood, or did not cover adequately. It would be akin to a check on how well the provider communicated, and the teach-back method could be the training

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tool for all the professions. And while she endorsed this idea, she also questioned its sustainability given present-day pressures to cut costs and shorten providers' time with patients.

Edward Saltzman representing American Society for Nutrition also commented on the need for students and trainees to obtain foundational skills that are transferrable across different situations and encounters. These skills would be applicable to practice globally and locally, and would create an awareness of the effects of global events on local communities. Many of these skills are components of health literacy as described by Pleasant, Coleman, and Cabe, but competency in cultural sensitivity would be particularly relevant.

Malcolm Cox approached the question slightly differently by expanding the discussion beyond culture. The glue that holds effective education together is work in the community. And while important, health literacy is just one of the ways to enhance community engagement. He challenged the group to think about how a set of constructs might be created that can be used within a community framework to help revolutionize the existing curriculum. This would provide a generic solution that could be taken to deans as the basis for a more specific toolkit for educating health professionals.

Improving Communication in a Globalized World

The next question was addressed using a rapid-fire presentation technique where participants succinctly share ideas in a short amount of time. Table 3-2 is a compilation of the responses generated from the question: How might health literacy be globally integrated into health professional education to improve communication in a globalized world?

As a parting thought, Coleman believed that providing understandable, actionable health information is an ethical imperative that needs to be included in the ethical foundations of training for all the health professions. Access to understandable information is probably the greatest health disparity faced today by all nations. Perhaps by modifying ethical standards that focus on communication it may be possible to approach this disparity on a global scale.

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TABLE 3-2 Participant Responses to "How Might Health Literacy Be Globally Integrated into Health Professional Education to Improve Communication in a Globalized World?"

Person	Affiliation	Response
Joanne Schwartzberg	Accreditation Council for Graduate Medical Education	Always ensure that you have understood the patient and use teach-back techniques to ensure that the patient has understood you.
Francisco Eduardo de Campos	Former National Secretary of Labor and Education Management in Health of the Ministry of Health, Brazil	Expand the use of community health workers as translators between providers and patients.
Brenda Zierler	University of Washington	Do not forget faculty, staff, and preceptor skills development; experiential learning in practice can be used along with training in simulation labs for greater imprinting of experiences.
Jan De Maeseneer	Ghent University	Health literacy is not a medical issue but an educational issue; integrate health literacy into all educational tracks, starting from primary school.
Warren Newton	American Board of Family Medicine	Provide a breadth of experiences that cut across class and ethnicity, and allow adequate time for students to truly understand differences among people and cultures.
Emilia Iwu	Jonas Nursing Scholar	Use real patients who understand their disease process to provide feedback to prelicensure health professional learners about their ability to communicate effectively.

REFERENCES

AAMC (Association of American Medical Colleges). 2013. *Medical schools take active role in reducing students' stress and anxiety*, edited by R. Greenberg. Washington, DC: AAMC.

Aronson, L. 2015. Necessary steps: How health care fails older patients, and how it can be done better. *Health Affairs (Millwood)* 34(3):528-532.

Ball, S., and A. Bax. 2002. Self-care in medical education: Effectiveness of health-habits interventions for first-year medical students. *Academic Medicine* 77(9):911-917.

Boal, A. 1993. *Theatre of the oppressed*. New York: Theatre Communications Group.

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Envisioning the Future of Health Professional Education: Workshop Summary

Cabe, J. 2015. *The power of health literacy in health professional education*. Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 23.

Carmona, R. H. 2003. *Health literacy in America: The role of health care professionals*. http://www.surgeongeneral.gov/news/speeches/ama061403.html (accessed July 14, 2015).

The Centre for Literacy. n.d. *Health literacy—Calgary charter*. http://www.centreforliteracy.qc.ca/health_literacy/calgary_charter (accessed September 9, 2015).

Coleman, C. 2011. Teaching health care professionals about health literacy: A review of the literature. *Nursing Outlook* 59(2):70-78.

Coleman, C. 2015. *Curriculum transformation: Integrating health literacy teaching in medical education*. Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 23.

Coleman, C. A., and S. Appy. 2012. Health literacy teaching in U.S. medical schools, 2010. *Family Medicine* 44(7):504-507.

Coleman, C. A., and A. Fromer. 2015. A health literacy training intervention for physicians and other health professionals. *Family Medicine* 47(5):388-392.

Coleman, C. A., S. Hudson, and L. L. Maine. 2013. Health literacy practices and educational competencies for health professionals: A consensus study. *Journal of Health Communication* 18(Suppl. 1):82-102.

Coleman, C. A., S. Peterson-Perry, and T. Bumsted. In press. Long-term effects of a health literacy curriculum for medical students. *Family Medicine*.

Coleman, C. A., R. Garvin, B. Sachdeva, A. Kobus, and S. Peterson-Perry. n.d.-a. Health literacy training for family medicine residents: Effects of a longitudinal curriculum.

Coleman, C. A., N. T. Nguyen, R. Garvin, C. Sou, and P. A. Carney. n.d.-b. Health literacy teaching in U.S. family medicine residency programs: A national survey.

CRI (Canyon Ranch Institute). 2011. *Health literacy*. http://www.canyonranchinstitute.org/about-cri/focus-areas/health-literacy (accessed July 7, 2015).

Dyrbye, L. N., M. R. Thomas, J. L. Huntington, K. L. Lawson, P. J. Novotny, J. A. Sloan, and T. D. Shanafelt. 2006. Personal life events and medical student burnout: A multicenter study. *Academic Medicine* 81(4):374-384.

Eckleberry-Hunt, J., and J. Tucciarone. 2011. The challenges and opportunities of teaching "Generation Y." *Journal of Graduate Medical Education* 3(4):458-461.

Gerteis, J., D. Izrael, D. Deitz, L. LeRoy, R. Ricciardi, T. Miller, and J. Basu. 2014. *Multiple chronic conditions chartbook*. AHRQ publications No. Q14-0038. Rockville, MD: AHRQ.

Grubbs, V., S. E. Gregorich, E. J. Perez-Stable, and C. Y. Hsu. 2009. Health literacy and access to kidney transplantation. *Clinical Journal of the American Society of Nephrologists* 4(1):195-200.

HLS-EU (European Health Literacy Survey) Consortium. 2012. *Comparative report on health literacy in eight EU member states. The European health literacy Survey HLS-EU*. http://www.health-literacy.eu (accessed August 28, 2015).

Horton, G. E., N. Diaz, and D. Green. 2009. Mental health characteristics of social work students: Implications for social work education. *Social Work in Mental Health* 7(5):458-475.

IOM (Institute of Medicine). 2004. *Health literacy: A prescription to end confusion*. Washington, DC: The National Academies Press.

IOM. 2013. *Health literacy: Improving health, health systems, and health policy around the world: Workshop summary*. Washington, DC: The National Academies Press.

Knecht, M. K., G. F. Bauer, F. Gutzwiller, and O. Hämmig. 2011. Persistent work-life conflict and health satisfaction: A representative longitudinal study in Switzerland. *BMC Public Health* 11:271.

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Envisioning the Future of Health Professional Education: Workshop Summary

Kutner, M., E. Greenber, Y. Jin, and C. Paulsen. 2006. *The health literacy of America's adults: Results from the 2003 National Assessment of Adult Literacy (NCES 2006-483)*. Washington, DC: U.S. Department of Education.

Lunau, T., C. Bambra, T. A. Eikemo, K. A. van der Wel, and N. Dragano. 2014. A balancing act? Work-life balance, health and well-being in European welfare states. *European Journal of Public Health* 24(3):422-427.

Mackert, M., J. Ball, and N. Lopez. 2011. Health literacy awareness training for healthcare workers: Improving knowledge and intentions to use clear communication techniques. *Patient Education and Counseling* 85(3):e225-e228.

Msemo, G., A. Massawe, D. Mmbando, N. Rusibamayila, K. Manji, H. L. Kidanto, D. Mwizamuholya, P. Ringia, H. L. Ersdal, and J. Perlman. 2013. Newborn mortality and fresh stillbirth rates in Tanzania after Helping Babies Breathe training. *Pediatrics* 131(2):e353-e360.

Pleasant, A., A. de Quadros, M. Pereira-León, and J. Cabe. 2014. A qualitative first look at the arts for behavior change program: Theater for health. *Arts & Health* 7(1):54-64.

Pryjmachuk, S. 2004. *Sources of stress, stress and coping in a population of pre-registration nursing and midwifery students (Research Completed). Duration of Project: 1999-2003*. Principle Investigator: Steven Pryjmachuk. Manchester, UK: University of Manchester School of Nursing, Midwifery, and Social Work.

Rao, T. S. S., and V. Indla. 2010. Work, family or personal life: Why not all three? *Indian Journal of Psychiatry* 52(4):295-297.

Saravanan, C., and R. Wilks. 2014. Medical students' experience of and reaction to stress: The role of depression and anxiety. *Scientific World Journal*. Article ID 737382.

Sharif, F., and S. Masoumi. 2005. A qualitative study of nursing student experiences of clinical practice. *BMC Nursing* 4(6):1-7.

Sullivan, J., S. Petronella, E. Brooks, M. Murillo, L. Primeau, and J. Ward. 2008. Theatre of the oppressed and environmental justice communities: A transformational therapy for the body politic. *Journal of Health Psychology* 13(2):166-179.

Vos, T., et al. 2012. Years lived with disability (YLDS) for 1160 sequelae of 289 diseases and injuries 1990-2010: A systematic analysis for the global burden of disease study 2010. *Lancet* 380(9859):2163-2196.

Zarcadoolas, C., A. F. Pleasant, and D. S. Greer. 2006. *Advancing health literacy: A framework for understanding and action*. San Francisco, CA: Jossey-Bass.

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4

Building a Global Health Workforce

Key Messages Identified by Individual Speakers and Participants

- Arguments for the curricular redesign toward a One Health concept include the growing risk of disease caused by overcrowding and urbanization, changes in food production and supply systems, and extreme weather conditions, environmental degradation, and the inappropriate use of antibiotics. Solely focusing on human or animal or environmental health would not set a foundation for learning about or addressing these 21st-century challenges. (Colwell, Fox, Kahn, Olsen)
- Learners are being prepared for a health system that no longer exists. (Scrimshaw)
- There needs to be a functional model for educators to follow that would quickly capture the attention of leaders who possess the power and the money to create real change. Community-based education could be the broad, overarching construct from which everything else follows. (Cox)

James Fox, representing the Association of American Veterinary Medical Colleges (AAVMC), provided the background for the session he moderated on building a global health workforce through the One Health framework. He started by describing the origins of the One Health concept that began with Rudolph Virchow who argued in the mid-1800s that no

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dividing line exists between animal and human medicine (Schultz, 2008). Adding the environmental context, this forms the basis for the present day One Health concept: "Unite the entire spectrum of medical expertise with the goal of improving and protecting the health of humans, all other animals, and our environment, worldwide."

Fox went on to describe the world as complicated, shrinking, and changing. With a changing environment, populations are increasingly exposed to a multitude of organisms through a plethora of different animal species. He called it the convergence model (see Figure 4-1) and described it as the perfect storm in terms of physical, environmental, genetic, and biological factors that influence the outcome of disease. It includes wildlife vectors and insults to wildlife caused by the demands of encroaching human population. These demands are driven by social, political, and economic concerns that impact the ecology and are inextricably linked to human and animal health.

Fox and his veterinary colleagues realize how important diseases transmitted from animals to humans are: they constitute 60 percent of all known infectious organisms in man and 75 percent of emerging pathogens

FIGURE 4-1 Convergence model.
NOTE: EID = emerging infectious disease.
SOURCE: Fox, 2015, with kind permission of Lonnie J. King, Ohio State University.

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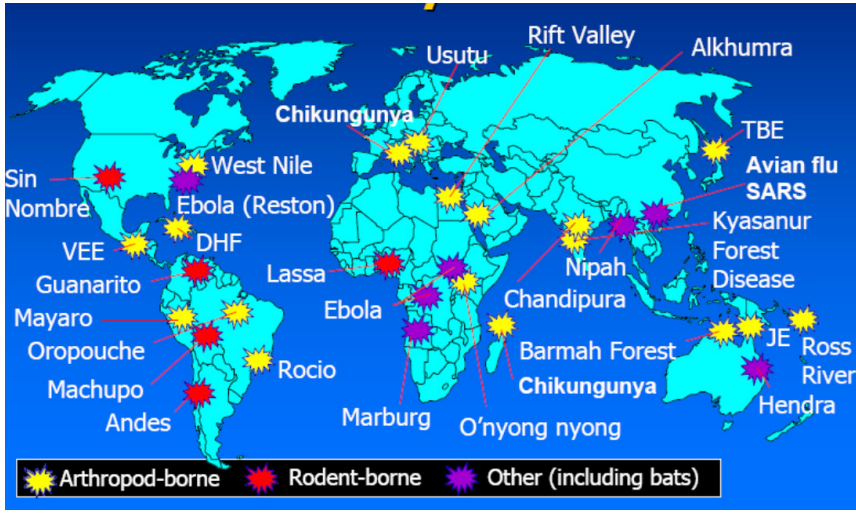

FIGURE 4-2 Global map of emerging infections.
NOTE: DHF = dengue hemorrhagic fever; JE = Japanese encephalitis; SARS = severe acute respiratory syndrome; TBE = tick-borne encephalitis; VEE = Venezuelan equine encephalitis.
SOURCE: Gibbs, 2005, as presented by Fox on April 24, 2015.

(AVMA, 2008). The literature is replete with examples of the interface of climate change and infectious disease and how these two are affecting our various ecosystems and they way diseases present. This is not only evident in humans but also in various species of animals whose survival is also being negatively affected (Altizer et al., 2013). Figure 4-2 is a global map of emerging infections. It is because of the complexity of ecological environments and the encroachment upon native habitats that exposure to different species of bats carrying pathogens has become an increasingly important global problem.

Another often overlooked point is that by 2050 there will be 9 billion people inhabiting Earth. This has profound implications for the food supply and food security, both of which are impacted by animals. For example in Asia, 6 percent of the annual rice harvest, or roughly enough to feed Indonesia's 240 million people for 1 year, is ingested by rats. This is an example of how the intricate balance of our food production supply chain is so important and will be increasingly important in the future (Normile, 2010).

The One Health Commission is addressing One Health issues through public, government, and academic education programs. The International One Health Platform Foundation has created a new, open access *One Health Journal* with Elsevier. It is a global initiative, but there are other

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efforts underway through the AAVMC. It recently launched a project that seeks to integrate One Health concepts into degree programs of health professional students through interprofessional case studies. This project demonstrates how One Health advocates promote multidisciplinary approaches and encourage collaborations that break down walls through enhanced educational programs for local, national, and global improvement.

ENVIRONMENT, CLIMATE, AND HUMAN HEALTH: WATERBORNE DISEASES

Rita R. Colwell, Ph.D., D.Sc.
University of Maryland, College Park

Rita Colwell from the University of Maryland extended the One Health foundation set by Fox in his opening remarks by providing an example of how human health is closely intertwined with aquatic systems and how it is affected by climate and nonhuman life forms in and around bodies of water.

She began by explaining that there are at least two dozen diseases that are transmitted by water (see Table 4-1). Cholera and diarrheal diseases alone account for 1.5 billion cases every year, and close to 2 million deaths. And while the disease is transmitted person to person under conditions of poor sanitation, she and her colleagues were able to show that the bacte-

TABLE 4-1 Water-Related Diseases

	Cases per Year	Deaths per Year
Amoebiasis	48,000,000	110,000
Arsenic	28–35m exposed to drinking water with elevated levels	
Diarrheal disease, including cholera	1.5 billion	1,800,000
Dracunuliasis (guinea worm)	>5,000	—
Fluorosis	26 million (China)	—
Giardiasis	500,000	Low
Hepatitis A	1,500,00	—
Intestinal helminths	1333,000,000	9,400
Malaria	396,000,000	1,300,000
Schistosomiasis	160,000,000	>10,000
Trachoma	500,000,000	—
Typhoid	500,000	25,000

SOURCE: Colwell, 2015, courtesy of Rita Colwell, University of Maryland, College Park, and Antar Jutla, West Virginia University.

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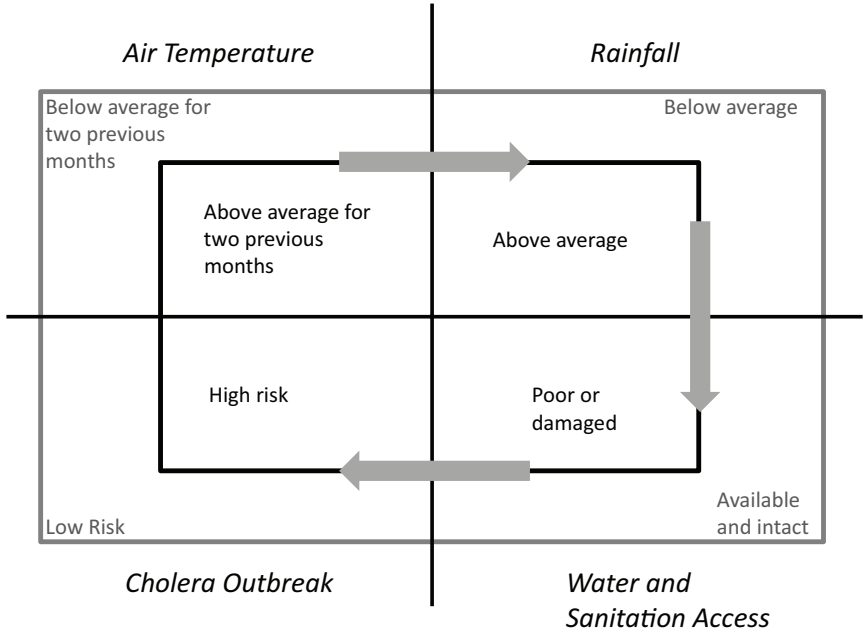

FIGURE 4-3 Theoretical framework for predicting cholera outbreaks in epidemic regions.
SOURCE: Colwell, 2015, courtesy of Rita Colwell, University of Maryland, College Park, and Antar Jutla, West Virginia University.

rium *Vibrio cholerae* is part of the natural flora of the environment. They then developed a model using changes in air temperature and rainfall, to predict cholera outbreaks in such places as Bangladesh, Haiti, and India where there is either a poor or a damaged infrastructure for delivering water and handling sanitation (see Figure 4-3). In each of these countries, there was an interaction of the environment, the weather patterns, and exposure to *Vibrio cholerae* at a time when the populations were most vulnerable leading to a cholera epidemic.

Colwell then applied the One Health example she presented to education and cultural interactions that demonstrate how holistic one must be in understanding and dealing with public health. Having spent 25 to 30 years working in Bangladesh, she and her colleagues had uncovered what she described as a waterborne vector (the copepods) responsible for transmitting the cholera as a carrier. With their satellite imagery, they could predict when an outbreak would occur—but Colwell wanted to help the villagers in remote areas prevent cholera. She developed a variety of simple filtering materials that could remove 90 percent of the copepods and particulate

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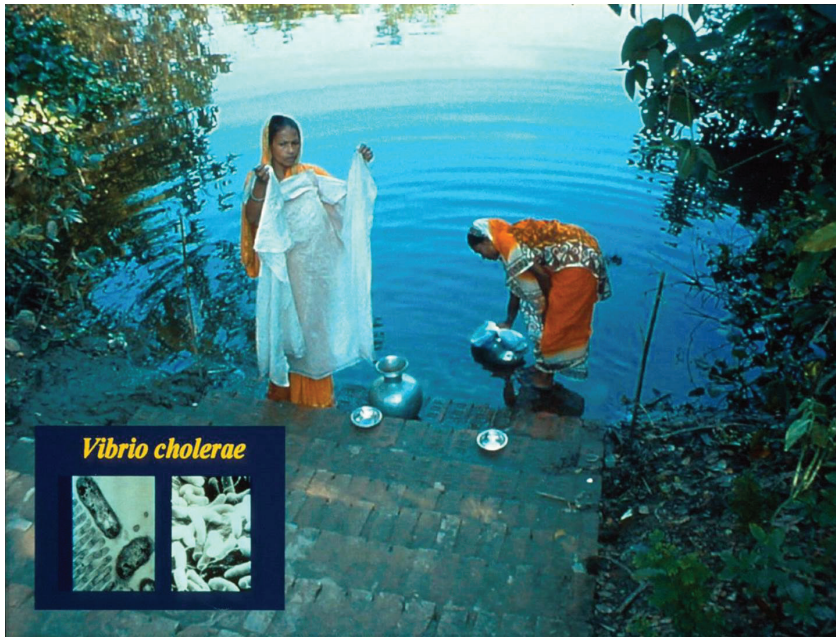

FIGURE 4-4 *Vibrio cholerae.*
SOURCE: Colwell, 2015.

matter from the water (see Figure 4-4). With financial assistance from the National Institutes of Health (NIH), Colwell undertook a 3-year study in 50 villages involving 150,000 Indian villagers. To reach the populations, Colwell set up health care extension agents, much like the agricultural extension agents; these were women who taught others how to take a square of used old sari cloth, fold it four to eight times, and then place it over the carafe where they collect water for their family for the day, and pour the water through the filter.

