Improving Environments for Learning in the Health Professions

Proceedings of a conference chaired by
David M. Irby, PhD

April 2018 | Atlanta, Georgia

December 2018

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FOREWORD

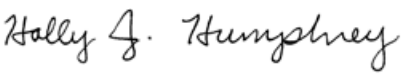
HOLLY J. HUMPHREY, MD, MACP

THE CLINICAL LEARNING ENVIRONMENT

As I pen this foreword to the Macy Foundation's spring 2018 conference focused on the clinical learning environment, I do so as the new President of the Josiah Macy Jr. Foundation. I also write this foreword having participated in this conference as an attendee. As George Thibault said, both at the conference and in the pages that follow, "this might be our most important conference of the decade." For me, this was the perfect conference theme on which to begin my work as the Macy Foundation's President.

The learning environment is created by the cultures of our health care delivery systems, our schools, and our virtual spaces. These cultures produce learning environments that are powerful and have an important impact on not only learning, but on patient care. In the pages that follow, you will find a high level, deeply informed introduction from the conference chair, David Irby, along with a scoping review and case studies. Taken together, these materials lay out not only a description of the current state of our learning environments, but present a framework for how we may address the myriad issues going forward.

I am personally energized by this topic because my own career, at multiple, specific moments, was both positively inspired and deeply impacted by the culture where I was learning and later leading. I saw and was inspired by many positive and heroic exemplars and was also disappointed by unprofessional interactions sometimes driven by misaligned incentives and lack of appropriate oversight. Our learning environments must inspire and uphold the highest standards of the profession so that together we can ensure optimal learning for our trainees and exemplary care for our patients. This is a profoundly important way for me to begin my service as the Macy Foundation's President and for all of us to work together to improve the health of the public.



Holly J. Humphrey, MD, MACP
President, Josiah Macy Jr. Foundation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PREFACE

GEORGE E. THIBAULT, MD

For our 2018 annual conference, the Macy Foundation decided to focus on *Improving Environments for Learning in the Health Professions* because it has been a central issue—perhaps **the** central issue—in our decade-long mission to better align health professions education with societal needs. Without improved environments for learning (and working), many of our prior recommendations from conferences over the last decade are likely to be difficult to implement or less effective even if they are implemented. We have come to see the learning environment as the great enabler that will either help us realize the full potential of all learners and workers or the great barrier that will thwart these efforts. This is why, when opening the meeting, I said that this may be our most important conference of the decade.

It is worth noting that some of the current interest in improving learning environments is related to the alarming increase in clinician burnout. Sub-optimal learning environments undoubtedly contribute to clinician burnout, but they are certainly not the only cause. One of the many benefits of optimizing learning environments, however, should be a reduction in clinician burnout. Other benefits should include greater efficiency of learning, improved professional identity formation, and better teamwork and communication. All learners—aside from their experiences with burnout—would benefit from the optimization of their learning environments. Thus, even though Macy did not choose to focus on learning environments solely as a potential solution to burnout, we do hope the recommendations will be helpful in addressing the issue.

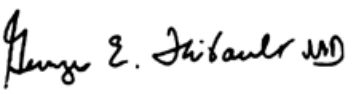
It also is important to note that, in choosing this topic, we meant to address **all** learning environments across the spectrum of health professions education—from classrooms to research laboratories, to simulation laboratories, to hospitals and clinics, to community settings where learning takes place, and to the rapidly increasing numbers of virtual learning opportunities. We believe all these components play important roles in the formation of health professionals along different career pathways and across the lifelong continuum of education. And we believe all of them can be improved.

Another overriding premise is that learning environments are not owned by any one profession and will not be optimized without a truly interprofessional approach. This premise greatly influenced the planning committee in selecting an interprofessional group of conferees and it was an important guide throughout the discussions and the writing of the recommendations.

Given the breadth and complexity of the topic, it was remarkable how quickly the conferees came together and how thoughtfully they engaged in honest and insightful discussions. Those conversations began when the conference did and they continued up to its last minute and subsequently via written exchanges. We benefitted from extraordinarily strong leadership from our planning committee, which also served as the implementation and writing committee. And we had an exemplary chair in David Irby, who provided the discipline and intellectual insight to keep the whole process moving in the most productive way.

No conference like this can ever be successful without exquisite planning and staff support. Yasmine Legendre skillfully led the year-long planning and implementation efforts and oversaw the publication of the prior Executive Summary and Recommendations and this monograph. Peter Goodwin provided superb financial and planning oversight. Ellen Witzkin provided her usual personal onsite support. Finally, our wonderful writer, Teri Larson, who has now worked with us on six Macy Conferences, wove her magic once again to help make our thoughts readable and our ideas clearer.

As I said in concluding the conference, "This was the perfect conference on which to end my tenure as President. The discussion was rich and engaging and the resulting recommendations are thoughtful and substantive. I am honored to have spent these past few days with you all, creating a product that we can be proud of and that I believe will help move the needle toward more optimal learning environments in the health professions."



George E. Thibault, MD
Former President, Josiah Macy Jr. Foundation


George
Thibault
David
Irby


Sarah
Joan


Bob
Berkowitz

INTRODUCTION

DAVID M. IRBY, PHD
CONFERENCE CHAIR

Health professions learners, practitioners, and patients all thrive in positive environments that support their growth, development, and well-being. Yet, in today's fast-paced health care settings, they often encounter less than optimal learning and caring environments. Health professionals often work in stressful settings with high productivity expectations and inadequate resources. Learners are not always welcomed into work settings, may receive inadequate guidance and support, and sometimes are excluded or harassed—leaving them feeling anxious, depressed, and alone. In such contexts, patients can feel unsupported and their care can be compromised. The outcomes of such negative environments are burnout, depression, turnover, and poor-quality care. There is an urgent need to turn these settings around. Thus, the purpose of the Macy conference on learning environments was to make specific policy recommendations to improve environments for learning in the health professions for all.

The word "environment" derives from a Middle French preposition meaning "that which surrounds."[1] It includes the psycho-social and physical worlds of a particular setting. So a learning environment is that which surrounds learning. One formal definition is "a set of features that gives each circumstance and institution a personality, a spirit, a culture and describes what it is like to be a learner within that organization."[2] The term is frequently used interchangeably with atmosphere, learning climate, organizational culture or milieu, and educational environment. It describes the routine ways in which people interact with each other and the tone of the social and cultural climate as well as the organizational structures and physical spaces that surround learning.[3] To increase precision in conference discussions, the conference adopted its own definition: "Learning environment refers to the social interactions, organizational culture and structures, and physical and virtual spaces that surround and shape the learners' experiences, perceptions, and learning."[4]

Learning to become and then work as a health professional is a long, arduous, and often stressful career-long journey. A learner's success—whether student, resident,

fellow, or even faculty member—is influenced by the many forces that surround the individual. A positive learning environment can empower and strengthen learning and caring—making it a challenging, supportive, and joyful experience. A chilly or hostile learning environment can thwart learning and lead to discouragement, self-doubt, and burnout. Health professions learners and workers want their learning and work to be purposeful and stimulating, collaborative and respectful, yet many experience the opposite. The learning environment has a powerful impact on their perceptions, experiences, and actions.

Health professions learning environments have become the focus of national attention, resulting in standards for accreditation at all levels. For example, the Accreditation Council for Graduate Medical Education has initiated its Clinical Learning Environment Review (CLER) site visit program. The assumption underlying the CLER program is that the educational program and patient care will be improved if constructive actions are taken regarding patient safety, health care quality, care transitions, supervision, fatigue management, and professionalism.[5,6] Another initiative is the National Collaborative for Improving the Clinical Learning Environment (NCICLE).[7] These are just two of many initiatives by national professional organizations and national accreditation organizations to improve learning environments for the health professions.

Many health professionals are working at the local level to transform the learning environments within their own organizations. These efforts have included interventions focused on curricular change, such as well-being and resilience educational programs, and the creation of longitudinal clinical experiences that build community. Faculty and staff development have been used to improve faculty members' abilities to create welcoming learning climates, respectful communication, and teamwork. Pass/fail grading systems have been implemented to reduce stress. Accreditation regulations that encourage a focus on well-being, and structure work hours and intensity, are also beneficial. Instructional practices that create a community of peers and peer-coaching programs have positive effects. Providing coaching and mentoring programs, online learning communities, and physical spaces for team-learning interactions all improve the broader learning environment.[8]

From the literature review produced for the conference, we learned that there are four domains or components of a comprehensive learning environment.[8] These domains are based on both theoretical and empirical research and include

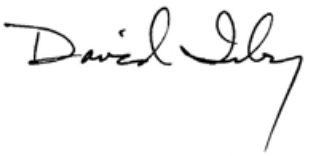
1) personal, 2) social, 3) organizational, and 4) physical/virtual spaces. Having a conceptual framework helps to identify not only which areas are being addressed but also which are not. This high-level conceptual work is helpful in thinking about interventions to improve learning environments. For example, which dimensions are targeted and which are ignored? It can also be instructive to understand the historical and theoretical derivation of the learning environment construct. Schonrock-Adema and colleagues provide an excellent description of the evolution of the concept and instruments to assess it.[9]