It did not take a lot of convincing for their extension agents and for the women in the villages to see that the water was clear after filtration compared to the turbid water that they were otherwise serving to their families for their drinking water. Through this system of education and outreach using local villagers, Colwell and her colleagues were able to reduce cholera by 50 percent in this population.

To test whether their intervention was sustainable, Colwell returned to India 5 years later. She was interested in testing the effectiveness of their educational program by comparing cholera rates between groups of villagers who did and did not receive the intervention. This proved to be

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a difficult task because the control villagers had discovered the filtration. Roughly 75 percent of the population was now filtering their water. But what Colwell did learn was there appears to be a herd effect that is similar to vaccines. By being surrounded by families that filter their water, those who do not filter are actually protected.

This is an example of condensing all of the sophistication to understand the transmission of this disease, its relationship to the environment, and then provide a simple workable technique for the population that is shared through local resources.

PUBLIC HEALTH AND GLOBAL HEALTH AS VENUES FOR CROSS-DISCIPLINARY HEALTH PROFESSIONAL EDUCATION

Christopher W. Olsen, D.V.M., Ph.D.
University of Wisconsin–Madison

Christopher Olsen is a professor of public health in the School of Veterinary Medicine at the University of Wisconsin–Madison (UW–Madison). He is also Associate Director for the One Health, Global Health Institute, which is why he was asked to speak about public health and global health as opportunities for cross-disciplinary health professional education. Olsen feels strongly that public health and global health education provide venues for bringing students across multiple disciplines together to learn together and to learn how to cooperate and work effectively together. Because almost all of the health professional programs are in close proximity to each other on a single campus, his university is uniquely positioned to facilitate learning across the professions. In particular, education programs at UW–Madison that began as cross-disciplinary among the health professional programs have grown to include nonhealth professions such as agriculture, engineering, law, the arts and humanities, and education. He provided two examples to illustrate his point.

Master of Public Health Program

The first example Olsen provided is the UW–Madison cross-disciplinary master in public health degree program. Launched in 2005, it had an intentional cross-disciplinary perspective right from its start. Another important aspect of their mission is the emphasis Olsen and his colleagues placed on engaging the community particularly in the area of prevention. To accomplish their goals, Olsen reported gathering a diverse faculty with expertise in climate change, environmental health, epidemiology, pharmacy, biostatistics, global health, nursing, and veterinary medicine, among others, that reflect the One Health concept.

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More than 400 students have participated in the nondual and the dual degree programs that include combining the master's in public health with degrees in medicine, veterinary medicine, nursing, pharmacy, law, and public affairs.

Certificate in Global Health

The second is the Certificate in Global Health program that focuses on global health topics and health issues that transcend national and disciplinary boundaries. Its curriculum emphasizes health and disease in developing countries as viewed through a cultural lens and incorporates complex, upstream determinants of health. Implementation of the certificate program is a collaborative effort of the Schools of Medicine and Public Health, Nursing, Pharmacy, Veterinary Medicine, and the Division of International Studies.

As part of the certificate program, there are faculty-led summer field courses in three different countries: Ecuador, Thailand, and Uganda. These experiences provide opportunities for students across health and nonhealth professions to travel, live, learn, and reflect together on what they are experiencing in the local community. The program in Ecuador is led by an anthropologist. The intention is to help students better understand health and well-being at the intersection of humans and animals through an anthropological lens. The program is conducted in collaboration with a nongovernmental organization (NGO) called Andean Health and Development. Conversely, the program in Thailand is conducted in collaboration with a university partner, Mahidol University in Bangkok. This program has a strong focus in tropical medicine and in community health. Students traveling to both Ecuador and Thailand live in local homes. They are imbedded in the communities where they are learning and working. The third program in Uganda also has a strong focus in community health. It emphasizes what it means to manage HIV/AIDS patients in a developing country setting.

Both the programs Olsen presented rely upon a cross-disciplinary group of faculty for support (see Table 4-2). This is a challenge. And while it is difficult to get the different faculty members together, they have managed to overcome this obstacle mainly because the faculty themselves are committed to the programs. UW–Madison is not the only place successfully bringing the diverse professions together, which means it is not impossible to do. Olsen believes that competencies for interprofessional education, global health, and One Health could be drivers of collaborative educational models.

Olsen closed with an apt quote from Ren Wang, who is the Assistant Director General for the Agriculture and Consumer Protection Department of the Food and Agriculture Organization of the United Nations (FAO).

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TABLE 4-2 Faculty Demographics (2004–2014)

Discipline	Ecuador	Thailand
Anthropology	Annually	—
Public health	Multiple years	Multiple years
Medicine	Annually	Annually
Veterinary medicine	Annually	Multiple years
Nursing	Multiple years	Annually
Pharmacy	Multiple years	Multiple years
Other	Engineering	Sociology

SOURCE: Olsen, 2015.

Wang said: "In today's world, we humans have become increasingly linked not only to each other, but also to all other life on the planet. Human health has become ever more intertwined with the health of our environment and the animals that populate it—the animals we rely on for food, draught, power, savings, security, and companionship as well as the wildlife inhabiting sky, land, and sea" (FAO, 2013).

A GLOBAL HEALTH WORKFORCE THROUGH A ONE HEALTH FRAMEWORK: A PUBLIC HEALTH PERSPECTIVE

Laura H. Kahn, M.D., M.P.H., M.P.P.
Princeton University

Laura Kahn is a physician and research scholar with the Program on Science and Global Security at the Woodrow Wilson School of Public and International Affairs at Princeton University. She is a cofounder of the One Health Initiative that serves as a global repository for all news and information pertaining to One Health.[1] In her presentation at the workshop, Kahn provided a public health perspective on building a global health workforce through a One Health framework that recognizes human health, animal health, and ecosystem health as inextricably linked.

Kahn started by listing traditional subjects taught in schools of public health that do not address the challenges faced by 21st-century societies (see Box 4-1). To reconcile this, Kahn advocated for a restructuring of the curriculum away from the human health focus and more toward a One Health concept. Her arguments for the curricular redesign echoed those of Colwell, Olsen, and Fox, and include the growing risk of disease

[1] For more information about the One Health Initiative, visit http://www.onehealthinitiative.com (accessed July 7, 2015).

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BOX 4-1
Traditional Subjects Taught Versus 21st Century Challenges

Traditional Subjects in Schools of Public Health

- Biostatistics
- Epidemiology
- Health policy and management (hospitals and health insurance)
- Population and family health
- Sociomedical sciences (applied social sciences)
- Environmental health (human health risks—carcinogens, toxic waste, etc.)

Challenges We Face in the 21st Century That Impact Global Health

- Increasing populations and megacities
- Massive waste production
  - Human and animal
- Water and food contamination
- Potential food shortages
- Antibiotic resistance
- Environmental degradation
- Mental illness
- Public mistrust of vaccines
- Emerging infections
- Climate change
  - Extreme weather events, droughts, floods

SOURCE: Kahn, 2011, as presented by Kahn on April 24, 2015.

caused by overcrowding, changes in food production and supply, extreme weather conditions, environmental degradation, and the indiscriminant use of antibiotics. Solely focusing on human or animal or environmental health would not set a foundation for learning about or addressing these 21st-century challenges. As such, the curriculum needs to change and Kahn proposed how she would redesign it.

Her curricula would set up professional education and training using a One Health framework. There would be a greater emphasis on zoonotic diseases, including entomology and parasitology. While there are some courses taught on zoonotic diseases, she argues that it is not enough. She would place greater emphasis on virology and bacteriology. Schools of public health would teach more about food safety and security, global health, and agriculture. Other topics would include water purity, sanitation, and hygiene in both a human and animal context including domestic and wild animal health.

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Next she would involve ecosystem health. Currently this is taught as environmental health with a focus on toxins and contaminants. Kahn would instead teach ecosystem health and create an understanding of what exactly a healthy environment entails. This would incorporate ideas presented by Colwell on the importance of monitoring not only weather, but also ocean conditions. There are many things that can be monitored in the environment that directly affect health, and these areas should be taught and institutionalized in the way public health and global health are practiced. That would mean educating students about policy, and specifically, One Health policy. Currently, when schools of public health teach policy, they focus solely on hospital administration and health insurance. Kahn thinks this should be expanded to include such topics as disaster preparedness, biodefense, and food security.

An additional aspect of her One Health curricula would be to focus on teams. The work would be arranged similar to that of business schools where basically all of the student assignments are in teams and involve case-based and problem-solving activities. The curricula would reflect the interdisciplinarity described by Olsen in his talk. It would be cross-cultural learning and would include understanding qualitative and quantitative forms of research.

Kahn listed the public health core competencies developed by the Council on Linkages Between Academia and Public Health Practice (2014) (see Box 4-2). In her view, these could be expanded to include a One Health focus. The educational lens would be on local, regional, national, and international teams because that is what will be needed in a global workforce to be able to assess and address health situations in any and all contexts.

BOX 4-2
Core Competencies for Public Health Professionals

- Analytic and assessment
- Policy development and program planning
- Communication
- Cultural competency
- Community dimensions of practice
- Public health sciences
- Financial planning and management
- Leadership and systems thinking

SOURCE: Council on Linkages Between Academia and Public Health Practice, 2014, as presented by Kahn on April 24, 2015.

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Students would be taught how to critically evaluate public health programs, how crises are responded to, and how to develop strategies for improvement. In this way, education produces creative thinkers and problem solvers who think beyond the hospital walls.

A challenge to implementing Kahn's vision of a global One Health workforce is the shortage of human and animal health workers who could be trained to understand a broader perspective of health. And while there are documented shortages of health workers particularly in certain regions of the world (WHO, 2006; WHO and GHWA, 2013), the global veterinary workforce is even further challenged. First, there are no universally accepted educational requirements for people working in veterinary services resulting in great variation in how veterinary medicine is taught in different countries; the World Organization for Animal Health (OIE) is advocating for defined competencies and skills and for minimum competencies (Sabin and DeHaven, 2012). Second, there is no reliable data for estimating the number of veterinary and paraveterinary workers. Some countries like India, Liberia, Malaysia, and Russia have no data at all (OIE, 2013). Kahn could also not locate any data on a global health environmental health or ecosystem health workforce.

In closing, Kahn argued there is much room for improving the education of health professionals that could be addressed using a One Health framework. It would fill many gaps, both nationally and internationally. To address 21st-century problems, Kahn said there needs to be a workforce with the education and training to assess the entire milieu where people live and work that is not just focused within hospital or clinic walls.

ENVISIONING THE FUTURE

As reminded by Mary Elizabeth (Beth) Mancini of the Society for Simulation in Healthcare, the purpose of the workshop was to explore the implications that shifts in health, policy, and the health care industry could have on health professional education and workforce learning; to identify learning platforms that could facilitate effective knowledge transfer with improved quality and efficiency; and to discuss opportunities for building a global health workforce that understands the role of culture and health literacy in perceptions and approaches to health and disease. These three areas were converted into questions that were examined in greater depth through breakout groups. Each of the participants was equally divided into three clusters and assigned one question to discuss. Joanna Cain, who grew up in the medically underserved Yakima Indian Reservation and saw firsthand how difficult it is to meet the needs of rural and underserved women, represented the American Board of Obstetrics and Gynecology and the American College of Obstetricians and Gynecologists. She was the

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first to report on the question her group was assigned (noted below). Cain's report drew from ideas presented within her small group that was led by Thomas Clawson from the National Board for Certified Counselors, Inc. and Affiliates.

What Are the Implications That Shifts in Health, Policy, and the Health Care Industry Will Have on Health Professional Education and Workforce Learning?

Cain divided her report into three parts that took a global perspective in addressing shifts in health, shifts in policy, and shifts in the health care industries.

Shifts in Health

Cain noted that people are living longer but with more chronic disease. There are unpredictable outbreaks of infectious disease leading to an even greater need to focus on One Health to jointly address human, animal, and environmental health in a globalized world. Also, patients are getting more involved in their own personal care. This led individuals at the table to suggest a greater educational focus on the social determinants of health, on prevention, on biomedical research, and on big data that could lead to major breakthroughs in prevention, wellness, and care. With greater patient or person involvement, Cain acknowledged a need for focusing on health literacy, lifestyle choices, and cultural diversity as key educational elements.

Shifts in Policy

Cain reported a need to continue pushing toward universal health coverage in a manner described by Francisco Campos, keynote speaker and former National Secretary of Labor and Education Management in Health of the Ministry of Health, Brazil. She reported that members at her table were particularly interested in addressing barriers inhibiting access to care for undocumented persons and low-income workers, as well as underserved, unserved, or never-served communities. She noted that it was important to continue to move toward a concept of health care as a right versus a privilege and establish policies that support this through competency sharing, both locally and globally. Her concern was that incentives to work with poor and underserved populations have been damaged by the cost of education, thus policies that facilitate loan repayment could be important incentives to overcome financial realities of health professional education. Other policies that some individuals of the group endorsed would invest in prevention. However, the effectiveness of this investment would depend on

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a health literate society, so Cain suggested that science education could start in preschool for children and continue through community colleges. There might also be science education for the public and other leaders in need of an expanded view of science. She felt health literate communication was important. In this regard, the role of media in translating health material and increasing health literacy is critical to improving science education for all.

Cain proposed on behalf of members in the small group other policies that would broaden the definition of *teams* to recognize complementary skills and expertise and include interdisciplinary education, innovative leadership education, and community-based training. She emphasized that such policies would be established not just in Washington, DC, but at every level—in the community, at the hospital, and within professional and educational associations. In summary, the policy foci Cain identified would be on

- Investing in prevention;
- Leveraging technology to deliver care where it is most needed;
- Developing strategies and plans to effectively translate and disseminate to multiple levels; and
- Reimbursing for costs of care and education that prioritize prevention and community-oriented health delivery rather than highly subspecialized health care interventions.

Shifts in the Health Care Industry

Like the policy suggestions, Cain expressed a desire for the health care industry to adopt more team-based approaches and focus greater energy on collaborations. This would mean training the health workforce to understand how the health care system works. The training would include knowledge as well as a demonstrated ability to advocate for patients and communities. It would build a workforce that could change how the industry works. This would likely mean collaborating with insurance companies. It might also involve public–private partnerships and leveraging the health care industry to facilitate education of health professionals.

Cain also brought up fiscal constraints that could impede some of her proposed ideas. It might in part be dealt with through redistribution of resources in order to balance hospital and community-based care. Another option would be to reduce waste as a way of funding innovative initiatives, or keying in on particular technologies for saving time and money. An added benefit of virtual communication could be an expanded boundary of the hospital beyond the physical walls of the institute. In closing, Cain expressed a number of points that emphasized the importance of

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- Health literacy in understanding how to navigate a health care system and complex insurance policies;
- A system that rewards prevention and healthy lifestyle choices rather than just treatment of disease; and
- Investing in community-based health promotion as a primary focus of the health care industry.

The second report to the participants was provided by Michelle Troseth from Elsevier and who was also representing the National Academies of Practice, although the session was led by Timi Agar Barwick from the Physician Assistant Education Association. Troseth provided remarks in response to the following question:

Which Learning Platforms Will Most Effectively Facilitate Knowledge Transfer with Improved Quality and Efficiency?

To set the stage for her report, Troseth offered the words of Max De Pree, an American businessman and writer, who said, "The first responsibility of a leader is to know reality" (De Pree, 1987). She then explained how the group facilitators brought new realities to her breakout group through a video titled *The Future of Education: Epic 2020*.[2] This was a 10-minute film that focused on current and future trends in education as a result of technology. It explored the rapidly growing market of for- and not-for-profit companies like the Kahn Academy, TedEd, and Udacity that offer online educational opportunities. These entrepreneurial companies are moving into the future by providing badges, certificates, and common learning platforms that take into consideration cost and realities of student debt. The video helped Troseth and the other small-group participants consider their roles within health professions education given the exponential growth in technology. This discussion led the group to a more focused dialogue where individuals shared lessons learned from their own personal context and experiences. Based on some of the presented ideas, group members described what each sees as the pros and cons of new learning platforms that, according to the video, are replacing traditional, classroom education. Below are individual group member's pros and cons of technology-based learning platforms for effective knowledge transfer as presented by Troseth.

[2] For more information, visit http://epic2020.org (accessed August 11, 2015).

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Pros

Beginning first with the positive aspects of online learning and learning platforms, Troseth stated that technology-based education would allow educators to more easily customize learning. For example, tools and techniques could enable real-time, course correction. Adaptive learning would be guided and provided at the exact moment it is required by the learner. There would also be the potential for increased virtual connections both globally and locally, that could include learning communities. Online communities would stretch connections to new and different learners, educators, and stakeholders. But while there is tremendous value in the online experience, Troseth and other individuals in the group touted the greatest benefits from blended learning. Combining virtual with face-to-face education has been shown to be more effective than either technique alone, showing increased student engagement and satisfaction.

Troseth also reported that online education is more closely aligned with today's students' needs and skill set. Many millennials are digital natives, meaning that they were raised in a digital, media-saturated world and are very comfortable with technology. The online platforms offer education in a format they are often more comfortable with using. Other advantages include reduced duplication of the same course in multiple schools; increased efficiency so students can learn at their own pace and in their own time; and mitigation of some of the faculty shortages.

Virtual learning has the added benefit of analytics. With real-time statistics, educators can more accurately study where learners are struggling from an individual or population level.

Cons

Troseth then went on to describe some of the disadvantages to online learning that began with a lack of business models to help support this type of learning. These models would be creative and innovative and would be used to demonstrate the effectiveness of the online education. Implementing such a model would entail training current faculty and teachers on the technology and retooling how they think, work, and guide students. This would require new infrastructures and resources to support it.

Assuming an appropriate model was available, implementers of the new learning platform would have to think through multiple aspects of the technology while it is introduced and while it is being used. Troseth compared this to implementation science that integrates research with policies and practice. For her purposes, it means thinking through all of the implications related to its use. These implications would involve cultural transformations and change that if ignored would be a strike against its

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use, but if carefully crafted to embrace cultural sensitivities, could be an exceedingly effective educational tool.

What Opportunities Are Available for Building a Global Health Workforce That Understands the Role of Culture and Health Literacy in Perceptions and Approaches to Health and Disease?

Andrew Pleasant from Canyon Ranch Institute provided his report on the discussions that took place in the breakout group he led. To answer the question presented to his group, Pleasant divided the response into three areas: (1) opportunities for building a global health workforce that understands culture and health literacy; (2) challenges to building a global health workforce that understands culture and health literacy; and (3) outcomes of a culturally aware global health workforce. Each of these areas is described in more detail below.

Opportunities

The first opportunity Pleasant identified for building a global health workforce was metrics. This means using the available data for measuring success, process stability, and sustainability. Another opportunity is smartphones and information technology (IT) and the rapid proliferation of new educational platforms. Interprofessional core competencies was seen as another opportunity along with the creation of resource incentives to drive this change. Pleasant pointed out that many of the opportunities he mentioned are external to the formal health professional education opportunities and include society and the economy as a whole. They all start from a common core and then progress. One of these examples is the Patient Protection and Affordable Care Act (ACA) that created a demand for a change in the health workforce. Other opportunities Pleasant mentioned include

- Scaling-up successful community-based, health professional education activities and programs
- Starting early, before schooling begins, and reinforcing throughout a child's education in order to create a health literate society that can make informed lifestyle and other health-related choices
- Reaching families with health messages through children and women
- Including foundation workers (community health workers, teachers, etc.) for culture and health literacy learning

Pleasant explained the last three bullets by saying these are opportunities for connecting with families through children at school and by

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educating women in particular. His thought was to start early with the children and repeat the messaging often throughout their education. He also described the important role of foundational workers for reaching families. Incorporating these individuals and groups into health professions learning are opportunities for multidirectional education on culture, health, and health literacy.

Challenges

Pleasant then went on to describe some challenges to building a global health workforce that understands culture and health literacy. The first is a lack of and maldistribution of resources. Another is corruption. Corruption is a worldwide problem that was evident even during the recent Ebola crisis when funds did not go where they were supposed to go (O'Carroll, 2015). It presents a challenge to many of the efforts of health professionals and educators because it limits the available resources.

The third challenge Pleasant identified was poor pedagogy. What we need, he said, is more dynamic and engaged learning. This would include better role models and stronger mentoring that support innovative learning environments and would likely include effective use of technology. Any of this could present a hurdle if used inappropriately.

More challenges Pleasant reported involved:

- Prioritizing curricular issues to avoid curricular obesity
- Changing paradigms of health professional education
- Entrenched special interests
- Outliers in education, research, and health professions

Trying to cram too many educational topics into a single semester was coined *curricular obesity* and described as something to avoid, but avoiding this brings up the inevitable challenge of prioritization. What topics should go first, which courses should be dropped from the curriculum, and which ones should be redesigned? Possibly even more crucial is understanding who sets the priorities and who will be responsible for redesigning the existing paradigms in ways that address the issues discussed at the workshop—issues that might include designing curricula around community-based experiential learning, health literacy, or collaborative education and care through a One Health framework. Whoever sets the priorities, said Pleasant, will also be fraught with personal or entrenched interests that will challenge the redesign process. Biases and conflicts of interest will become evident within academia but also in society as a whole. There may be an ample supply of well-educated providers and educators, but if the systems do not support the work they are trying to accomplish, the paradigm

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change will never be realized. Finally, the notion of outliers in education, research, and the health professions can also create barriers to change.

Outcomes

Taking into consideration all the previously mentioned challenges and the opportunities, Pleasant described what a culturally aware global health workforce would look like. In essence, it would create a culture of service learning and caring. Experiential learning to achieve cultural humility was a critical component to achieving successful outcomes. That is very different than how many currently consider culture. Often, culture is thought of as something outside of ones realm instead of considering themselves as part of the rich blend of cultures that exist around the globe. If a culturally aware global health workforce could be created, that would move providers toward greater empathy. There would be mindfulness and an understanding of helping health workers—professional and otherwise—to manage stress better and how to take better care of oneself. These skills and attributes could be shared and hopefully transferred to the overall society. Pleasant emphasized the importance of promoting health, wellness, and quality of life by including a wide array of actors and environments.

The approach would be holistic. It would address the needs of the entire person, his or her world view, and impediments each person faces in their daily life that prevent them from living a happy and healthy existence. A health literate global workforce would understand how to communicate successfully in whatever mode was most effective for a given community. It might be written or spoken, through numbers, symbols, or body language. In this regard, said Pleasant, a shared understanding of disease, health, and well-being with individuals and communities is created. There would also be a greater awareness of science in the general population and hence a greater ability to differentiate between valid and faulty evidence, something that is particularly relevant when searching the Internet for health information.

Pleasant acknowledged that if there are to be outcomes, there would have to be a system to measure them as well as a set of competencies needed by health professionals in order to attain the desired outcomes. These would not be a static set of skills and abilities though. As the world changes, those skills and abilities would have to adapt to newly desired outcomes.

In closing, Pleasant emphasized the importance of basic literacy to economic development. That fundamental skill underpins all potential success and may be the most important tie to the social determinants of health.

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Spectrum of Ideas Moving Forward

Malcolm Cox was asked to provide summary comments. He started by mentioning the Gaming Arcade and Showcase that was a joint effort of the IOM and the Society for Simulation in Healthcare (SSH). Taking place at the workshop, this evening event provided participants an opportunity to test 26 different games and virtual environments-based educational technology (see Appendix B for the description of the arcade and of the games that were presented). The event culminated with SSH awarding Geoffrey Miller, M.S., EMT-P, and Andrew Cross from Eastern Virginia Medical School the Leading Innovator Award to for their entry, *Automated Intelligent Mentoring System (AIMS): Applying Game Technology to Advance Medical Education*, which they presented on day two of the workshop (see Box 4-3).

Cox then described an important concept raised by Susan Scrimshaw, who remarked that learners are being prepared for a health system that no longer exists. And while Cox noted that each person or profession may have a particular way of expressing this sentiment, the fundamental essence

BOX 4-3
Automated Intelligent Mentoring System (AIMS): Applying Game Technology to Advance Medical Education[a]

AIMS came out of a dilemma that Geoffrey Miller and Andrew Cross identified, which is for learners to acquire the requisite abilities to perform clinical procedural skills and achieve competence and mastery, they need opportunities for deliberate and repetitive practice. There also needs to be an abundance of qualified faculty monitoring every learner throughout each of their skills building exercises. However, this is an unrealistic scenario. Individualized prescriptive feedback that is unique to the learner requires not only a major investment in human resources but financial resources as well. AIMS is the solution to this dilemma.

AIMS uses Microsoft Kinect, an affordable gaming technology that is readily available, and applies it to the tools and pieces that are already within medical schools and simulation centers. AIMS works by watching a person's body movements and procedural skills, then providing feedback to the learner on how to more correctly perform the procedure. To program AIMS to do this, the team created aggregate three-dimensional time–space models of what a perfect performance looks like, and then created an interface allowing a learner to practice against the expert model while receiving real-time visual or audio feedback. This technology can also be used for assessment of learners by cataloguing what the learner did correctly and incorrectly.

[a] For more information, see Appendix B and visit http://iom.nationalacademies.org/futureofhpe.

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of the statement is still true. Not only are students being prepared incorrectly, but large sums of money are being spent in a manner that has been described by many as wasteful. The message Cox heard repeatedly throughout the workshop presentations was a need to change the way learners are prepared that would transform the present and future workforce. A visual representation of this was offered by Christopher Olsen who described a sort of punctuated evolution. How do you get a square ball to the tipping point so it rolls over to the next side? While Cox was not convinced health professional education is yet at the a tipping point, he did believe that open, frank discussions, like those taking place at this workshop, are what is needed to begin a quiet revolution that could apply the right amount of pressure to move the metaphorical rectangle to a new side.

Global perspectives were provided by Francisco Campos from the Ministry of Health, Brazil, and Laura Magaña Valladares, from the Instituto Nacional de Salud Pública in Mexico. Campos described similarities and differences between Brazilian health care systems and others around the world, and Magaña offered her insights on the future of health professional education based on the ideas proposed in the Lancet Commission report *Health Professionals for a New Century: Transforming Education to Strengthen Health Systems in an Interdependent World* (Frenk et al., 2010).

In a panel moderated by Susan Skochelak, Arthur Kaufman, David Asprey, Elizabeth Baxley, and Terry Wolpaw, each provided a perspective on curriculum design and structure. Cox clarified that the term *curriculum design* is used here broadly; presenters did not offer specific curriculum designs and structure; rather, they took on the broad concept of curriculum design that blurred lines between education and practice and drew on community-based experiential opportunities for learners. Additional insight was offered by Timi Agar Barwick, who facilitated small-table discussions around educational opportunities now and in the future.

The next session demonstrated pedagogy through semistructured debating. Deborah Trautman managed the first debate on work–life balance that was further expanded on by respondents from China and Nigeria. Holly Wise ran the second debate. This one focused on the value and the risks of developing a more task-specific workforce versus expanding the roles of health professionals already providing services. Again, perspectives were offered from a Nigerian view.

Andrew Pleasant moderated the final session of day one. In it, speakers offered examples of health literacy within health professional curricula before Pleasant provided two questions for each table to discuss. These questions encouraged global thinking about the future health workforce and how health literacy concepts might be integrated into health professional education to improve communication in a globalized world.

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Lessons Learned

In reflecting on the presentations, Cox described his interpretations of key messages that were presented by speakers or brought up by several participants in response to issues raised by speakers or others. The take home messages Cox identified are as follows:

- No "Xeroxing." Cox thanked Francisco Campos for this powerful metaphor. Too many educators in health professional education clone and recreate the same curricula over and over again. This needs to stop. Educators and others have to start thinking creatively beyond just doing more of the same. No more tinkering, as Susan Skochelak encouraged through her *Accelerating Change in Medical Education* initiative; more radical ideas must be tested.
- There are many ways of addressing the social determinants that are and could be platforms for health professional education. This was an underlying message in the presentations of Kaufman, Campos, and Pleasant.
- A movement is afoot to place greater emphasis on broad concepts of health and well-being as opposed to only health care. Liza Goldblatt staunchly supported this emphasis for reducing hospital visits and for the benefit of the public. In descriptions of their work, speakers promoting health literacy and One Health as frameworks for education emphasized creating healthy environments. Kaufman brought up the added benefit of potential cost savings by keeping people healthy.
- There will be no new money for health professional education. This was talked about by Kaufman as a need for redistribution financing or insurer-related financing using existing dollars in a capitated system. If faculty want money for a project, program, or curriculum, what other already existing source will the funds be taken from? This will be a difficult but critical discussion, added Cox.
- Match the needs of society with the curriculum. Terry Wolpaw's slide from Penn State showed they had achieved some balance between the biomedical component and the social determinants component of their curriculum. While commendable, Cox wondered why, if the majority of the health problems in the world have social underpinnings, then why are the social determinants not making up a majority of the curriculum? "Do not ask for equality, ask for it all," he said. Asking for small increments will only result in obtaining small increments. Documenting the rationale and need for greater levels of funding for curricular elements that address social determinants is likely to be more effective. Cox again

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referred to Skochelak's request not to tinker around the edges of the curriculum.

- Language is important. Cox reminded the group of Andrew Pleasant's remark about *people* formerly known as *patients*. He then took it a step further by considering whether *communities* might be formerly known as *populations*?
- Communities and community health workers can play a significant role in transforming health professional education. Numerous speakers brought up this often untapped potential. To truly involve communities in education, they should be invited to participate in the power structure—for example, serving on academic health center boards. This thought was offered by Kaufman during one of the table discussions. While Cox appreciated the idea, he wondered what would move boards from their current practice of involving one "token" community representative to one that includes multiple, and perhaps even a majority of, community members? Others may have different ideas but one that occurred to Cox was to reassess and if necessary revoke academic health centers' tax-exempt status if they refused to comply. These centers are given 501(c)(3) tax-exempt status because they are public goods; they should be required to demonstrate this commitment by allowing more community members onto their boards.
- Task shifting may not be the best term applied to transferring responsibilities from one health professional to another. Afaf Meleis from the University of Pennsylvania School of Nursing reminded the participants that *competency sharing* maybe a better description of what the clinical workforce needs, Cox agreed.
- Cox also noted that it is wrong to think of community health workers as nonprofessionals. In his opinion, the people who form the base of the health pyramid worldwide should be considered professionals.

Cox finished his remarks by bundling all he had heard and the lessons he took away into a productive action-oriented package. It occurred to him when listening to the health literacy examples that maybe there is a larger construct for organizing health professional education rather than simply trying to fit ever more topics into an already constrained curriculum. Putting students in the community provides experiential learning in areas such as transportation, food, housing, and utilities. These would never be courses in a health professional school, but by placing learners in neighborhoods, students face many if not all of these issues when dealing with people's clinical needs.

In his mind there needs to be a broad functional model for educators

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to follow. This conceptual model would have to quickly capture the short attention spans of leaders who possess the power and the money to effect real change. In Cox's view, community-based education is the broad, overarching construct from which everything else follows.

REFERENCES

Altizer, S., R. S. Ostfeld, P. T. J. Johnson, S. Kutz, and C. D. Harvell. 2013. Climate change and infectious diseases: From evidence to a predictive framework. *Science* 341(6145):514-519.

AVMA (American Veterinary Medical Association). 2008. *One health: A new professional imperative*. Washington, DC: American Veterinary Medical Association.

Colwell, R. 2015. *Environment, climate, and human health: Waterborne diseases*. Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 24.

Council on Linkages Between Academia and Public Health Practice. 2014. *Core competencies for public health professionals: Revised and adopted by the Council on Linkages Between Academia and Public Health Practice: June 26, 2014*. Washington, DC: Council on Linkages Between Academia and Public Health Practice.

De Pree, M. 1987. *Leadership is an art*. East Lansing: Michigan State University Press.

FAO (Food and Agriculture Organization of the United Nations). 2013. *World livestock 2013: Changing disease landscapes*. Rome, Italy: Food and Agriculture Organization of the United Nations.

Fox, J. 2015. *A global health workforce through a One Health framework*. Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 24.

Frenk, J., L. Chen, Z. A. Bhutta, J. Cohen, N. Crisp, T. Evans, H. Fineberg, P. Garcia, Y. Ke, P. Kelley, B. Kistnasamy, A. Meleis, D. Naylor, A. Pablos-Mendez, S. Reddy, S. Scrimshaw, J. Sepulveda, D. Serwadda, and H. Zurayk. 2010. Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. *Lancet* 376(9756):1923-1958.

Gibbs, E. P. 2005. Emerging zoonotic epidemics in the interconnected global community. *Veterinary Record* 157(22):673-679.

Kahn, L. H. 2011. The need for One Health degree programs. *Infection Ecology & Epidemiology* 1:10.3402/iee.v3401i3400.7919.

Kahn, L. 2015. *A global health workforce through a One Health framework: A public health perspective*. Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 24.

Normile, D. 2010. Holding back a torrent of rats. *Science* 327(5967):806-807.

O'Carroll, L. 2015. Sierra Leone investigates alleged misuse of emergency Ebola funds. *The Guardian*. http://www.theguardian.com/world/2015/feb/17/sierra-leone-investigates-alleged-misuse-of-emergency-ebola-funds (accessed September 1, 2015).

OIE (World Organization for Animal Health). 2013. World Animal Health Information Database (WAHID) interface: Version 1. Paris, France: OIE.

Olsen, C. 2015. *Public health and global health as venues for cross-disciplinary health professional education*. Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 24.

Sabin, E. A., and W. R. DeHaven. 2012. Veterinary education: A basis for good governance leading to effective veterinary services. *Revue scientifique et technique (International Office of Epizootics)* 31(2):519-531.

Schultz, M. 2008. Rudolf Virchow. *Emerging Infectious Diseases* 14(9):1480-1481.

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Envisioning the Future of Health Professional Education: Workshop Summary

WHO (World Health Organization). 2006. *The world health report 2006: Working together for health*. Geneva, Switzerland: WHO.

WHO and GHWA (Global Health Workforce Alliance) Secretariat. 2013. *A universal truth: No health without a workforce. Third global forum on human resources for health report*. Geneva, Switzerland: WHO.

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Appendix A

Workshop Agenda

ENVISIONING THE FUTURE OF HEALTH PROFESSIONAL EDUCATION

A Public Workshop of the Global Forum on Innovation in Health Professional Education
April 23–24, 2015

The Keck Center of the National Academies
500 Fifth Street NW, Washington, DC 20001

Workshop Purpose

The purpose of this workshop is to explore the implications that shifts in health, policy, and the health care industry could have on health professional education and workforce learning; to identify learning platforms that could facilitate effective knowledge transfer with improved quality and efficiency; and to discuss opportunities for building a global health workforce that understands the role of culture and health literacy in perceptions and approaches to health and disease.

DAY 1: APRIL 23, 2015

9:00am **Welcome**
Susan Scrimshaw, Global Forum on Innovation in Health Professional Education (IHPE) Co-Chair

SESSION I: SETTING THE STAGE

Objective: To envision a future where there is an adequate supply of competent, confident, and health literate health and health care providers, educators, and associated professionals to meet the needs of a global population.

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9:10am **Orientation to the workshop**
Beth Mancini and Christopher Olsen, Workshop Co-Chairs

9:25am **Keynote address**
Francisco Campos, former National Secretary of Labor and Education Management in Health of the Ministry of Health, Brazil

9:45am Discussion and Q&A

SESSION II: ENVISIONING THE FUTURE OF CURRICULUM DESIGN AND STRUCTURE

Objective: To explore health professional education within the context of new collaborations and nontraditional partners within and outside of academia with a focus on creating value for health systems and improving health outcomes.

Models of partnerships within and outside of academia
Moderator: Susan Skochelak, American Medical Association

10:00am **Model 1:** Social Determinants of Health: Changing the Care Team
Arthur Kaufman, University of New Mexico Health Sciences Center

Model 2: A Model for Educational Efficiencies
David Asprey, Department of Physician Assistant Studies and Services, University of Iowa

Model 3: Faculty Development for Improving System Teaching and Curriculum Design
Elizabeth G. Baxley, Brody School of Medicine at East Carolina University

10:35am Moderated discussion with the audience

11:00am **BREAK**

Value in new partnerships
Moderator: Susan Skochelak, American Medical Association

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11:30am **Students as patient navigators and coordinators program**
Therese M. Wolpaw, Penn State College of Medicine

Discussion and Q&A

11:55am **Small-table discussions**
Facilitator: Timi Agar Barwick, Physician Assistant Education Association

Question 1: Who are the educators of the future and how will their roles be different from the traditional "teacher"?
Report back and Discussion

Question 2: How will these evolving roles impact the educational process and the community?
Report back and Discussion

12:30pm **LUNCH**

SESSION III: ENVISIONING THE NEW WORKFORCE

Objective: To illuminate issues that have arisen because of a changing workforce, and how such transformations impact the current and future education and training of health professionals.

1:30pm **Debate 1 proposition: Health professional schools should adjust their curriculum and training to provide greater work life balance for their learners**
Speaker/Moderator: Deborah Trautman, American Association of Colleges of Nursing
Debaters:
- Yes: Rick Talbott, Association of Schools of the Allied Health Professions
- No: Rick Valachovic, American Dental Education Association

Perspectives:
- Perspective from Nigeria: Emilia Iwu, Jonas Nursing Scholar
- Perspectives from China: Xuejun Zeng, Peking Union Medical College

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2:15pm **Debate 2 proposition: The creation of new task-specific roles should be the strategy for health professionals to meet individual and community health needs**
Speaker/Moderator: Holly Wise, American Council of Academic Physical Therapy
Debaters:
- Yes: Liza Goldblatt, Academic Consortium for Complementary and Alternative Health Care
- No: Elaine Tagliareni, National League for Nursing

Perspectives:
- Perspective from Nigeria: Emilia Iwu, Jonas Nursing Scholar
- Perspective from China: Xuejun Zeng, Peking Union Medical College

3:00pm **BREAK**

SESSION IV: ENVISIONING A GLOBALIZED HEALTH PROFESSIONAL EDUCATION (GLOBALIZATION AND CHALLENGES TO HPE)

Objective: To illuminate the strengths and weaknesses of the current health professional educational systems as the workforce is functioning in an increasingly interconnected global community, and implications for education worldwide.

3:30pm Moderator: Andrew Pleasant, Canyon Ranch Institute

Examples of health literacy in the health professional curriculum
Speaker 1: Clifford Coleman, Oregon Health & Science University (via video connection)
Speaker 2: Jennifer Cabe, Ohio State University College of Nursing and Canyon Ranch Institute

Discussion and Q&A

4:20pm **Small-table discussions**
Question 1: Are health professionals being prepared to function and serve in a globalized community? What is in place?
Report back and Discussion

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4:40pm **Question 2:** How might health literacy be globally integrated into health professional education to improve communication in a globalized world?
Report back and Discussion

5:00pm **ADJOURN**

5:15pm **Institute of Medicine and Society for Simulation in Healthcare Gaming Arcade and Showcase (Reception)**

DAY 2: APRIL 24, 2015

8:20am **Welcome and expectations**
Beth Mancini, Workshop Co-Chair

8:30am **Society for Simulation in Healthcare Leading Innovator Award presentation**
- Presented by Beth Mancini and Jeffrey Taekman
- Remarks by Leading Innovator

SESSION V: ENVISIONING A GLOBAL HEALTH WORKFORCE

Objective: To discuss opportunities for building a global health workforce that considers such crosscutting themes as technology, health literacy, social accountability, culture, and humanism as they relate to the education and training of health professionals.