In addition to a conceptual framework and a working definition of learning environments, it is useful to have a vision of what is possible. Such a vision should be actionable and embrace the organizational complexity of health care and health professions education. Since health professionals work and learn in the most complex organizations ever invented, we face an interesting set of challenges. How do we do our work and improve it at the same time? And how do we create an environment within which everyone can thrive? Using concepts from complex adaptive systems, a conference author group crafted a powerful vision for innovation and change.[10] They describe how to bridge the organizational divide between education and patient care. Other case studies in this monograph, presented by one university and two health care organizations that have each worked on improving their learning environments, demonstrate how this alignment of education and patient care within organizational environments may yield remarkable insights into the complexities, challenges, and successes of these undertakings.[11–13]

The vision paper pointed out that everyone who participates in health professions education and health care environments shares the same goal of better health for all, and all participants in the learning environment can be both teachers and learners (faculty and other staff members, learners, and patients). In addition, exemplary learning environments support the well-being and inclusion of all participants. This means that organizations must be committed to diversity, equity, and inclusion.

To better improve learning environments there is an urgent need for more rigorous research and greater clarification of concepts and terms used to describe learning environments. Confusion still exists about what learning environments are as well as how to improve them.

The conference recommendations describe a comprehensive set of recommendations addressed to governance board members, executive leaders, faculty members, policymakers, accreditation organization leaders, and educational researchers. All are called to support and sustain exemplary learning environments. The health and well-being of all participants in health professions education and health care depends on the success of our individual and collective efforts to achieve this goal and to thereby improve the health of all.



David M. Irby, PhD
Conference Chair

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Wagner


Regina
Joanne
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Mary
Dolansky

CONFERENCE AGENDA

SUNDAY, APRIL 15, EVENING

3:00 – 6:00 pm	Registration
6:00 – 7:00 pm	Welcome Reception
7:00 – 9:30 pm	Dinner with Introduction of Conferees

MONDAY, APRIL 16, MORNING

7:00 – 8:00 am	Breakfast
8:00 – 12:00 pm	**Session 1**
8:00 – 8:25 am	Opening remarks George Thibault, David Irby
8:25 – 9:10 am	Discussion of themes from commissioned paper *Interventions Designed to Improve the Learning Environment in the Health Professions: A Scoping Review* Larry Gruppen, David Irby Moderator: Kevin Weiss
9:10 – 10:00 am	Discussion of themes from commissioned paper *Toward Exemplary Learning Environments for the Health Professions* Sandrijn van Schaik, Susan Reeves, Linda Headrick Moderator: Stephen Schoenbaum
10:00 – 10:20 am	Break
10:20 – 10:45 am	Discussion of themes from case study *Intentionally Designing Learning in the Clinical Workplace at Aurora Health Care* Deborah Simpson Moderator: Regina Cunningham

10:45 – 11:10 am Discussion of themes from case study
Our Lady of the Lake Regional Medical Center: Transforming a Large Tertiary Community Hospital into an Academic Medical Center
Laurinda Calongne
Moderator: Linda Headrick

11:10 – 11:35 am Discussion of themes from case study
The University of Rochester Medical Center Institute for Innovative Education: Reimagining the Architecture of Our Learning Environment
Sarah Peyre
Moderator: Joanne Disch

11:35 – 12:00 pm Charge to breakout groups

MONDAY, APRIL 16, AFTERNOON

12:00 – 1:00 pm Lunch

1:00 – 5:00 pm **Session 2**

1:00 – 3:00 pm Breakout Sessions

Breakout 1

Personal Component of the LE: *Focus on individual learners (everyone in the LE), their activities/engagement, their personal growth/goals, their well-being, and their progressively increasing levels of autonomy*
Moderator: Stephen Schoenbaum

Breakout 2

Social Component of the LE: *Focus on social, instructional, and work interactions in the LE, including navigating multiple personal and team relationships (peer-relationships, learner-faculty/staff relationships, team relationships, learner-patient relationships)*
Moderator: Linda Headrick

Breakout 3

Organizational Component of LE: Focus on organizational leadership and structures, infrastructure, supports, rules and culture (including curriculum structure, learner support services, placements, accreditation rules, clinical electronic health record [EHR], and organizational practices and culture)
Moderator: Regina Cunningham