8:50am **Reflections of day 1**
Malcolm Cox, Global Forum on IHPE Co-Chair

9:00am **A global health workforce through a One Health framework**
Moderator: James Fox, Association of American Veterinary Medical Colleges representative

Public health and global health as venues for cross-disciplinary health professional education
Christopher Olsen, University of Wisconsin–Madison

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Environment, climate, and human health: Waterborne diseases
Rita Colwell, University of Maryland and Johns Hopkins Bloomberg School of Public Health

A global health workforce through a One Health framework: A public health perspective
Laura H. Kahn, Cofounder, One Health Initiative

10:00am **Breakout groups and webcast session**
Provide instructions and disperse to breakout rooms

10:20am **Breakout Groups:**
Question 1 (Room 105): What are the implications that shifts in health, policy, and the health care industry will have on health professional education and workforce learning?
Facilitator: Thomas Clawson, National Board for Certified Counselors, Inc. and Affiliates

Question 2 (Room 207): What roles do the public and private sectors have in facilitating effective knowledge transfer with improved quality and efficiency?
Facilitators: Susan Skochelak, American Medical Association, and Timi Agar Barwick, Physician Assistant Education Association

Question 3 (Room 101): What opportunities are available for building a global health workforce that understands the role of culture and health literacy in perceptions and approaches to health and disease?
Facilitator: Andrew Pleasant, Canyon Ranch Institute

Main room: Webcasting Forum members' examples of "envisioning the future of health professional education"

11:30am **BREAK**

12:00pm **Breakout group report back**
Moderator: Beth Mancini, Workshop Co-Chair
Group 1
Group 2
Group 3

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12:30pm **Closing**
The Lancet Commission Report: Where do we go next?
Laura Magaña Valladares, Instituto Nacional de Salud Pública

1:00pm **LUNCH AND ADJOURNMENT**
Room 100 will remain open until 5:00pm for networking opportunities.

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Appendix B

Gaming Arcade Submission Descriptions

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SUMMARY: INSTITUTE OF MEDICINE/SOCIETY FOR SIMULATION IN HEALTHCARE GAMING ARCADE AND SHOWCASE

Eric B. Bauman, Ph.D., R.N.
Society for Simulation in Healthcare

The Institute of Medicine (IOM) (now a division of the National Academies of Sciences, Engineering, and Medicine) invited the Society for Simulation in Healthcare (SSH) Serious Games and Virtual Environments Special Interest Group to facilitate an arcade and showcase on April 23 as part of the 2-day workshop *Envisioning the Future of Health Professional Education*. The IOM/SSH Gaming Arcade and Showcase was modeled after the Serious Games and Virtual Environments Arcade and Showcases at the International Meeting on Simulation in Healthcare (IMSH) that have taken place over the past 5 years. Twenty-six teams were on hand to demonstrate their games and virtual environments-based educational technology. A panel of judges led by Dr. Jeff Taekman from Duke University Medical Center reviewed all of the participants' work. These judges included Dr. Taekman; Dr. Pamela Jeffries, George Washington University School of

Gaming Arcade and Showcase Judges (from left to right): Gerald Stapleton, Laura Magaña Valladares, Pamela Jeffries, and Jeff Taekman

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Gaming Arcade and Showcase Presenters

Nursing and SSH Past President; Mr. Gerald Stapleton, University of Illinois at Chicago; and Dr. Laura Magaña Valladares, National Institute of Public Health, Mexico.

SSH awarded a Leading Innovator Award and a runner-up award. Geoffrey Miller, M.S., EMT-P, and Andrew Cross from Eastern Virginia Medical School received the Leading Innovator Award for their entry, *Automated Intelligent Mentoring System (AIMS): Applying Game Technology to Advance Medical Education*. The runner-up award was given to Joyce Flores representing Games that Work for their entry, *Brush Up*, a game to teach young children proper teeth-brushing technique. Miller and Cross presented AIMS to the Global Forum on Innovation in Health Professional Education, workshop participants, and webcast viewers at day two of the workshop (April 24). The video of their presentation as well as a highlights video of the gaming arcade is available on the workshop's website, iom.nationalacademies.org/futureofhpe. The pictures, in digital form, are also available on the workshop's website.

This appendix includes the abstracts for each of the games presented during the IOM/SSH Gaming Arcade and Showcase.

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B.1
PROJECT MAGIC: MOBILE APPLICATION GUIDE FOR INNOVATIVE CURRICULUM

Eric B. Bauman, Ph.D., R.N.[1]; David Pederson[1]; Reid Adams[1]; Brian Pelletier[2]; Greg Vaughan[2]; Bruce Kaplan, D.O., FACOI[1]; and Carmen Fuentealba[3]

[1]DeVry Medical International's Institute for Research and Clinical Strategy, New Jersey;
[2]Learning Games Network, Wisconsin;
[3]Ross University School of Veterinary Medicine, St. Kitts, West Indies

A suite of innovative mobile applications custom designed to enhance medical and veterinary education by supporting and reinforcing didactic content and preparing students for simulated and clinical learning experiences. The project elements were created collaboratively with teaching faculty and content experts to support their existing curricula.

The project includes the following games for medical and veterinary students:

- *Bone Viewer 3D*, an interactive, mobile three-dimensional (3D) game-based learning tool to prepare medical and veterinary students for core principles of anatomy
- *Diagnose Me!*, an interactive, mobile 3D game-based learning tool to prepare clinicians for OSCE (Objective Structured Clinical Examination) exams, including the USMLE (United States Medical Licensing Examination) step two clinical exam
- *iAnesthesia*, an interactive, mobile 3D game-based learning tool to prepare veterinary students for clinical experiences focusing on the delivery of anesthesia to multiple species
- *Embryo Tempus*, an interactive, mobile 3D game-based learning tool that provides a high-fidelity active learning experience to supplement and reinforce traditional embryology content found in medical and veterinary medicine curricula

Objective 1: Engage learners in a high-fidelity, 3D, interactive experience to support content found within the medical, veterinary medicine, and other health sciences curricula.

Objective 2: The applications leverage game mechanics to engage students in active learning.

Objective 3: Prepare students for clinical learning experiences and licencesure exams.

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B.2
MIMIC TECHNOLOGIES ROBOTIC SURGERY SIMULATION SUITE: DV-TRAINER, MAESTRO, AND XPERIENCE TEAM TRAINER

Glenn Carstater, M.B.A.
Mimic Technologies, Washington

Innovation, Thought Leadership in Robotic Simulation

First installed as a prototype at Indiana University's Department of Urology in 2007, the dV-Trainer is the original robotic surgery simulator. It remains the only stand-alone robotic simulator that has been independently validated in published studies. In addition, the Intuitive Surgical Skills Simulator for the da Vinci Si Surgical System is based on Mimic's proprietary simulation technology, MSim. The combined dV-Trainer/Skills Simulator install base has grown to approximately 1,500 systems, making it the most widely adopted platform for robotic simulation.

Cost-Effective and Accessible Training

Built on a compact, portable hardware platform, the dV-Trainer provides access to training outside of the operating room, when and where it is most convenient. According to numerous independent validation studies, the dV-Trainer closely reproduces the look and feel of the da Vinci system.

State-of-the-Art Robotic Surgery Simulation Technology

Mimic's proprietary MSim platform powers the exercises available on the dV-Trainer, providing the most realistic and lifelike simulation available. MSim is at the heart of Mimic's mission of helping prepare surgeons to deliver better care. It also has allowed the dV-Trainer to extend the benefits of simulation to now include team training (Xperience Team Trainer) and procedure-specific content (Maestro AR).

Industry-Leading Metrics and Scoring System

For objective performance evaluation, dV-Trainer users benefit from MScore. Built in to the dV-Trainer, MScore incorporates experienced surgeon data to establish proficiency-based scoring baselines—an industry first and Mimic exclusive.

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Advanced Curriculum Development and Sharing

The dV-Trainer comes with best-in-class administration tools for educators to create, import, and export customized training protocols. dV-Trainer curricula can be uploaded and shared on Mimic's MShare, an online portal for collaboration, providing access to validated simulation curricula from top institutions.

Mimic's dV-Trainer offers more than 65 exercises under four overall categories:

1. da Vinci overview and basic skills training
   - Surgeon console overview—Review basic da Vinci functionality, covering topics such as icons, ergonomics, and settings.
   - EndoWrist manipulation—Develop EndoWrist dexterity when working with as many as three common da Vinci instruments.
   - Camera and clutching—Improve camera control, and learn to use the clutch effectively; train while using different motion scaling settings.
   - Troubleshooting—Understand common da Vinci error messages, and determine how to react to them.
2. Advanced surgical skills training
   - Needle control and needle driving—Develop skill when manipulating needles, including the ability to hand off and position needles for effective and accurate needle driving.
   - Suturing and knot tying—Improve suturing and knot tying technique with a variety of geometries common to robotic surgery, now including tube anastomosis and tube closure.
   - Energy and dissection—Learn to properly apply monopolar and bipolar energy; practice dissection and manage bleeding.
   - Games—Enjoy competing with other surgeons while developing robotic surgical skills at the same time.
3. Procedure-specific content
   - Maestro AR (Augmented Reality)—Use virtual instruments and augmented 3D case video to advance clinical decision making and procedural knowledge; refine skills specific to the procedure.
4. Team training
   - Xperience Team Trainer—Enable the robotic surgeon and first assistant to train together with this optional component for the dV-Trainer.

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B.3
MIMYCX—THE WORLD'S FIRST 3D, MULTIPLAYER, IPE GAME

John Damici, M.F.A.
Professions Quest, Virginia

The Professions Quest staff is developing and publishing this virtual, interprofessional and interactive multiplayer learning solution targeted toward health professions education institutions and health professions students. Professions Quest's products and services represent a unique vehicle for interprofessional education, and will deliver increased interaction, collaboration, and knowledge among the health professions and health professions students.

Interprofessional education has long been regarded as the best way of reducing medical errors and improving the health care system, but achieving it in any kind of collaborative or meaningful way has been elusive. That is about to change thanks to an innovative learning tool called MIMYCX. This interactive learning platform uses video game technology to bring students from different health care professions together to solve real-world scenarios.

The goal of MIMYCX is to transform interprofessional education by developing multiplayer virtual team-based learning solutions that provide true multicollaborative critical thinking, scholarship, and problem-solving skills to produce a new generation of professionals. Each player, or player team, can access MIMYCX and all of their personal and game performance data on desktops or mobile devices anywhere in the world. Students can benchmark their performance in the game against other health professions students.

B.4
CYBER-BASED CLINICAL EXPERIENCE FOR PHYSICAL THERAPY

Marjorie Zielke, Ph.D.[1]; Gary Hardee, M.A.[1]; and Sue Scherer, P.T., Ph.D.[2]

[1]University of Texas at Dallas; [2]Regis University, Colorado

Clinicalvpt.com is a prototype game-based simulation developed to allow physical therapy students and faculty at Regis University's Rueckert-Hartman College for Health Professions an opportunity to experience and provide feedback on a virtual NIH Stroke Scale practice session. Participants can practice four Stroke Scale items (1a, b, c, and 2). Responses are scored and feedback is provided during and at the end of gameplay. Data about decisions made during gameplay are tracked and stored. Clinicalvpt.com is designed to address the shortage in clinical placements for health care

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professions, which can contribute to a backlog of students waiting for placement and affect graduation rates.

A 4-year National Simulation Study by the National Council of State Boards of Nursing found that up to 50 percent simulation "was effectively substituted for traditional clinical experience in all core courses across the prelicensure nursing curriculum" (NCSBN, 2014). California, Colorado, and Florida state boards of nursing have allowed up to a 25 percent of clinical hours to be substituted by simulations, including virtual and game-based simulations. Clinicalvpt.com was first developed as a Web-based simulation and later as a virtual reality (VR) experience using an oculus head-mounted display. Both versions provide varying educational advantages. The Web-based simulation facilitates asynchronous, distance-education opportunities; the VR experience adds greater immersion by enveloping the student in a lifelike visual and auditory virtual environment. Both versions will be demonstrated.

The Web-based simulation was used in a small study at Regis. Students and faculty who tested clinicalvpt.com completed posttest surveys and discussed the experience during focus group sessions in order to provide feedback on the design. Students said they appreciated having an opportunity to work on their own in a simulation, which is usually offered only in a group setting. All students agreed or strongly agreed that the gaming experience was appealing to play through and was helpful. Students stated they would like to see higher-fidelity virtual patients with multiple and more complex conditions. They also wanted opportunities for more clinical tasks, to interact with virtual caregivers, and to practice with virtual medical equipment. All faculty agreed or strongly agreed that the interaction in the gaming experience was appropriate for the activity.

Project Objective 1: Assess student participants' reactions to the effectiveness of the game-based educational simulation as a representation of a clinical experience.

Project Objective 2: Assess faculty participants' reactions to the effectiveness of the game-based simulation as an educational tool and representation of clinical experience.

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B.5
USING A GAME-BASED SIMULATION TO COMPLEMENT FACE-TO-FACE MEDICAL EDUCATION

Marjorie Zielke, Ph.D.[1]*; Gary Hardee, M.A.*[1]*; and Dorothy Sendelbach, M.D.*[2]

[1]*University of Texas at Dallas;*
[2] *University of Texas Southwestern Medical Center*

UTTimePortal.com is an innovative use of virtual environments and game-based simulation designed to address the goals of the University of Texas (UT) System's Transformation in Medical Education (TIME) initiative. TIME's mission is to increase the effectiveness of medical education while shortening its duration. UTTimePortal was developed as an assessment framework for game-based simulations as a complement to face-to-face clinical training. It was introduced as an assigned task during one of the TIME initiative's summer courses at the UT Southwestern Medical Center. The course introduces undergrad premed students to a communications curriculum that includes lectures on professionalism in medical interviewing and in electronic media behavior.

UTTimePortal focuses on two of the course's teaching objectives: how to efficiently gather the essential portions of a medical history; and to understand the requirements for maintaining professionalism in electronic media. One simulation module allows students to practice active listening techniques with a virtual patient and his caregiver to gain information about seven attributes of his current medical complaint. A second module represents a potential online conversation in which the student is asked by friends on a simulated social site about the patient and the medical interview.

Students were assigned to play the two game-based simulations following face-to-face classroom lectures on the topics and, with the medical interview module, before practicing with a standardized patient. In addition to game play, students were asked to discuss the professor's questions about each module on discussion boards. The professor selected the best posts and awarded stars worth points toward the team total. Statistically significant improvement in students' self-reported knowledge of interviewing skills, active listening techniques, medical interviewing, and understanding the attributes of a patient's illness indicates support for Research Question 1: Can a game-based simulation help improve knowledge and attitudinal measures?

Students (n = 49) responded that the simulation: (1) allowed them to practice active listening (89 percent agree/strongly agree); (2) prepared them for conducting a medical interview (85 percent agree/strongly agree); and (3) was an effective means to educate students in the program (85

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percent agree/strongly agree). Student responses about accountability in professional electronic communications on social networking pages indicate that the game's social media episode increased awareness of personal responsibility.

Survey data also indicates support for Research Question 2: Is a game-based simulation an effective module for enhancing classroom lectures? Overall, 81 percent either agreed or strongly agreed that they were satisfied with the gaming experience. Two-thirds perceived the combination of lectures, the gaming experience, and standardized patient interviews as the most effective method for learning how to conduct a medical interview.

Project Objective 1: Explore the use of a game-based simulation to help improve knowledge and attitudinal measures regarding medical interviewing skills and professionalism in social media use.

Project Objective 2: Assess the effectiveness of a game-based simulation as an education module for enhancing classroom lectures.

B.6
PHARMACOLLEGĒ: A GAME-BASED MASTERY APPROACH TO LEARNING PHARMACOLOGY AND NURSING CLINICAL ROTATION PREP

Tim Harrington, Ed.D.[1]*; and*
Leila McKinney, D.N.P., M.S.N., APRN, NP-C[2]

[1]*DeVry Education Group, Arizona;*
[2]*DeVry Education Group, Georgia*

PharmaCollegē is a game-based learning tool designed by Chamberlain College of Nursing to prepare students for practical nursing experience on procedure and responsibility relating to medication administration, nursing protocol, and practice in patient care. PharmaCollegē solves many teaching and learning challenges presented in traditional pharmacology courses.

Project Objective 1: Increase patient safety measures while administering medications in a clinical environment by improving drug therapy knowledge, nursing protocol, and patient education.

Project Objective 2: Increase subject knowledge retention as demonstrated through improved scores and pass-rates on the national exams.

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B.7
BRUSH UP

Dov Jacobson[1]; and Joyce Flores, RDH, M.S.D.H.[2]

[1]Games That Work, Georgia; [2]Gene W. Hirschfeld School of Dental Hygiene, Old Dominion University, Virginia

Brush Up is a game in which young children learn tooth brushing. The game provides immediate feedback from a Bluetooth-connected, sensor-enabled toothbrush. The new software-only version introduces a novel "Selfie Assessment." Guided by cognitive science and formative tests, the development team designed specialized characters, music, vocabulary, and a system of challenges and rewards. Efficacy was measured in a rigorous study that included a 1-year follow-up.

Project Objective 1: Improve brushing behaviors in young children.
Project Objective 2: Even distribution of brushing time across all tooth surfaces.

B.8
I-HUMAN PATIENTS

Craig Knoche, M.S., M.B.A.
i-Human Patients, Inc., California

i-Human Patients, International Meeting for Simulation in Healthcare Conference Best in Show winners, is an interactive, cloud-based, multimedia-rich platform that simulates a complete patient encounter to development patient assessment and diagnostic reasoning skills.

Project Objective 1: This project/innovation was developed to augment and accelerate apprenticeship training for clerkship students and residents.
Project Objective 2: This project/innovation was developed to integrate basic science education into a clinical context.

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B.9
VIRTUAL INFANT PATIENTS, FAMILIES, AND STAFF COLLABORATION: SIMULATING SITUATIONAL MEDICAL SCENARIOS WITH A VIRTUAL LIVING WORLD

Judy LeFlore, Ph.D., R.N., NNP-BC, CPNP-AC&PC, ANEF, FAAN; and Patricia Thomas, Ph.D., R.N., NNP-BC, CNE
University of Texas at Arlington

Medical training simulations mirroring the immersive environment of commercial video games offer benefits superior to physical mannequins. We have developed a recursive platform for the development and visualization of sociocultural models in medical situations. The model integrates visualization, sound design, and behavioral/cultural modeling with recursive assessment tools to create a living world that is sensory and culturally realistic.

Project Objective 1: Inspire a vision for transforming education that leads to greater student success by incorporating technologies that are more consistent with student learning styles, as in using gaming technology in a virtual world for the delivery of content.

Project Objective 2: Evaluate student success and performance from use of the virtual world to provide meaningful evidence that this type of instructional modality is valid.

B.10
CAN GAME PLAY TEACH STUDENT NURSES HOW TO SAVE LIVES: AN UNDERGRADUATE TRAINING PROPOSAL FOR STUDENT NURSES IN PEDIATRIC RESPIRATORY DISEASES WITH A LIVING WORLD GAMING CONSTRUCT

Judy LeFlore, Ph.D., R.N., NNP-BC, CPNP-AC&PC, ANEF, FAAN; Mindi Anderson, Ph.D., R.N., CPNP-PC, CNE, CHSE-A, ANEF; Kristine Nelson; and Patricia Thomas, Ph.D., R.N., NNP-BC, CNE
University of Texas at Arlington

The academic environment tends to "abstract" clinical concepts by teaching them in the classroom and out of context. Immersive video game technology may be a powerful medium for delivering nursing content and offers a variety of benefits superior to physical mannequins or standardized patients. The purpose of the study was to compare pediatric respiratory content delivered through a virtual world to the standard "in the seat lecture."

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Project Objective 1: Assess whether learning pediatric respiratory content through a virtual world is equal to learning in a traditional lecture for knowledge acquisition, knowledge transfer, and accuracy and timeliness of decision making.

Project Objective 2: Are students who learn pediatric respiratory content through a virtual world more satisfied than students who learn through traditional lectures?