Breakout 4

Physical Component of LE: Focus on adequate physical spaces where learning and practice takes place
Moderator: Kevin Weiss

Breakout 5

Virtual Component of LE: Focus on the virtual LE, which incorporates online learning spaces, EHRs in education, informatics and data analytics
Moderator: Joanne Disch

3:00 – 3:15 pm Break

3:15 – 5:00 pm Plenary Session
Report out from Breakout Groups and general discussion of themes of the day to set agenda for the following day
David Irby

5:00 pm Adjourn

MONDAY, APRIL 16, EVENING

6:30 – 9:00 pm Reception and Dinner at the Fernbank Museum

TUESDAY, APRIL 17, MORNING

7:00 – 8:00 am Breakfast

8:00 – 8:30 am Brief recap of Day 1 and Charge to Breakout Groups
David Irby

8:00 – 12:00 pm **Session 3**

8:30 – 11:30 am Five Breakout Groups

Breakout 1

Organizational supports for learning, well-being, and resilience: Responsive to personal, social, organizational components of LE

Moderator: Regina Cunningham

Breakout 2

Faculty/staff development to create an inclusive, welcoming, inquiring, and respectful learning environment: Responsive to the social component of LE

Moderator: Joanne Disch

Breakout 3

Curricula that address the LE through content, structure, instruction, and assessment: Responsive to organizational component of LE

Moderator: Linda Headrick

Breakout 4

Organizational policies and practices regarding clinical placements, workload and intensity, and meaningful learning/work: Responsive to the organizational component of LE

Moderator: Kevin Weiss

Breakout 5

Supervision and supporting emerging autonomy, especially in times of transition: Responsive to social component of LE

Moderator: Stephen Schoenbaum

11:30 – 12:00 pm Group Photo

TUESDAY, APRIL 17, AFTERNOON

12:00 – 1:00 pm Lunch

1:00 – 5:00 pm **Session 4**

1:00 – 3:00 pm Report out from Breakout Groups

Moderator: David Irby

3:00 – 3:15 pm Break

3:15 – 4:30 pm	Response to reports from Breakout Groups and identification of missing themes and recommendations Moderator: George Thibault
4:30 – 6:00 pm	Breakout Groups reconvene
6:00 pm	Adjourn

TUESDAY, APRIL 17, EVENING

6:30 – 9:30 pm	Reception and Dinner at Atlanta Grill

WEDNESDAY, APRIL 18, MORNING

7:00 – 8:00 am	Breakfast
8:00 – 11:45 am	**Session 5** Conference Conclusions and Recommendations George Thibault, David Irby
11:45 – 12:00 pm	Summary Remarks George Thibault
12:00 pm	Adjourn

HHS (CMS) should fund innovative
ways to support learning as part
of clinical care (CMMI)
Include pt/community voices on key committees
Build capacity
Remove state/fed scope of practice
restrictions that limit the ability

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George
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CONFERENCE CONCLUSIONS AND RECOMMENDATIONS

IMPROVING ENVIRONMENTS FOR LEARNING IN THE HEALTH PROFESSIONS

Over the past decade, significant strides have been made in the United States toward reforming and aligning health professions education and the health care delivery system with the ultimate goal of improving the health of the public. During the same period of time, however, the challenges facing those engaged in these enterprises have been largely overlooked. These challenges, among many others, include: revolutionary changes in the health care industry; increasing demands on practitioners to increase clinical productivity and improve patient safety and quality of care; structural systems of inequities and exclusion; and health disparities. Among health professions learners, educators, and practitioners, these trends are producing increasing rates of burnout, distress, and depression. Even those not experiencing these things will have their learning adversely affected by negative environmental factors. As a nation, we have reached a critical moment and are now faced with an urgent need to dramatically improve the environments in which current and future health professionals learn and work and we all receive care.

Learning environments (LEs) are created when people come together to share knowledge, skills, and information to improve the performance of all involved. These environments can be formal or informal and occur within a particular social, organizational, physical, and/or virtual setting. Learning environments comprise a wide array of structures and formats within organizations that vary by purpose, scope, size, location, availability of resources, leadership, and infrastructure.

Definition of "Learning Environment"

Learning environment refers to the social interactions, organizational cultures and structures, and physical and virtual spaces that surround and shape participants' experiences, perceptions, and learning.

Definition of "Learners"

In a continuously learning and improving health system, every participant is both a learner and a teacher. Participants include undergraduate and graduate health professions students, trainees, and researchers enrolled in formal educational programs as well as practitioners, educators, administrators, staff, patients, families, and community members.