B.11
THE AUTOMATED INTELLIGENT MENTORING SYSTEM: APPLYING GAME TECHNOLOGY TO ADVANCE MEDICAL EDUCATION

Geoffrey Miller, M.S., EMT-P; and Andrew Cross
Eastern Virginia Medical School, Virginia

The Automated Intelligent Mentoring System (AIMS) seeks to improve individualized, objective performance feedback during skill acquisition by rigorously assessing, real-time 3D psychometric measurement of performed skills. AIMS enhances individualized objective performance measurement, deliberate and repetitive practice, and feedback necessary for skill acquisition. It also provides uniformity in training and competency assessments.

Medical procedures, if performed incorrectly, can have serious and sometimes fatal consequences. The importance of deliberate and repetitive practice and feedback are well recognized as key features of high-fidelity medical simulation that leads to effective learning, particularly in the acquisition of clinical procedural skills. To provide adequate opportunity, learners must have access to appropriate simulation devices, equipment, mentoring, expertise, feedback, and individualized time to acquire a designated skill to a defined level of competence.

Although this model is achievable it comes at a high cost, and limits adequate, individualized opportunity to achieve desired performance outcomes. As clinical demands increase on medical educators, their time to observe, mentor students, and provide corrective feedback is becoming limited. Further, faculty observations of clinical procedural skills mainly rely on subjective criteria regarding the actual precision of real-time human performance metrics. The objective measurement of these metrics is a "missing middle" both in terms of simulator(s) and faculties' ability to provide feedback to aid in the acquisition or performance of procedural skills.

This project may substantially contribute to solving this training dilemma and provide new levels of human performance feedback and data related to clinical procedural skill acquisition and performance. AIMS was developed for teaching and rigorously assessing, real-time 3D psychometric

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measurement of procedural clinical skills performed by both novice learners and highly skilled professionals. AIMS is able to provide professional instruction with individualized, autonomous feedback for the learner, while providing detailed performance analytics for the instructors to remotely analyze, react, and refactor their future instructional efforts.

Unlike current simulation training models that require onsite instructors and often one-on-one interaction between learner and instructor, this technology accomplishes the same outcome in a more cost-effective manner. It provides comprehensive, real-time interactive instruction including active audio and visual cues, and dynamic feedback to users. As such, it may help to decrease the cost of medical education, in particular the teaching and training of critical clinical procedures and may lead to superior quality, effectiveness, and efficiency of the learner's education.

Project Objective 1: Develop a low-cost solution, focused on the measurement of human performance related to specific real-time, 3D psychometric measurements of clinical procedural skills.

Project Objective 2: Improve and increase opportunities for individual, independent, deliberate practice, with real-time, objective assessment and expert feedback for learners, and performance analytics for instructors.

B.12
COURSE FOR OPERATIONALLY RELEVANT PATIENT SAFETY (CORPS), BASED ON TEAMSTEPPS: STRATEGIES AND TOOLS TO ENHANCE PERFORMANCE AND PATIENT SAFETY, VERSION 2.0

V. Andrea Parodi, R.N., Ph.D.
Virginia Modeling Analysis and Simulation Center,
Old Dominion University, Virginia

This program provides an avatar-guided, computer-based Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) version 2.0 instructional approach that includes content knowledge and testing to appeal to personnel who prefer interactive learning versus didactic instruction. Real-world scenarios, encountered by military nurses, are incorporated. Scenarios demonstrate common safety and leadership issues experienced by military medical professionals. Program completion follows mastery of content materials reflected by the learner achieving 100 percent accuracy on all graded and timed exercises.

Project Objective 1: To provide the most up-to-date TeamSTEPPS training available to military members in a self-paced, interactive format to promote high-performance teamwork wherever care is rendered.

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Project Objective 2: To create a means to have a graded TeamSTEPPS component added to any training curriculum for continuous reinforcement for improved efficiency and patient safety.

B.13
CPG-BASED TRAUMA GAMES

V. Andrea Parodi, R.N., Ph.D.; Hector Garcia, M.S.A.;
Bridget Giles, Ph.D.; and Tom Frost, M.S.
Virginia Modeling Analysis and Simulation Center,
Old Dominion University

This suite of interactive computer-based trauma games were designed to support predeployment and sustainment education and training needs for military Nurse Corps officers. The games are a part of a larger, uniquely innovative military nursing trauma curriculum program. The content supports the learner acquisition of the knowledge needed to safely provide care to catastrophically wounded warriors. The program uses evidence-based practices (EBPs) that emerged from the Joint Theater Trauma Registry (JTTR) data analysis, and Clinical Practice Guidelines (CPGs) developed and promulgated by the Institute for Surgical Research (ISR). Additional clinical guidance came from the military lessons learned and operational nursing "pearls of wisdom." Recently deployed nurses were involved in all phases of this program's development to better identify some major learning needs and to better reflect operationally influenced care delivery.

The suite of games spans trauma content from primary to secondary survey and can make a perfect mobile app, tablet-based content mentor/refresher or a companion to the computer-based curriculum. The use of digital-based learning tools offers the benefits of malleability and agility, able to simulate diverse environments and modify scenarios rapidly thus allowing educators to present content rich materials across different services, roles, and disciplines.

The program uses Benner's model for leveling performance criteria and trauma and teamwork content is fully integrated into the program and grading criteria. We abandoned traditional percentage based grading for the mastery-learning format (must correctly complete all elements before proceeding) and created a self-paced deliberative practice approach as a means to acquire content knowledge (McGaghie et al., 2010).

The learner can choose to explore various supplemental content in the curriculum or keep repeating the games to improve proficiency and speed, or not. Consequently, a highly knowledgeable "player" can actually refresh and validate current content knowledge very quickly while another learner may need repeated efforts to gain content mastery. The games use high-fidelity photos of actual equipment from Role 2 and Role 3 type in-

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country surgical facilities so the learners also develop immediate product/equipment recognition. Game presentation allows for free-choice selections unless order sequence is required, then it too is required in the game. Game score is the amount of *time* to game completion when completed straight through with all items done correctly. Low score "wins." Multiple iterations are tracked, but not penalized. In trauma, "you must be right, right away"; therefore, the faster one is, the better the score.

Were only the games available now as a smartphone app, learners could start to "pre-learn" before a simulation scenario or reinforce already learned material in anticipation of its use while passing the time in a line. The content, when updated by small- and medium-sized enterprises, can also be easily "pushed" to subscribers with an alert that a new CPG or a modified CPG is now reflected in the content. This will significantly shorten the time to positive impact from the learning/knowledge update to the change in practice with potentially positive measurable outcomes for the patient and the enterprise.

Financial Disclosures

These games are part of an avatar-guided, computer game-based program of trauma instruction for military nurses. The general project was funded through the Defense Medical Research and Development Program (DMRDP) with programmatic management by the Joint Program Committee-1 and direct project oversight by the Telemedicine & Advanced Research Center (TATRC), an agency of the U.S. Army Medical Research and Matériel Command, under contract award No. W81XWH-12-2-0026. The views, opinions, and findings contained in this presentation are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision unless so designated by other documentation.

B.14
THE BACTERIONOMICON: A FANTASY WORLD OF MONSTERS AND HEROES INSPIRED BY BACTERIA AND ANTIBIOTICS

Brandon Patton
Nerdcore Medical, Connecticut

The Bacterionomicon is a compendium of infectious bacteria and antibiotics presented in the style of a *Dungeons & Dragons* bestiary book, in order to use imagination, metaphor, and stories to aid learning and promote awareness about antibiotic misuse.

Project Objective 1: Aid learning and promote awareness about antibiotic misuse.

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B.15
OCCAM'S RAZOR CARD GAME: SOCIAL STUDYING FOR NURSES AND MEDICAL STUDENTS

Brandon Patton
Nerdcore Medical, Connecticut

Occam's Razor is a card game designed to help medical students, nursing students, and health professionals practice diagnosing patients. It features 14 different diseases, from acute appendicitis to septic arthritis, and draws on two classic philosophical principles: Occam's razor (the simplest explanation is to be preferred) and Hickam's dictum (patients can have as many diseases as they please).

Project Objective 1: Assist medical students, nursing students, and health professionals with practice in diagnosing patients.

B.16
DEFENDERS OF SOMA: A CARD GAME ABOUT ANTIBIOTIC RESISTANCE

Brandon Patton
Nerdcore Medical, Connecticut

In Defenders of Soma, one player attacks the citizens of Soma with infectious bacteria, while the other player tries to defend them with recommended antibiotics. The more a given antibiotic is used, the less useful it becomes, as bacteria gain greater resistance. The game is designed to be a strategically challenging game for a general audience while also depicting medically relevant therapeutic recommendations.

Project Objective 1: Provide entertainment for learners while promoting awareness of antibiotic resistance and the challenges of treating infectious disease.

B.17
IMMUNE DEFENSE

Melanie Stegman, Ph.D.
Molecular Jig Games, Washington

Immune Defense teaches abstract, fundamental concepts in molecular biology, including diffusion, randomness, protein structure and function, cell differentiation, and cell behavior. These core abstract concepts are necessary for student success in science, technology, engineering, and math

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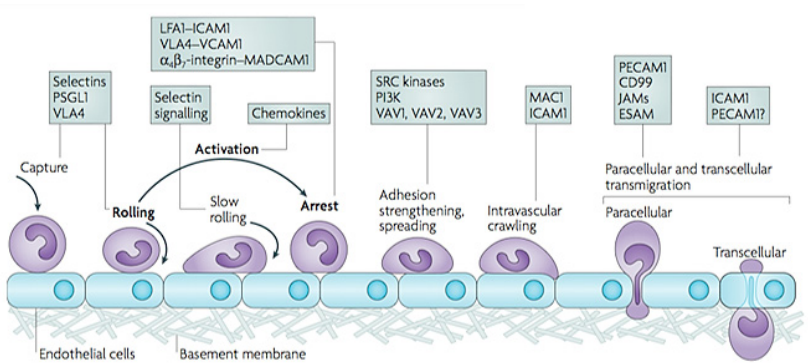

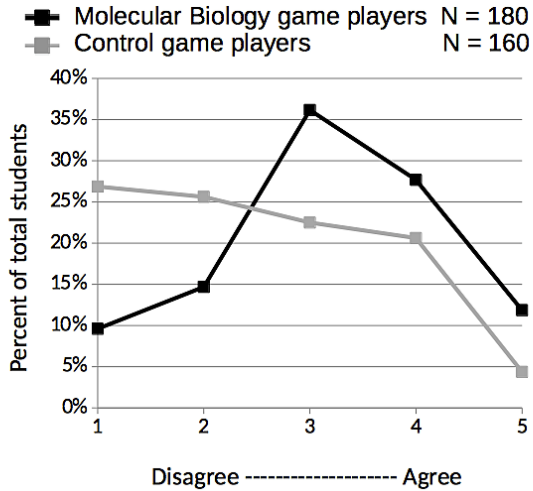

FIGURE B-1 Players' self-rated confidence after playing the molecular biology video game or an unrelated control game (10th to 12th grade student data).

NOTES: One day after playing the games, students were shown the diagram on the left and asked to agree or disagree with the following statement: I would be able to understand this diagram if I read it and thought about it. Answer choices: 1. I disagree definitely; 2. I disagree somewhat; 3. I am neutral; 4. I agree somewhat; 5. I agree definitely. The molecular biology game players gave more confident replies than their classmates who played the control game. Average scores were *IA = 3.16 and Control = 2.50 Students T-Test p << 0.000.* In other words, the molecular biology video game cut the number of negative replies by half. For more information, visit www.MolecularJig.com/research (accessed September 8, 2015).

SOURCE: Stegman, 2014. For more information, visit http://dx.doi.org/10.1039/C4FD00014E (accessed September 4, 2015).

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career paths, but typically are not taught until the student is in high school. Immune Defense allows younger students to learn abstract concepts. It drives player confidence by providing a clear set of possible actions and new, interesting challenges. The elements of the human immune system (cells, veins, receptors, and signaling molecules) are the parts of the puzzle that the player can manipulate. Controlled experiments with 7th to 12th grade students demonstrate that players remember the names, appearance, and functions of cells and proteins. Additionally, players show confidence when presented with novel diagrams that look and sound similar to the game (see Figure B-1). *Immune Defense* is a 15–20-minute game for Web browsers. For more information, visit ImmuneDefenseGame.com (accessed August 21, 2015).

B.18
IMMERSIVE LEARNING ENVIRONMENTS AT DUKE

Jeffrey Taekman, M.D.; and Michael Steele, P.M.P.
Duke University Medical Center, North Carolina

Immersive Learning Environments at Duke (ILE@D) is an ecosystem of 3D, collaborative worlds accessible from any Internet-connected computer that provides an innovative, interactive "front-end" to distance education and assessment in the health professions. ILE@D maximizes face-to-face interactions between teachers and students through self-directed, team-based, and facilitator-led preparatory activities in the virtual environment.

Sedation

The Pre-Deployment Anesthesia and Anaphylaxis Training System is a serious game designed to teach the cognitive skills of rapid sequence intubation and moderate sedation for nonanesthesia providers. This single-player, fully automated simulation enables clinicians to evaluate, sedate, and medically manage 10 patients each with a unique set of medical and contextual challenges. In each scenario, learners must review the patient's background and physical exam to determine primary and secondary sedation plans and execute that plan to anesthetize the virtual patient. Even with a correct plan, patients can sometimes act in unexpected ways. Several challenges (e.g., anaphylaxis) allow the learner to practice critical thinking in emergency situations.

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Hemorrhage

Postpartum hemorrhage is a devastating condition in both the United States and abroad and is the leading cause of maternal mortality in the developing world. ILE@D Hemorrhage is a 3D, multiplayer, instructor-facilitated virtual simulation designed to train teams of clinicians in the medical management of postpartum hemorrhage as well as effective teamwork and communication behaviors (TeamSTEPPS). Participants connect from anywhere, sharing the same virtual environment in real time. This software has been used locally in Duke Hospital and as a proof-of-concept for virtual training in both Australia and Uganda.

Stroke

Stroke is a devastating condition. Door-to-needle time (the time from patient entry into the hospital to the time of definitive therapy) is a critical factor in minimizing morbidity and maximizing survival. With the advent of telemedicine and tele-stroke facilities, nurses in outlying hospitals who lack adequate opportunities to keep their neurological exams skills fresh often perform the initial neurological exam. Our stroke scenario walks learners through a mentored neurologic exam, offering opportunities for physicians and nurses to hone their neuro exam skills in a safe environment.

Medic

Combat Medic is a single or multiplayer fully automated simulation where learners practice the procedural skills of cricothyrotomy, tourniquet management, and needle decompression. In this acute care case, the virtual patient will crash quickly if the learner fails to make the correct decisions. A complete debrief system allows the learner to playback the case, review the virtual patient's vitals throughout the case, and compare their decisions with that of an expert.

Handover

Handover allows learners to practice the skills of transferring a patient from the intensive care unit to the operating room. This single-player, fully automated simulation puts you in the director's chair, controlling all of the providers as they perform the actions necessary to move a patient. This also includes managing information exchange between the two teams. A playback/rating/feedback system allows mentors to review and comment on the learner's choices.

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Come explore ILE@D today at simcenter.duke.edu. We would like to thank The Duke Endowment for the Nanaline Duke Trust for support of ILE@D.

B.19
INTERPROFESSIONAL TEAMWORK TRAINING USING TEAMSTEPPS VIRTUAL TEAMS

Rachel Umoren, M.D., M.S.[1]; Linda Sweigart, M.S.N., APRN[2]; Evalyn Gossett, M.S.N., R.N.[3]; Barbara Truman[4]; John Fillwalk[2]; Patricia Scott, Ph.D., M.P.H., O.T.[5]; Kay Hodson Carlton, R.N., Ed.D., ANEF, FAAN[2]; Natalia Rybas, Ph.D.[6]; and Rohit Das, M.D., M.P.H.[1]

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TeamSTEPPS is a validated approach to teaching teamwork with demonstrated effectiveness in improving teamwork and patient safety. This multisite project evaluated students' recognition of TeamSTEPPS strategies and attitudes regarding interprofessional communication, mutual support, situation monitoring, and conflict resolution. TeamSTEPPS was developed as a national program for health professional team training. Though proven effective, it is challenging to implement the program simultaneously with interprofessional health care students due to varying learner schedules.

Virtual learning environments (VLEs) allow flexibility of scheduling and location. The 3D Unity VLE provides enhanced graphics and adaptability to a variety of user hardware devices. Evidence has revealed the successful deployment of VLEs for developing communication skills for medical and nursing students. Simulated patient care situations were created as immersive experiences involving a health care team in typical patient care situations. Embedding the learner in a virtual team allows for a single- or multiplayer experience with positive participant feedback and significant changes in teamwork attitudes.

Project Objective 1: Apply low-cost, high-access, virtual technologies for rapid deployment of teamwork training and refresher sessions for health professionals through TeamSTEPPS virtual teams.

Project Objective 2: Examine the impact of TeamSTEPPS virtual teams on health professional student knowledge and attitudes to teamwork and apply this knowledge to advance team training and interprofessional collaborative practice.

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Methods and Findings

The study involved more than 200 nursing, medical, occupational therapy, physician assistant, and social work students. Students completed three 5-minute scenarios based on TeamSTEPPS materials. The student's avatar interacted with the avatars of the virtual health care team members that modeled the use of the teamwork communication tools. Participants were immersed in the scenarios observing communication of health care team members in typical patient care situations and identified TeamSTEPPS strategies that were used or that would have prevented adverse outcomes had the strategy been used. The Teamwork Attitudes Questionnaire (T-TAQ) was used as a pre-post measure; the tool included five categories: leadership, communication, mutual support, situation monitoring, and team structure. Analysis of participants' scores on the T-TAQ revealed significant positive changes across the categories with $P < 0.05$. Students recognized the utilized or appropriate TeamSTEPPS communication strategy for various points in the realistic clinical situations. Student feedback of the activity was positive.

Conclusions and Implications

This pedagogical strategy overcomes many barriers to interprofessional teamwork skill development. It is an initial step to replacing face-to-face training sessions of these vital skills for all health care professional students. With future work, we expect to demonstrate that the 3D Unity-based simulation experiences are effective for teaching the communication skills that are essential to patient safety.

B.20
A NOVEL COMPUTER SCREEN–BASED SIMULATOR FOR DEFIBRILLATOR SKILLS TRAINING

Kathleen Ventre, M.D.[1]; Joshua Ferge[2]; and Anne Brenneman[3]

[1]University of Colorado, Aurora; [2]University of Colorado, Boulder; [3]Primary Children's Hospital, Salt Lake City, Utah

Rapid, well-coordinated resuscitation is essential for optimal outcomes from shockable cardiac arrest rhythms, yet studies from laboratory and clinical environments have found that health care teams often have difficulty delivering timely defibrillation. Acute care providers undergo advanced life support retraining every 2 years, and have few opportunities to gain experience in managing arrest rhythms between refresher courses. While mannequin-based simulation can impart and fortify resuscitation

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skills, it is difficult to scale this resource-intensive technique to satisfy health care providers' need for frequent retraining. These conditions suggest a need for fresh, sustainable approaches to the development and maintenance of competency in defibrillator operation.

Our principal objective was to build a computer screen-based simulator that could augment existing advanced life support curricula by facilitating the acquisition and maintenance of competency in defibrillator operation among large groups of providers, without the need for instructor presence. Thus, we developed a software-based simulator that models the look, sounds, and functions of the LIFEPAK 20e defibrillator. Our simulator operates within a Web browser so large numbers of users can access it at a time and place of their choosing. The simulator is driven by a computer program we created in HTML5 and Javascript. The features of the programming language allow our simulator to handle multimedia components such as graphics, animation, and video. The simulator's user interface features an image of a "patient" and realistic images of the defibrillator and its accessories, to support the user in performing each step in the process of properly operating the machine.

After building a prototype, we gathered data on our simulator's usability from beta testers who operated it using a "think aloud" protocol. Using these data we iteratively refined our simulator's user interface and functional capabilities. The simulator now includes three modes: an interactive overview of basic defibrillator controls and two case-based modes that allow users to experience the consequences of their decisions. Three "tutorial" cases guide the user through operating the defibrillator in the context of managing a clinical scenario, and three scored "assessment" cases require fluent defibrillator operation to treat specific cardiac dysrhythmias. To allow us to gain insight into users' error patterns, the simulator records management decisions and outcomes from the assessment cases. We configured our simulator to be hosted in a server at our hospital and transfer records to a secure database. We plan to use the data to inform curricular changes and future versions of the simulator.

B.21
DECISIONSIM

Bob Yayac, M.B.A.; and Jeffrey Zack, M.B.A.
DecisionSim Chadds Ford, Pennsylvania

DecisionSim is a cloud and mobile simulation platform that specifically focuses on cognitive skills by assessing and enhancing decision making. Adults can better recall, synthesize, and apply what they learn by learning in context, practicing the application of knowledge, and receiving

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personalized feedback. DecisionSim allows the learner to practice decision making in real-world scenarios, see consequences, and receive personalized feedback.

Project Objective 1: Demonstrate how DecisionSim can help improve decision making.

Project Objective 2: Demonstrate how DecisionSim's unique authoring tools allow educators to customize the learning experience.

REFERENCES

McGaghie, W. C., S. B. Issenberg, E. R. Petrusa, and R. J. Scalese. 2010. A critical review of simulation-based medical education research: 2003-2009. *Medical Education* 44(1):50-63. doi:10.1111/j.1365-2923.2009.03547.x.

NCSBN (National Council of State Boards of Nursing). 2014. *NCSBN releases results of national simulation study*. https://www.ncsbn.org/5507.htm (accessed November 11, 2015).

Stegman, M. 2014. Immune attack players perform better on a test of cellular immunology and self confidence than their classmates who play a control video game. *Faraday Discussions* 169:403-423.

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Appendix C

Abstracts of the April 24, 2015, Webcast Session

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C.1
TRAINING FOR HEALTH EQUITY NETWORK: PAVING THE WAY FOR RESULTS-ORIENTED HEALTH WORKFORCE EDUCATION

Björg Pálsdóttir, M.P.A.; and André-Jacques Neusy, M.D.
Training for Health Equity Network (THEnet)

Background

According to the seminal report of the Global Independent Commission on Education of Health Professionals for the 21st Century (Frenk et al., 2010), current models of health workforce education are not producing the people, research, and services needed to meet the changing needs of the 21st century. These challenges require a more fundamental shift in approach: it calls for the integration of health and education systems and for institutions that are equipped to address changing needs, to measure their impact, and collaborate to train health care teams with the necessary competencies and desire to address priority needs. The 2013 World Health Organization (WHO) guidelines for transforming and scaling up health professionals' education calls for "promotion of social accountability (SA) and of close collaboration with communities" in its vision of the future (WHO, 2013, p. 12). SA is defined as schools having "the obligation to direct their education, research, and service activities toward addressing the priority health concerns of the community, the region, and/or the nation they have a mandate to serve" (Boelen and Heck, 1995, p. 3). SA serves as a useful mechanism to support institutional reform and evaluate schools' impact on health services and health equity. It can also help determine the research agenda for evidence-based institutional reform.

The Training for Health Equity Network (THEnet) is a collaborative of trailblazing SA health professional education institutions from six continents. Working with and in underserved communities, THEnet schools define success through the lens of impact on health and equity and by how well schools meet the needs of the populations they serve. Data from THEnet's schools—operating in highly diverse contexts in high- and low-income countries, urban and rural settings—show positive results in increasing the number and quality of health professionals and health outcomes in deprived areas (Cristobal and Worley, 2012; Kaufman et al., 2010; Larkins et al., 2015; Strasser, 2010; Tayag, 2011). Their common strategies include training embedded in primary, secondary, and tertiary levels of the health system; targeted recruitment; community-engagement; distributed learning; competencies defined by needs; and integration of population health with clinical and social sciences.

Built on the successful approaches of its members, THEnet developed

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an institutional social accountability framework (Larkins et al., 2013; Ross et al., 2014). The framework identifies key factors that affect a school's ability to positively influence health outcomes and health systems performance and proposes ways to measure them across institutions and contexts. THEnet is working with WHO to align the framework to WHO's institutional assessment tools and with universal health coverage indicators. THEnet is conducting research and evaluations to build a solid evidence base for what works, how, and in which context. Research includes

- *Graduate Outcomes Study:* The ongoing study explores to what extent SA health professional education institutions are likely to train graduates that meet local workforce and health system needs, and identify factors that contribute to them doing so. It includes a longitudinal study (examining changes in students' values and intentions throughout training and tracking graduates up to 10 years into practice).
- *Philippines Impact Study:* This ongoing study assesses how SA health professional education affects health care and health outcomes in rural and remote communities in the Philippines. The research includes case studies and a common impact study at the two participating schools (Ateneo de Zamboanga School of Medicine and University of the Philippines Manila School of Health Sciences).
- *Return on Investment (RoI) Study:* The first phase of this study aims to assess what social capital SA health professions education builds in the communities and population it works with. Later phases include focus on health and economic impact.
- *Quality of Graduates:* This study aims to assess the knowledge, skills, and attributes of first-year graduates of SA health professional education institutions compared to that of graduates from "traditional" programs. This will be done in both hospital and community settings, and will consist of a survey of supervisors and close collaborators of first-year graduates from socially accountable schools and comparison schools.

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C.2
SPECIALTY TRAINING IN HEALTH PROFESSIONAL EDUCATION: TIME FOR A PARADIGM SHIFT?

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[1]Ghent University (Belgium); [2]Flinders University (Australia)

Background

Worldwide there is a huge variation in the way postgraduate specialty training in health professional education is designed. When it comes to specialty training of physicians, for example, many countries have adopted the "UK-model," where a specific (royal) college is in charge of the development of the training program and the assessment of the candidates. Often, organizations based on disciplines (family physicians, internists, surgeons, and others) are in charge of the recruitment, training, qualification, and license to practice for a certain specialty in a discipline. Mostly they are organized as strong bodies, with an important degree of independence, and apart from their training duties, they also act as representative bodies for that discipline, participating in societal and political health policy debates. In general, they are not accountable to the Minister of Education, but to the Minister of Health. In the United States, there is in essence a hybrid system where the universities do the training to college specifications within discipline-specific departments.

There are other models, such as in Europe, where the universities are responsible for the development of specialty training in the framework of a "Master-after-Master" program. We want to reflect on the question: "Is there a need for a paradigm shift for specialty training in health professional education in order to respond better to the changing health (care) needs?"

Analysis

Currently, societies are confronted with important new challenges: the demographic and epidemiologic transition, with a shift toward more chronic care and multimorbidity; the scientific and technological evolutions; the socioeconomic developments, especially the increasing social gradient in health in many countries; the cultural developments, in particular the fundamental change in the position of the patient as an active "consumer" of care; and globalization. How can the postgraduate educational systems be responsive?

The following reflections may be relevant: the availability of information through the Internet raises the chance that integrative models of medical practitioners and "new generalism" are now more possible; the debate

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on the role of "physician assistants" and "technicians" has significant ramifications for the current income models of subspecialists who rely on procedural monopoly; there is a need to develop an evidence base around maintenance of expertise that is not developed by those who have the most to protect; status as a profession should be seen as a gift from society and requires "social accountability."

Conclusion

The changing societal needs require appropriate training for specialties in the context of health professional education. We hypothesize that traditional colleges are probably not the best solution, due to the demonstrated conflicts of interest and lack of integrative capability of the college system, and that universities, especially if they are public universities, are better placed to serve society in postgraduate training. This hypothesis needs immediate investigation, exploring the ability of universities to experiment with different models and shifting the paradigm from "focus on subspecialization" toward "comprehensive integrative approaches."

C.3
INTRODUCING EDUCATIONAL GAMING TO ADVANCE INTERPROFESSIONAL EDUCATION

John R. Ressler, Ed.D.; Lucinda L. Maine, Ph.D., B.Pharm.; and Ruth E. Nemire, Ed.D., Pharm.D., B.Pharm.
American Association of Colleges of Pharmacy and Professions Quest

Health professions educators worldwide have acknowledged that the graduates of our programs must enter practice equipped to participate in patient-centered teams to improve patient outcomes. The Interprofessional Education Collaborative (IPEC) released core competency statements for interprofessional learning in May 2011, and these have been widely embraced as a common framework for integrating interprofessional education (IPE) across the curricula of colleges and schools of the health professions. Despite this commitment, most educators acknowledge that logistical, cultural, and other barriers make it very difficult to achieve the goals of graduating "team-ready" clinicians.

Serious educational video gaming is increasingly recognized as a tool for learning and engaging students. The term *serious games* covers a broad range of applications from two-dimensional education games to totally immersive and code-driven three-dimensional environments where users interface with large volumes of data through sophisticated and interactive digital interfaces. This shift toward immersive world applications being

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used to support education, health, and training activities and mobile applications mark the beginning of new challenges that offer real scope for collaborative and multidisciplinary research solutions, and real opportunities for innovative development.

The American Association of Colleges of Pharmacy has established Professions Quest to produce serious educational games for teaching and learning the IPEC core competencies. This interactive learning platform uses video game technology to bring multiple students from different health care professions together to solve real-world scenarios. The scenarios, called "Quests," demand players work collaboratively to communicate, plan, exchange ideas, and develop options for solving the kind of challenges they will one day face in real life. Not only does MIMYCX provide students with a fun and engaging vehicle to help master the established IPEC core competencies, it also has the potential to improve knowledge exchange throughout the health care industry.

Additional information about the role of games in health professions education and how the quests released in the Professions Quest game called MIMYCX can enable and expand opportunities for collaborative learning in the health professions will be presented.

C.4
THE NEED FOR INTERPROFESSIONAL COLLABORATIVE-READY NUTRITION AND DIETETICS PRACTITIONERS

Kathrin A. Eliot, Ph.D., R.D.; and Kathryn M. Kolasa, Ph.D., R.D.
Academy of Nutrition and Dietetics

Registered Dietitian Nutritionists (RDNs) are integral members of many health care and health prevention teams. As such, graduates of nutrition and dietetics education programs need opportunities to develop the soft skills required to become effective members of these teams. Currently there are no formal guidelines for incorporating IPE components into dietetics education programs in the United States, and the standards for core knowledge and competencies from the Accreditation Council for Education in Nutrition and Dietetics (ACEND) only generally refer to concepts that are related to IPE.

The benefit of IPE in health care education has been well studied across the professions though few studies mention specifically how dietetics has been involved. A review of literature, food, and nutrition conference abstracts and personal communication with dietetics education program directors revealed that dietetics education programs are minimally participating in IPE activities. The programs that are incorporating elements of IPE into their curricula cite benefits for both students and faculty. As a

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result of IPE, students develop an increased understanding and awareness of professionalism, and improve their confidence in working as part of a team. Students also report that engaging in IPE is enjoyable, and they appear to recognize benefits to their futures as professionals.

Experiential learning is a critical component of IPE. While dietetic students and interns are often engaged in community-based education, most do not appear to have the opportunity to learn interprofessionally. As was suggested at the spring 2014 Institute of Medicine (IOM) Global Forum on Innovation in Health Professional Education meeting, participating in student-run clinics may be one way dietetic students could work collaboratively with other health professions. Some of the best examples have been seen in the interactions among dental and dietetic students and faculty. A review of abstracts on www.studentrunfreeclinics.org identified several dietetics education programs with various levels of participation in these clinics. Where these volunteer clinics operate successfully, students comment that they experience real interprofessional practice (IPP) and help them become "team ready."

The Academy of Nutrition and Dietetics and ACEND are supporting efforts to involve the profession in the IPE movement. The academy currently sponsors membership in the Forum and recently renewed for an additional 3-year term. There is also an IPE task force within the dietetics education practice group that has been charged with devising a plan to distribute information about and promote opportunities for engaging in IPE. In February 2015, ACEND released a proposed new model for dietetics education that included a discussion of the need to train future dietitians interprofessionally. Ultimately, the IPE movement is rich with opportunities for nutrition and dietetics to become further involved in both the inpatient and outpatient settings. Dietetians have been members of multidisciplinary teams but now need to take advantage of opportunities for IPE and IPP. Educators and governing agencies need to respond to the challenges.

C.5
THE UNIVERSITY OF ARIZONA'S NATIONAL CENTER FOR INTEGRATIVE PRIMARY HEALTHCARE (NCIPH): CHANGING PRIMARY CARE HEALTH PROFESSIONALS' EDUCATION TO INCORPORATE AN INTERPROFESSIONAL INTEGRATIVE HEALTH APPROACH

Elizabeth A. Goldblatt, Ph.D., M.P.A./H.A.
NCIPH Leadership Team

The University of Arizona Center for Integrative Medicine, in collaboration with the Consortium of Academic Health Centers for Integrative

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Medicine received a grant from the Health Resources and Services Administration to establish the National Center for Integrative Primary Healthcare (NCIPH). The NCIPH supports the incorporation of competency- and evidence-based integrative health care (IH) curricula into educational programs in a movement toward integrative interprofessional patient care. The NCIPH will develop competencies, curricula, and best practices taking into consideration the determinants of health including physical and social environment, individual health behaviors, and health services as they relate to the practice of IH to affect health outcomes. The center goals are

1. Establish an interprofessional leadership team;
2. Develop a coordinated set of competencies in IH across primary care professions;
3. Develop a 45-hour interprofesssional IH curriculum for primary care;
4. Create an accessible and interactive online infrastructure to house IH curriculum, best practices, and resources; and
5. Develop patient education materials and facilitate access to IH practitioners working with the underserved.

First-year activities included developing IH meta-competencies and curriculum development planning. Experts representing primary care residency training programs, nursing, public health, dentists, pharmacy, behavioral health, and the complementary and integrative health professions of chiropractic, naturopathic, and traditional Chinese medicines convened to create a set of meta-competencies in integrative primary health care. A needs assessment was sent to primary care educational programs to assess interest and identify curriculum priorities, common content areas, core IH competencies, and implementation barriers to design a 45-hour IH online course. Curriculum content areas were identified based on the meta-competencies and needs assessment results. This presentation will include an overview of the project and a discussion of the 10 meta-competencies as well as the main subjects that will be included in the curriculum.

C.6
UNIVERSITY OF BRIDGEPORT INTEGRATED CLINICS—INTERPROFESSIONAL EDUCATION

Jennifer Brett, N.D., L.Ac.
University of Bridgeport

The rise of interprofessional education/clinics (IPE/Cs) coincides with the era of the rise of the idea of health care teams in medical education and

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delivery. U.S. patients increasingly self-choose services of a team of community complementary and alternative medicine (CAM) and conventional medical providers as their choice for care. Hospitals and health centers are adding CAM professionals to teams.

Dr. Brett describes the University of Bridgeport (UB) Integrated Clinics model of delivering interdisciplinary patient-centered care. The presenter will explore how a unique integration of interns of acupuncture, chiropractic, naturopathy, and dental hygiene at UB's teaching clinic helps interns learn to work together for optimal patient care; and will discuss examples of strategies for interprofessional clinical collaboration in teaching clinics.

Critical teaching competencies that have been identified in the UB integrated team patient assessment clinic include

1. Shared responsibility in patient care
2. Communication skills for interns working together from different health care backgrounds
3. Commitment to team-based care and team-building skills
4. Understanding patient-centered care
5. Time management
6. Effective active listening and active communication skills

Critical patient care competencies identified in the UB integrated team patient assessment clinic include

1. Incorporating assessment survey information (e.g., Short Form (36) Health Survey) with physical exam and subjective findings
2. Identifying how to prioritize diagnoses and treatments in complex cases
3. Identifying the type of care that is appropriate taking into account patient preferences
4. Incorporating referral to specialists outside of and within the team
5. Use of evidence-informed practices in an effective and timely manner

The presenter will identify issues that arose in setting up this model of care: level of training in patient assessment for each team member; understanding the strengths and weaknesses for each type of practice and practitioner; clinicians' high level of commitment to own program/field; the relationship of integrated practice model to overall educational goals; faculty expectations and work load; and funding. Dr. Brett also shares the expected and unexpected benefits of this integrated model: student intern team building; improved intern and supervisor communication; patient assessment and organized care for complicated case presentations; and su-

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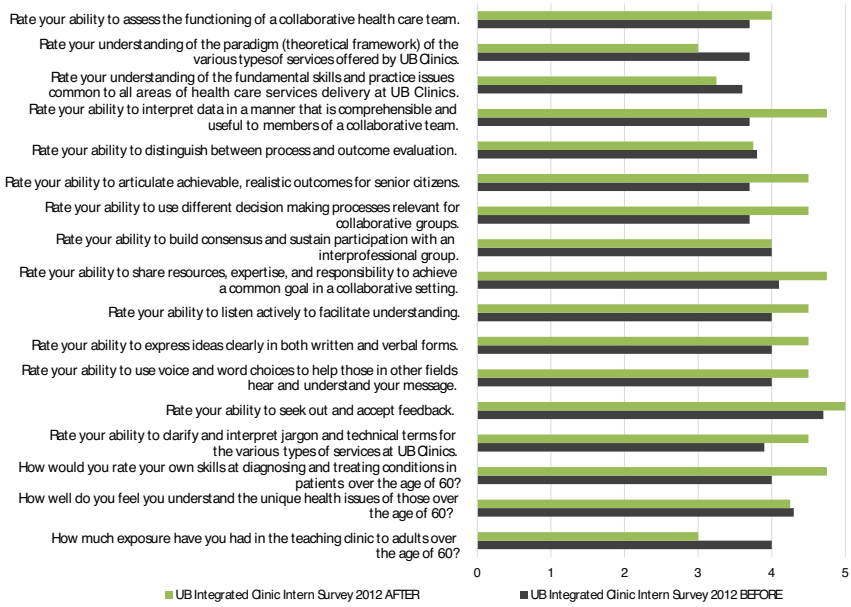

FIGURE C-1 University of Bridgeport (UB) integrated clinic intern survey 2012.
NOTES: Scale of 0–5 with 1 meaning poor/unsatisfactory and 5 meaning excellent. UB Integrated Clinic interns complete this survey before starting the shift and again and the conclusion of the semester.
SOURCE: Brett, 2015.

pervisor interprofessional respect and understanding. Figure C-1 shows the UB Integrated Clinic intern outcomes, as indicated by the interns.

REFERENCES

Boelen, C., and J. E. Heck. 1995. *Defining and measuring the social accountability of medical schools*. Geneva, Switzerland: WHO.

Brett, J. 2015. Strategies for interprofessional clinical collaboration in the U.S. based on ACCAHC competencies for optimal integration. Presented at the IOM workshop: Envisioning the Future of Health Professional Education. Washington, DC, April 24.

Cristobal, F., and P. Worley. 2012. Can medical education in poor rural areas be cost-effective and sustainable: The case of the Ateneo de Zamboanga University School of Medicine. *Rural Remote Health* 12:1835.

Frenk, J., L. Chen, Z. A. Bhutta, J. Cohen, N. Crisp, T. Evans, H. Fineberg, P. Garcia, Y. Ke, P. Kelley, B. Kistnasamy, A. Meleis, D. Naylor, A. Pablos-Mendez, S. Reddy, S. Scrimshaw, J. Sepulveda, D. Serwadda, and H. Zurayk. 2010. Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. *Lancet* 376(9756):1923-1958.

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Envisioning the Future of Health Professional Education: Workshop Summary

Kaufman, A., W. Powell, C. Alfero, M. Pacheco, H. Silverblatt, J. Anastasoff, F. Ronquillo, K. Lucero, E. Corriveau, B. Vanleit, D. Alverson, and A. Scott. 2010. Health extension in New Mexico: An academic health center and the social determinants of disease. *Annals of Family Medicine* 8(1):73-81.

Larkins, S. L., R. Preston, M. C. Matte, I. C. Lindemann, R. Samson, F. D. Tandinco, D. Buso, S. J. Ross, B. Palsdottir, and A. J. Neusy. 2013. Measuring social accountability in health professional education: Development and international pilot testing of an evaluation framework. *Medical Teacher* 35(1):32-45.

Larkins, S., K. Michielsen, J. Iputo, S. Elsanousi, M. Mammen, L. Graves, S. Willems, F. L. Cristobal, R. Samson, R. Ellaway, S. Ross, K. Johnston, A. Derese, and A. J. Neusy. 2015. Impact of selection strategies on representation of underserved populations and intention to practise: International findings. *Medical Education* 49(1):60-72.

Ross, S. J., R. Preston, I. C. Lindemann, M. C. Matte, R. Samson, F. D. Tandinco, S. L. Larkins, B. Palsdottir, and A. J. Neusy. 2014. The training for health equity network evaluation framework: A pilot study at five health professional schools. *Education for Health* 27(2):116-126.

Strasser, R. P. 2010. Community engagement: A key to successful rural clinical education. *Rural Remote Health* 10(3):1543.

Tayag, J. G. 2011. The service leaves of current medical students. In *Bringing health to rural communities: Innovations of the U.P. Manila School of Health Sciences*, edited by J. G. Tayag and L. L. Clavel. Manila: University of the Philippines Manila. Pp. 146-148.

WHO (World Health Organization). 2013. *Transforming and scaling up health professionals' education and training: World Health Organization guidelines 2013*. Geneva, Switzerland: WHO.

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Appendix D

Speaker Biographical Sketches

David Asprey, Ph.D., PA-C, currently serves as Assistant Dean in the Office of Student Affairs and Curriculum in the Carver College of Medicine and is Professor and Chair of the Department of Physician Assistant Studies and Services. He holds secondary appointments in the Department of Pediatrics and in the Department of Physical Therapy and Rehabilitative Sciences. His academic background includes a bachelor's degree in biology from Bethel College in St. Paul, Minnesota, and a bachelor's degree from the University of Iowa Physician Assistant Program. He received a master's degree in instructional design and technology and a Ph.D. in higher education from the University of Iowa College of Education. His clinical practice as a physician assistant (PA) has consisted of 4 years in emergency medicine and 22 years in pediatric cardiology at the University of Iowa Hospitals and Clinics. Dr. Asprey has been involved in the education of health sciences students for more than 20 years predominately working with medical, PA, and physical therapy (PT) students and has served as the Carver College of Medicine's faculty point person for interprofessional education (IPE) initiatives. Dr. Asprey has authored numerous abstracts, articles, and chapters in addition to co-editing three textbooks. He has served on the board of the Physician Assistant Education Association (PAEA), including a term as president, and was appointed to the Federal Advisory Committee on Training in Primary Care Medicine and Dentistry, where he also served as the vice chair. He recently served as a member of the Institute of Medicine's (IOM's) Committee on Governance and Financing of Graduate Medical Education and participated in the production of the committee's report titled *Graduate Medical Education That Meets the Nation's Health Needs*.

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Timi Agar Barwick, M.P.M., has served as chief executive officer of the PAEA since 2000. PAEA represents all of the accredited physician assistant educational programs located at colleges and universities across the United States. Prior to her appointment as CEO, Ms. Agar Barwick advanced through several association positions. She joined PAEA as its first full-time staff person in 1991 under a management contract. A graduate of Michigan State University and the University of Maryland, Ms. Agar Barwick's background in public policy and philosophy initially brought her to Washington, DC, as a legislative correspondent. After serving a brief time on Capitol Hill, she moved forward in her career through a position with the National School Public Relations Association, before coming to PAEA.

Elizabeth G. (Libby) Baxley, M.D., is a Professor of Family Medicine and serves as the Senior Associate Dean for Academic Affairs at the Brody School of Medicine at East Carolina University since May 2012. Prior to moving to Greenville, Dr. Baxley spent 18 years on the faculty of the University of South Carolina (USC) School of Medicine, From 2003–2012 she served as Chair of the Department of Family and Preventive Medicine. Prior to that time, she was Director of Faculty Development in USC's Office of Continuing Medical Education and Faculty Development and as Family Medicine Residency Program Director and the Director of Education for the Department of Family and Preventive Medicine. Earlier in her career, Dr. Baxley taught on the faculty of the Indiana University School of Medicine, Indianapolis, Indiana, and at Anderson Family Practice Residency Program in Anderson, South Carolina. She is a graduate of Clemson University, Clemson, South Carolina, where she earned a Bachelor of Science in Zoology. She received a Doctor of Medicine from the USC School of Medicine. A family practice residency at Anderson Family Practice Residency, Anderson, South Carolina, was followed by a faculty development fellowship at the University of North Carolina at Chapel Hill School of Medicine. Dr. Baxley's work has focused heavily on health care delivery system redesign and teaching about patient safety and quality improvement. She has a keen interest in improving care through actualization of team-based care that is focused on the patient and family, as well as community health needs. She is a nationally known leader in her discipline in this area, and is frequently invited to speak on these topics across the country. She has co-directed two regional academic collaborative of multiple teaching practices from North Carolina, South Carolina, and Virginia. She has also achieved individual National Committee for Quality Assurance (NCQA) recognition for Diabetes care, and her department's teaching practice was recognized as a Level III patient centered medical home by NCQA in early 2010. Most of her recent scholarly work has been on the outcomes associated with ambulatory practice redesign. She was a contributor to the Educational Principles

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of the Patient-Centered Medical Home, released in November 2010, and currently serves as Co-Chair of the Education and Training Task Force for the national Patient Centered Primary Care Collaborative. Throughout her career she has been honored with a number of distinctions, including three teaching advancement awards from the USC School of Medicine, the Halford Award for Leadership in Humane Education, and the American Academy of Family Physicians Exemplary Teaching Award.

Jennifer Cabe, M.A., has spent more than 20 years in positions dedicated to improving community health, and now serves as executive director for Canyon Ranch Institute (CRI), a 501(c)(3) nonprofit public charity that catalyzes the possibility of optimal health for all people. Ms. Cabe also is on the faculty of the Ohio State University College of Nursing. Ms. Cabe served in the Office of the Surgeon General as communications director and speechwriter for U.S. Surgeon General Richard H. Carmona. She was responsible for developing health literacy initiatives with health professionals, advocacy groups, policy makers, community leaders, and the public. Ms. Cabe previously served as communications officer at the Fogarty International Center at the National Institutes of Health (NIH), and led communications, wellness, and government relations for HealthNet Health Plan in the Pacific Northwest. Ms. Cabe was awarded the Surgeon General's Medallion, which is the highest honor conferred by the U.S. Surgeon General. Ms. Cabe earned a bachelor's degree at Trinity University in San Antonio, Texas, and a master's degree in public communication at American University in Washington, DC.

Francisco Eduardo de Campos, Ph.D., is a physician, public health specialist, retired professor of Federal University of Minas Gerais (UFMG), Science and Technology Specialist at Oswaldo Cruz Foundation and Executive Secretariat of Open University of Unified Health System. Dr. Campos graduated in Medicine at UFMG, in Brazil. He holds a Master Degree in Social Medicine and a Doctoral Degree in Public Health. His first assignment was to coordinate a national research in Preventive Medicine Teaching in Brazil from where he was invited to coordinate the first massive Rural Internship, implemented at UFMG—the biggest public medical college within one of the most prestigious Brazilian Universities. Upon the redemocratization of Brazil, he was invited to work as Minister of Health's Secretary of Human Resources. Dr. Campos was one of the leaders that spearheaded the proposal of unification of the Brazilian health system, coordinating the Human Resources Group in the National Commission of Health Reform. He joined the Pan American Health Organization (PAHO)/World Health Organization (WHO) as a staff member (based in Washington, DC) and went back to Brazil to coordinate the Nucleus of Education in Public Health of UFMS.

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From 2005 to 2010 he acted as Secretary of Management of Education and Workforce for health, responsible for many programs. He represented Brazil in WHO's Executive Board. Dr. Campos was a board member of the Global Health Workforce Alliance and co-shared the 2nd Global Forum of Human Resources, held in Bangkok on January 2011. Currently, Dr. Campos holds a position as Science and Technology Specialist at Oswaldo Cruz Foundation and Executive Secretariat of Open University of Unified Health System.

Clifford Coleman, M.D., M.P.H., is a national expert in the field of health literacy. His teaching and research activities focus on workforce training to improve the clinical and public health response to low health literacy in the United States. Dr. Coleman received his medical degree from Stanford University in 2000, and completed a combined residency in Family Medicine and Public Health & General Preventive Medicine at Oregon Health & Science University (OHSU), with a Master's of Public Health from Portland State University in 2004. He joined the faculty in the Department of Family Medicine at OHSU in 2004. He practices at OHSU's Richmond Clinic, a Federally Qualified Health Center, where his clinical interests include care delivery for medically complex underserved patients.

Rita R. Colwell, Ph.D., is Distinguished University Professor at the University of Maryland, College Park, and the Johns Hopkins Bloomberg School of Public Health and Chairman and Chief Science Officer, CosmosID, Inc. Her interests are focused on genomics, biodiversity, and molecular microbial systematics and ecology. Dr. Colwell is an honorary member of the microbiological societies of Australia, Bangladesh, France, India, Israel, the United Kingdom, and the United States. Dr. Colwell served as the 11th Director of the National Science Foundation from 1998 to 2004. She has authored/co-authored 19 books and more than 700 scientific publications. She is a member of the National Academy of Sciences and has been awarded the Stockholm Water Prize, Order of the Rising Sun, Japan, and the U.S. National Medal of Science.

Malcolm Cox, M.D., is an Adjunct Professor at the Perelman School of Medicine, University of Pennsylvania. He most recently served for 8 years as the Chief Academic Affiliations Officer for the U.S. Department of Veterans Affairs (VA) in Washington, DC, where he oversaw the largest health professions training program in the country and repositioned the Veterans Health Administration (VHA) as a major voice in clinical workforce reform, educational innovation, and organizational transformation. Dr. Cox received his undergraduate education at the University of the Witwatersrand and his M.D. from Harvard Medical School. After com-

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pleting postgraduate training in internal medicine and nephrology at the Hospital of the University of Pennsylvania, he rose through the ranks to become Professor of Medicine and Associate Dean for Clinical Education at the Perelman School of Medicine. He also served as Dean for Medical Education at Harvard Medical School; upon leaving the Dean's Office, he was appointed the Carl W. Walter Distinguished Professor of Medicine at Harvard Medical School. Dr. Cox was the first Robert G. Petersdorf Scholar in Residence at the Association of American Medical Colleges and has also served on the National Leadership Board of the VHA, the VA National Academic Affiliations Council, the National Board of Medical Examiners, the National Advisory Committee of the Robert Wood Johnson Foundation Clinical Scholars Program, the Board of Directors of the Accreditation Council for Graduate Medical Education, and the Global Forum on Innovation in Health Professions Education of the National Academies of Sciences, Engineering, and Medicine.

James G. Fox, D.V.M., is a Professor and Director of the Division of Comparative Medicine and a Professor in the Department of Biological Engineering at the Massachusetts Institute of Technology. He is also an Adjunct Professor at Tufts University School of Veterinary Medicine and the University of Pennsylvania School of Veterinary Medicine. He is a Diplomat and a past president of the American College of Laboratory Animal Medicine (ACLAM), past president of the Massachusetts Society of Medical Research, past chairman of Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC) Council, past chairman of the NCCR/NIH Comparative Medicine Study Section, and past president of the American Association of Veterinary Medical Colleges (AAVMC). He is a member of various other organizations including the American Association for the Advancement of Science, American Association for Laboratory Animal Science, American Veterinary Medical Association, AAVMC, Infectious Diseases Society of America, American Gastroenterological Association, ACLAM, and American Society for Microbiology. He is an elected fellow of the Infectious Disease Society of America and the American Gastroenterological Association, a past or current member of the Board of Directors of Public Responsibility in Medicine and Research (PRIM&R), One Health Commission, ACLAM, American Committee on Laboratory Animal Diseases, AAALAC, Massachusetts Society for Medical Research, National Association for Biomedical Research, and AAVMC. He has served on the editorial board of several journals, is a past member of the NIH/NCRR Scientific Advisory Council, and of the Institute for Laboratory Animal Research Council of the National Academies of Sciences, Engineering, and Medicine.

Dr. Fox was elected to the National Academy of Medicine in 2004.

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He has received numerous scientific awards including the AVMA's Charles River Prize in Comparative Medicine, the AALAS Nathan Brewer Scientific Achievement Award, and the AVMA/American Society of Laboratory Animal Practitioners Excellence in Research Award. In 2006, Dr. Fox received the Distinguished Alumni Award from Colorado State University and in 2007 was selected as the inaugural recipient of the American College of Laboratory Animal Medicine Comparative Medicine Scientist Award. Dr. Fox was recently elected as an honorary member of the European Helicobacter Study group, and is the 2008 recipient of the American Association for Laboratory Animal Science Charles A. Griffin Award. He has been studying infectious diseases of the gastrointestinal tract for the past 35 years and has focused on the pathogenesis of *Campylobacter* spp. and *Helicobacter* spp. infection in humans and animals. Dr. Fox is considered an international authority on the epidemiology and pathogenesis of enterohepatic helicobacters in humans and animals. He has been the principal investigator of an NIH postdoctoral training grant for veterinarians for the past 24 years and has trained 60 veterinarians for careers in biomedical research. He also has NIH training for veterinary students and has introduced more than 100 veterinary students to careers in biomedical research. He has chaired a committee for the Academies that published a report titled *National Need and Priorities for Veterinarians in Biomedical Research*, which highlights the urgent need for increased numbers of veterinarians involved in the biomedical research arena. He is a past member of Academies Committee to Assess the Current and Future Workforce Needs in Veterinary Medicine.

Elizabeth (Liza) Goldblatt, Ph.D., M.H.A./P.A., is the chair of the Academic Consortium for Complementary and Alternative Health Care. Dr. Goldblatt is a leading educator in the acupuncture and Oriental medicine profession. She served as vice-president of the Council of Colleges of Acupuncture and Oriental Medicine (CCAOM) from 1990 to 1996, president from 1996 to 2002 and is currently on the CCAOM Executive Committee. Dr. Goldblatt also co-chaired the Education Committee of the North American Acupuncture and Oriental Medicine Council, from 1993 to 2007. She served on the board of trustees for Pacific University for 10 years from 1994 to 2004. Dr. Goldblatt was president of the Oregon College of Oriental Medicine (OCOM) from 1988 to 2003, was the Vice President for Academic Affairs for the American College of Traditional Chinese Medicine (ACTCM) from 2003 to 2011, and currently serves as Director of Assessment and Planning at ACTCM in San Francisco, California. Throughout this time, Dr. Goldblatt has been a strong advocate for interdisciplinary, collaborative, academic efforts. She assisted in creating three NIH National Center for Complemen-

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tary and Alternative Medicine centers with OHSU and Kaiser Permanente that included representation from the complementary and alternative health care colleges. She helped OHSU and the other complementary health care educational institutions to create the Oregon Collaborative for Integrative Medicine (OCIM). Dr. Goldblatt also had the lead in creating two of the eight clinical doctoral programs in Acupuncture and Oriental Medicine (DAOM) at OCOM and ACTCM. These programs focus on collaborative and integrated medicine which she views as a major step for educational programs in this field. In 2008–2009, she served as a member of the Planning Committee for the IOM National Summit on Integrative Medicine and the Public Health. Dr. Goldblatt is currently working with University of California, San Francisco (UCSF) Osher Center and California Pacific Medical Center in acupuncture internship placements, cross-education projects, exploring collaborative research and placing medical doctors from both institutions on ACTCM's faculty. Dr. Goldblatt has a Master's in Public Administration/Health Administration (MPA/HA) from Portland State University. She earned her Ph.D. from the University of California, Los Angeles (UCLA), in Ethnomusicology, which combined anthropology and ritual arts. Her emphasis was on Tibetan culture.

Emilia Iwu, R.N., M.S.N., APNC, FWACN, completed her basic nursing and midwifery education in Nigeria. She obtained a bachelor's degree in School Health Services from Rowan University of New Jersey; another undergraduate and graduate degree in Nursing from Rutgers University of New Jersey. Before joining University of Maryland's Institute of Human Virology and School of Nursing as technical advisor for the Presidential Emergency Program for AIDS Relief (PEPFAR) grant in Nigeria, she worked as a Family Nurse Practitioner in Infectious Diseases Clinic at Cooper Hospital University Medical Center and Healthcare for the Homeless Program, both in Camden, New Jersey. Her key interests have been capacity development of Nurses through education and practice. As Assistant Professor at the School of Nursing, University of Maryland, Ms. Iwu helped design a postmaster's global health certificate program that involves clinical and research rotations for U.S.-based nursing students in Nigeria and other resource-constrained countries. Her research interests include nurses' work and safety, nurses' roles in changing health care delivery in resource constrained countries, patient access and retention in care as well as impact of mentored training for Health Care Workers on quality of care provision. She is currently enrolled in a Ph.D. in Nursing program at Rutgers University. Building on her global health work in Nigeria, Ms. Iwu's Ph.D. project interest is to study "the impact of task shifting on nurses, quality of care, and professional regulatory policies."

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Laura Kahn, M.D., M.P.H., M.P.P., a physician, is a research scholar with the Program on Science and Global Security at the Woodrow Wilson School of Public and International Affairs, Princeton University. A native of California, Dr. Kahn holds a B.S. degree in nursing from UCLA, an M.D. from Mt. Sinai School of Medicine, a Master of Public Health from Columbia University, and a Master of Public Policy from Princeton University. In April 2006, she published "Confronting Zoonoses, Linking Human and Veterinary Medicine" in the Centers for Disease Control and Prevention's (CDC's) *Journal of Emerging Infectious Diseases*. That publication helped launch the One Health Initiative. In 2010 and 2011, she taught, "When Cows Go Crazy: The Inextricable Links Between Human and Animal Health," to Princeton University freshman. She is the author of *Who's in Charge?: Leadership During Epidemics, Bioterror Attacks, and Other Public Health Crises* published in 2009 by Praeger Security International. She writes regular online columns for the *Bulletin of the Atomic Scientists*, and has published in many peer-reviewed journals. She has recently completed a book tentatively titled *Physicians, Farmers, and the Politics of Antibiotic Resistance: A One Health Analysis*. It will be published by Johns Hopkins University Press. Dr. Kahn is a fellow of the American College of Physicians (ACP) and is a recipient of the New Jersey Chapter's Laureate Award. In 2010, the American Veterinary Epidemiology Society (AVES) awarded her with an honorary diploma for her work in One Health. In 2014, she received a Presidential Award for Meritorious Service from the American Association of Public Health Physicians.

Arthur Kaufman, M.D., received his medical degree from the State University of New York, Brooklyn, in 1969 and is Board Certified in Internal Medicine and Family Practice. He served in the U.S. Indian Health Service, caring for Sioux Indians in South Dakota and Pueblo and Navajo Indians in New Mexico, before joining the Department of Family and Community Medicine at the University of New Mexico in 1974, where he has remained throughout his career, providing leadership in teaching, research, and clinical service. He was promoted to full Professor in 1984 and Department Chair in 1993. In 2007, he was appointed as the first Vice Chancellor for Community Health, and was promoted to Distinguished Professor in 2011. Dr. Kaufman has a passion for creating innovative education and service models to better address community, indigent, rural, and population health needs. He helped initiate the Primary Care Curriculum in New Mexico which became an international model for change by innovative track in traditional medical schools. He began to integrate Public Health and Family Medicine as Director of the Rockefeller-funded Health of the Public Program in New Mexico. He is Director of New Mexico's WHO Collaborating Center for Innovative Health Workers Education Service

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and Research Models. In 1999 he was elected Secretary General for the Network: Towards Unity for Better Health—a WHO-affiliated, nongovernment organization (NGO) composed mostly of academic health centers in developing countries interested in improving their relevance in education and service in addressing health needs of their local populations. Dr. Kaufman has been the recipient of many awards during his career. He has received national teaching awards from the Association of American Medical Colleges (Primary Care Award) and from Society of Teachers of Family Medicine (Achievement Award). He received the "Humanism in Medicine Award" (AAMC) in 2001 and the "5 Star Doctor Award" from WONCA in 2008. He has more than 70 publications and has written 4 books. His publications concern health care for uninsured and marginalized populations and problem-based and community-oriented teaching innovations. He has received numerous federal and private foundation grants to support his work.

Laura Magaña Valladares, Ph.D., has a bachelor's degree in Education, a master's degree in Educational Technology, and a Ph.D. in Educational Administration from Gallaudet University in Washington, DC. She is a certified trainer in the cognitive programs of the Hadassah-Wizo-Canada Research Institute of Israel. Dr. Magaña Valladares has more than 30 years dedicated to higher education in public and private universities in Mexico; educational organizations in the United States; United Nations programs and NGOs in Central America and Europe. Among her multiple positions are the following: Advisers' Coordinator in the Special Education Department of Mexico State; Educational Consultant for UNICEF; Dean of the School of Education of the University of the Americas; Executive Director of the Mexican-American Institute of Cultural Affairs; Consultant for the International Educational Programs, Denmark government; General Academic Coordinator, Anahuac University; Educational Consultant, Easter Seals, Michigan, USA; Dean, School of Education and Human Development, La Salle University. She has also been a teacher, trainer, and lecturer in diverse forums in national and foreign universities. For the past 10 years she has been the Academic Dean of the National Institute of Public Health in Mexico leading the most important educational and technological innovation of the school in its 92 years of existence having a regional impact. Her research interest is in learning environments and the use of technology in education. She is member of the National System of Researchers of Mexico (SNI), and the State System of Researchers (SEI). Dr. Magaña's research works are captured in more than 35 publications, including books, book chapters, manuals, and articles of indexed national and international journals. Additionally, she is the author of three technological developments for public health teaching. Dr. Magaña is an active member in community

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educational organizations such as Mexican Association for the gifted and talented; The International Net for the Education of the deaf person; board member of the College of Arts and Sciences at Oakland University, EUA; executive board member of Troped; active member of the International Advisory Committee (IAC) of Public Health Global, and president of the Capacity Building Committee GEMNet, among others.

Mary E. (Beth) Mancini, R.N., Ph.D., N.E.-B.C., FAHA, ANEF, FAAN, is Professor, Associate Dean and Chair for Undergraduate Nursing Programs at the University of Texas at Arlington College of Nursing. She holds the Baylor Health Care System Professorship for Healthcare Research. Prior to moving to an academic role in 2004, Dr. Mancini held progressive management positions in the service sector including 18 years as Senior Vice President for Nursing Administration and Chief Nursing Officer. Dr. Mancini received a B.S.N. from Rhode Island College, a Master's in Nursing Administration from the University of Rhode Island, and a Ph.D. in Public and Urban Affairs from The University of Texas at Arlington. In 1994, Dr. Mancini was inducted as a Fellow in the American Academy of Nursing. In 2009, she was inducted as a Fellow of the American Heart Association. In 2011, she was inducted as a Fellow in the National League for Nursing's Academy of Nurse Educators. Dr. Mancini is active in the area of simulation in health care, including serving as President of the Society for the Society for Simulation in Healthcare; past member of the Royal College of Physicians and Surgeons of Canada's Simulation Task Force, Sigma Theta Tau International's Simulation and Emerging Technologies Content Advisory Group, the WHO's Initiative on Training and Simulation and Patient Safety; and Co-Chair of the Education Task Force for the International Liaison Committee for Resuscitation. Dr. Mancini has more than 90 publications to her credit and is a sought-after speaker at local, national, and international conferences on such topics as simulation in health care; health professions education, patient safety; teaching, retention, and outcomes related to basic and advanced life support education; emergency and critical care nursing; nursing research; and work redesign.

Christopher Olsen, D.V.M., Ph.D., is professor of public health in the Department of Pathobiological Sciences at the School of Veterinary Medicine and Associate Director for One Health of the Global Health Institute at the University of Wisconsin–Madison (UW–Madison) (Acting Director 2014–2015). He is also affiliated with the Master of Public Health degree program and a member of the MPH Advisory Committee; and, a member of the UW–Madison Morgridge Center for Public Service and Wisconsin Without Borders Advisory Committees, and the Division of International Studies Academic Planning Council. Dr. Olsen received his D.V.M. and

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Ph.D. degrees from Cornell University and completed a postdoctoral fellowship at the UW–Madison. From 2007 to 2012 he served as Associate Dean for Academic Affairs in the School of Veterinary Medicine, and from September 2012 through June 2014, he served as Interim Vice Provost for Teaching and Learning for the UW–Madison. In that senior university leadership position he co-chaired the University's Educational Innovation effort and the University of Wisconsin System learning analytics project, and was a member of the core team planning for the University's Higher Learning Commission reaccreditation, among other responsibilities. Dr. Olsen's research has focused on public health aspects of influenza in animals and the viral and host factors that control transmission of influenza viruses among people and animals. More generally, he has strong educational interests in zoonotic infectious diseases, in building bridges between the veterinary medical and human medical professions, and in promoting a cross-disciplinary One Health approach for global and public health. Dr. Olsen completed the Joseph F. Kauffman Administrative Development Program at the UW–Madison in 2009–2010, and was a Committee on Institutional Cooperation (CIC) Academic Leadership Program Fellow in 2010–2011. He has published more than 65 refereed research and educational journal articles, as well as numerous proceedings and book chapters. He is also the recipient of several faculty honors, including election to the UW–Madison Teaching Academy, and the School of Veterinary Medicine's Norden Distinguished Teacher Award and Walter F. Renk Distinguished Professor Award.

Andrew Pleasant, Ph.D., had an early interest in communication, literacy, and social change that started while working on his parents' small-town weekly newspapers. That early inspiration underpins his ongoing professional practice and research in health literacy, science, risk, and environmental communication, and social marketing. Dr. Pleasant joined CRI, a 501(c)(3) nonprofit public charity, in May 2009. Dr. Pleasant is responsible for advancing the role of health literacy across CRI activities, including in current partnerships and programs, as well as in planning future activities. He also leads all research and evaluation activities at CRI, and is the program manager for numerous CRI partnerships. Dr. Pleasant is also engaged in developing new programs and partnerships. Dr. Pleasant has published numerous peer-reviewed journal articles and technical reports, and is co-author of the book *Advancing Health Literacy: A Framework for Understanding and Action* (2006). He is also a member of the scientific committee of the Public Communication of Science and Technology Network, represents CRI on the National Academies of Sciences, Engineering, and Medicine's Roundtable on Health Literacy, and serves on the Food and Drug Administration's Risk Communication Advisory Committee. Dr. Pleasant earned a bachelor's degree in journalism from Arizona State University; a master's

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degree in environmental studies from Brown University; and a doctorate in communication from Cornell University.

Susan Scrimshaw, Ph.D., M.A., is currently the President of The Sage Colleges in Troy, New York. Prior to her appointment as President of The Sage Colleges, Dr. Scrimshaw was President of Simmons College in Boston, Massachusetts. She was dean of the School of Public Health, and professor of community health sciences and of anthropology at the University of Illinois at Chicago (UIC) from 1994 through June 2006. Prior to becoming dean at UIC in 1994, she was associate dean of public health and professor of public health and anthropology at UCLA. Dr. Scrimshaw is a graduate of Barnard College and obtained her M.A. and Ph.D. in anthropology from Columbia University. Her research includes community participatory research methods, addressing health disparities, improving pregnancy outcomes, violence prevention, health literacy, and culturally appropriate delivery of health care. She is a member of the National Academy of Medicine, where she has been elected a member of the governing council and serves on the Committee on Science, Engineering, and Public Policy (COSEPUP), a joint unit of the National Academies of Sciences, Engineering, and Medicine. She is also a fellow of the American Association for the Advancement of Science, the American Anthropological Association, and the Institute of Medicine of Chicago. While in Chicago, Dr. Scrimshaw was an appointed member of the Chicago Board of Health and Illinois State Board of Health. She chaired the Academies Committee on Communication for Behavior Change in the 21st Century: Improving the Health of Diverse Populations, and served as a member of the Academies Committee on Health Literacy. She is a past president of the board of directors of the U.S.-Mexico Foundation for Science, former chair of the Association of Schools of Public Health, and past president of the Society for Medical Anthropology. Her honors and awards include the Margaret Mead Award, a Hero of Public Health gold medal awarded by President Vicente Fox of Mexico, the UIC Mentor of the Year Award in 2002, and the Chicago Community Clinic Visionary Award in 2005.

Susan E. Skochelak, M.D., M.P.H., became the vice president for Medical Education at the American Medical Association (AMA) in May 2009. Dr. Skochelak previously served as senior associate dean for academic affairs at the University of Wisconsin (UW) School of Medicine and Public Health, where she was also a tenured professor of family medicine. In addition to providing leadership to the school's academic programs and affiliated statewide campuses, she was responsible for academic standards and budget oversight for programs offering degrees in medicine, clinical laboratory sciences, PT, PA, and public health. She received her medical degree from

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the University of Michigan and completed residencies in family practice and preventive medicine at the University of North Carolina at Chapel Hill (UNC). While in Chapel Hill, Dr. Skochelak completed a fellowship with the Robert Wood Johnson Clinical Scholars program and obtained a master's degree in public health in epidemiology from UNC. A nationally recognized authority in medical education, Dr. Skochelak pioneered new models for community-based and interdisciplinary medical education. While with the UW School of Medicine and Public Health, she developed more than 200 community practice teaching sites across the state for medical students, initiated new programs in rural, urban, and global health, and led the development of a new master's in public health degree at the university. Dr. Skochelak is actively involved in medical education research and has been the principal investigator for more than $18 million in grant awards from the NIH, the U.S. Department of Health and Human Services, and from private foundations. She has served as the director of Wisconsin Area Health Education Consortium (AHEC) System, the chairperson of the Consortium for Primary Care in Wisconsin and as a member of the governor's Rural Health Development Council. Her leadership and expertise have been recognized through numerous honors and awards, including the State Medical Society of Wisconsin Distinguished Service Award, the Distinguished Alumnae Award from Michigan Technological University, and the Chancellor's Award for Distinguished Teaching at UW–Madison.

Jeffrey M. Taekman, M.D., is professor of anesthesiology, the assistant dean for educational technology, faculty in the Center for Health Informatics, and the director of the Human Simulation and Patient Safety Center (HSPSC) at Duke University. He has more than 20 years of experience in learning technology, simulation, and informatics. In the HSPSC, he oversees an interdisciplinary team of physicians, nurses, educators, and engineers who focus on health care education, safety, and quality. The HSPSC model, with clinicians and educators working side by side with human factors engineers, has been cited as a 21st-century model for improving patient safety. He is a founder of, an inaugural elected officer for, and served on the Board of the Society for Simulation in Healthcare during its inception. He helped launch the Society's journal, *Simulation in Healthcare*, and sat on the inaugural Editorial Board. He founded the Society's Special Interest Group on Virtual Environments and Games Based Learning. He was honored with the 2013 Teaching Recognition Award for Innovation in Education by the International Anesthesia Research Society.

Elaine Tagliareni, Ed.D, R.N., CNE, FAAN, is currently a Chief Program Officer and Director of the National League for Nursing (NLN) Center for Excellence in Care of Vulnerable Populations at the NLN, Washington,

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DC. For more than 25 years, Dr. Tagliareni was a Professor of Nursing and the Independence Foundation Chair in Community Health Nursing Education at Community College of Philadelphia. Dr. Tagliareni also served as President of the NLN from 2007 to 2009; in that position Dr. Tagliareni worked to reframe the dialogue concerning entry into practice to focus on developing and supporting models that increase the academic progression of all nursing graduates, from licensed practical nurse to baccalaureate to master's and doctoral programs, to build a more diverse and educated workforce. In her role as Independence Foundation Chair, she has served as president of the National Nursing Centers Consortium (NNCC) to advance state and federal health policy to include nurse-managed health centers as essential safety net providers for vulnerable populations.

She has a long history of organizational leadership and grant-funded initiatives, funded through the W.K. Kellogg Foundation, the National Institute of General Medical Sciences, National Institutes of Health, the John A. Hartford Foundation, Independence Foundation, and the Independence Blue Cross Foundation. She has worked to advance nursing practice and education, increase diversity of the nursing workforce, and promote educational mobility for all nurses through the creation, implementation, and dissemination of new educational models. Currently, Dr. Tagliareni is the principal investigator on a Hearst Foundations–funded project to disseminate the NLN.

Richard (Rick) Talbott, Ph.D., FASAHP, FASHA, FAAA, is currently the Dean of the College of Allied Health Professions at the University of South Alabama and the President of the Association of Schools of Allied Health Professions (ASAHP). He also serves on the American Speech and Hearing Association (ASHA) Foundation Board, the ASHA Committee on Honors, and is a founding past board member of the American Academy of Audiology. He has previously served as President of the Council of Academic Programs in Communication Sciences and Disorders; President of the Speech and Hearing associations of Oklahoma and Georgia; Head of the Division for Exceptional Children at the University of Georgia; and Chair of the Communication Sciences and Disorders programs at the University of Virginia and Oklahoma Health Sciences Center. He has served in leadership roles on more than 60 professional boards and committees. Dr. Talbott received his doctoral degree in audiology with an emphasis in auditory neurophysiology from the University of Oklahoma Health Sciences Center in 1973. He has published and/or presented more than 100 scientific papers, including topics ranging from the role of the Rasmussen's bundle in audition, efficacy of otoacoustic emissions in newborn hearing screening, and controlling variables affecting hearing aid performance.

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Deborah E. Trautman, Ph.D., R.N., M.S.N., assumed the role of Chief Executive Officer of the American Association of Colleges of Nursing (AACN) on June 16, 2014. At AACN, she oversees all of the strategic initiatives, signature programming, and advocacy efforts led by the organization known as the national voice for baccalaureate and graduate nursing education. Formerly the Executive Director of the Center for Health Policy and Healthcare Transformation at Johns Hopkins Hospital, Dr. Trautman has held clinical and administrative leadership positions at the University of Pittsburgh Medical Center and the Johns Hopkins Medical Institutions. She also served as the Vice President of Patient Care Services for Howard County General Hospital, part of the Johns Hopkins Health System; and as Director of Nursing for Emergency Medicine at Johns Hopkins Hospital. She also held a joint appointment at the Johns Hopkins University School of Nursing.

Dr. Trautman received a B.S.N. from West Virginia Wesleyan College, an M.S.N. with emphasis on education and administration from the University of Pittsburgh, and a Ph.D. in health policy from the University of Maryland, Baltimore County. She has authored and co-authored publications on health policy, intimate partner violence, pain management, clinical competency, change management, cardiopulmonary bypass, the use of music in the emergency department, and consolidating emergency services. As a member of the senior leadership at Johns Hopkins Hospital, she represented the hospital on the Baltimore City Domestic Violence Fatality Review Team. Dr. Trautman serves as an advisory board member and chair for Academy Health's Interdisciplinary Research Interest Group on Nursing Issues. She has served as a Magnet Appraiser Fellow for the American Nurses Association Credentialing Center Commission on Accreditation and as an advisory committee member for the navigator and enrollment committee of the Maryland Health Insurance Exchange. Dr. Trautman is a 2007/2008 Robert Wood Johnson Health Policy Fellow who worked for the Honorable Nancy Pelosi, then Speaker of the House, U.S. House of Representatives.

Richard W. Valachovic, D.M.D., M.P.H., is the executive director of the American Dental Education Association (ADEA) and president of the ADEAGies Foundation. He joined ADEA in 1997 after more than 20 years in research, practice, and teaching of pediatric dentistry and oral medicine/radiology. He is a diplomate of the American Board of Oral and Maxillofacial Radiology and completed postdoctoral training in pediatric dentistry and dental public health. He previously served on the faculty and administration of the Harvard School of Dental Medicine and the University of Connecticut School of Dental Medicine. Dr. Valachovic has served as president of the Federation of Associations of Schools of the Health Profes-

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sions and as executive director of the International Federation of Dental Educators and Associations (IFDEA). He is a member of the Washington Higher Education Secretariat. Dr. Valachovic earned his B.S. degree in 1973 from St. Lawrence University; his D.M.D. in 1977 from the University of Connecticut School of Dental Medicine; and a Master in Public Health degree (1981) and a Master of Science degree in health policy and management (1982) from the Harvard School of Public Health. He completed a residency in pediatric dentistry at the Children's Hospital Medical Center in Boston in 1979.

Holly H. Wise, PT, Ph.D., is the representative for the American Council of Academic Physical Therapy (ACAPT), a component of the American Physical Therapy Association and is chair of the ACAPT IPE Task Force. She is an academic educator and physical therapist with a breadth of experience in IPE and collaborative practice and is currently a professor at the Medical University of South Carolina (MUSC), an academic health center with six colleges: dental medicine, graduate studies, health professions, medicine, nursing, and pharmacy. A graduate of Wake Forest University, Duke University, and the University of Miami, Dr. Wise has worked in settings ranging from acute care to rehabilitation centers, co-owned a private practice for 13 years, and co-founded two interprofessional post-polio evaluation clinics. Dr. Wise is a member of the MUSC incubator team with the National Center for Interprofessional Practice and Education (NEXUS), a member of the MUSC Strategic Plan Interprofessional/Interdisciplinary Operations Team, and is a faculty facilitator for the mandatory MUSC interprofessional course: *Transforming Health Care*. She has also served as a faculty facilitator since the inception of the MUSC campus-wide interprofessional day and mentored numerous extracurricular interprofessional activities including the MUSC Presidential Scholars Program and the yearly MUSC Clarion competition. Dr. Wise has several publications and presentations related to her experiences with IPE and collaborative practice and has been actively involved in interprofessional funded research teams.

Therese (Terry) M. Wolpaw, M.D., MHPE, is a Professor Medicine and the Vice Dean for Educational Affairs at the Pennsylvania State University College of Medicine and a faculty member in the Division of Rheumatology at the Milton S. Hershey Medical Center. Her office oversees and supports the continuum of educational programs spanning undergraduate medical education, graduate medical education, and continuing medical education, including (1) curriculum development and implementation, (2) curriculum evaluation and outcomes assessment, and (3) faculty development programs. With her broad education portfolio, she has the op-

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portunity to improve education from entry to medical school through ongoing professional development for the practicing physician. Dr. Wolpaw is a recognized national leader in medical education. She was the recipient of one of the first American College of Rheumatology Clinician Scholar Educator Awards, serves on the association's Education Committee, and chaired its Continuing Assessment, Review, and Evaluation committee. At Penn State, she and Dr. Robin Wittenstein serve as the co-PIs on a 5-year AMA grant to accelerate change in medical education. This grant is funding a new Health Systems Navigation curriculum for Penn State medical students. Students not only study the science of health systems but also serve as patient navigators so they see the way the system functions from the patient perspective. Dr. Wolpaw completed a master's degree in Health Professions Education at the University of Illinois at Chicago. Her research focused on the expression of clinical reasoning and uncertainties in case presentations. She has developed the SNAPPS technique (S: summarize the case, N: narrow the differential, A: analyze the differential, P: probe the preceptor, P: plan management, S: select an issue for self-directed learning) for case presentations to preceptors, based on experiential learning theory. Dr. Wolpaw brings her experience in curriculum change, a track record of scholarship, and commitment to collaboration to the Penn State Hershey students, faculty, and staff.

Xuejun Zeng, M.D., Ph.D., FACP, is a professor of medicine, chief of the Division of General Internal Medicine, and associate chair of the Department of Medicine at Peking Union Medical College Hospital (PUMCH). She received her Ph.D. from Peking Union Medical College (PUMC) and Chinese Academy of Medical Sciences in 1993, and her M.D. from Hunan Medical College in 1986. She was a research fellow within the division of viral pathogenesis at Beth Israel Deaconess Medical Center, Harvard Medical School, and was a visiting scholar within the Division of General Internal Medicine at UCSF. In 2012, she received the 1st prize for Higher Education Teaching Achievement, PUMC, and the 2nd prize for Higher Education Teaching Achievement, Beijing Municipal City. She is an Executive Council member for the Community Health Association of China and a Standing Committee Member for the Society of Internal Medicine, China Medical Association. Additionally, she is a Fellow at the ACP and a professor in the Department of Medicine at PUMC. Dr. Zeng was appointed the first dean of the new Department of Internal Medicine in PUMCH and in China. Now the department is becoming the medical education center for Internal Medicine (medical students and residents) and Family Medicine (residents and primary care physicians) and interdisciplinary consultation center for rare and complicated diseases. Dr. Zeng is actively involved in

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general internal medicine and medical education. Some of Dr. Zeng's ongoing programs include the Development of a Continuous Outpatient Teaching Platform for Medical Students in Sub-Internship at PUMC Hospital, a Training Program of Teaching Skills for Senior and Chief Residents, and Junior Faculty Development Programs for the Ministry of Health.

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