Health professionals want their learning and work to be meaningful, stimulating, empowering, collaborative, and respectful. Yet too many experience the opposite: high levels of depression and burnout as well as distress and marginalization and/or exclusion. The national initiatives designed to create optimal learning and work environments for health professions learners, educators, and practitioners, and ultimately contribute to better outcomes for patients, have not yet achieved the necessary results. They require more meaningful attention, including identifying and broadly disseminating best practices.

This conviction motivated the Josiah Macy Jr. Foundation to host a conference on *Improving Environments for Learning in the Health Professions*. Held in Atlanta in April 2018, the two-and-a-half-day meeting brought together a group of 44 invited experts to identify the elements of optimal health professions LEs and recommend actions needed to better align them with patient needs and societal goals for better health.

"This is possibly the most important conference we've ever had," said George Thibault, MD, president of the Macy Foundation, during his opening remarks. "It certainly represents the culmination of our previous conferences. Actionable

recommendations to improve health professions learning environments will be the great enabler or facilitator of many of our previous sets of conference recommendations—all of which have been directed toward reforming, aligning, and integrating health professions education and clinical practice to improve the health of the public."

BACKGROUND

For the past decade, the Josiah Macy Jr. Foundation has sought to improve health by better aligning health professions education with societal needs through work focused in five priority areas: interprofessional education and teamwork, new curriculum content, new models for clinical education, education for the care of underserved populations, and career development of future leaders in health professions education. One of the many ways the Foundation has advanced these priorities over the last decade has been through annual, invitation-only conferences that bring together experts to develop recommendations designed to amplify best practices and exemplars.

Recommendations from these conferences have tended to focus on important elements controlled by health professions educators, including faculty and staff development, curricular content, measurement and assessment, and use of educational technologies. Upon review of this previous work, it became clear that one important element surrounds and connects all of it: the health professions learning environment. Further, it is increasingly clear that negative environments for learning can undermine other well-designed and well-intended efforts to improve education, research, and patient care.

The Macy Foundation's recognition of this reality was informed by important work on the clinical LE being done by the Accreditation Council for Graduate Medical Education (ACGME) and its Clinical Learning Environment Review (CLER) program; the National Collaborative for Improving the Clinical Learning Environment (NCICLE) and its work on the interprofessional clinical LE; and the National Center for Interprofessional Practice and Education (NCIPE) and its work at the nexus of collaborative practice and IPE. The decision to examine LEs was reinforced by the crisis levels of burnout being reported among clinicians and learners across the professions. The Foundation's interest lies in all learning environments that are

relevant to health care, whether in a physical or virtual classroom, a laboratory, a simulation center, a clinical setting, the community, or anywhere else.

For this conference on *Improving Environments for Learning in the Health Professions*, the Foundation assembled leaders in health professions education and health care delivery, as well as health professions learners, representatives of accrediting bodies, and patient advocates. Conferees discussed two papers commissioned to inform the proceedings. One reviewed the literature and identified interventions designed to improve health professions LEs; the other offered a vision for a high-functioning learning environment. They also discussed three case studies from institutions that have worked specifically to improve their health professions learning environments.

The first commissioned paper, *Interventions Designed to Improve the Learning Environment in the Health Professions: A Scoping Review*, was authored by Larry Gruppen, PhD, of the University of Michigan; David Irby, PhD, of the University of California, San Francisco; and Steven Durning, MD, PhD, and Lauren Maggio, MS(LIS), PhD, of the Uniformed Services University. The paper noted that "learning environment," as it has appeared in the health professions education literature, is a complex theoretical construct that has lacked a unified definition. The authors, therefore, proposed a conceptual framework for LEs comprised of four overlapping, interactive components:

1. *Personal Component.* The individual learner interacts with the LE through activity, develops perceptions of the LE, and engages in personal growth through clarity about goals, selection of relevant and meaningful learning; and in the process develops professional identity and increasing autonomy.

2. *Social Component.* Learners engage with others and navigate multiple relationships that shape their perceptions of and experiences with the LE. These relationships—peer-to-peer, learner-to-faculty/staff, and learner-to-patient—influence what and how students learn.

3. *Organizational Component.* Organizations provide structure, guidance, and support for learning, including curriculum resources, geographic placements, accreditation rules, as well as organizational culture, practices, and policies.

4. *Physical and Virtual Component.* Learning and practice take place within physical spaces of educational and practice settings. Similarly, informational infrastructures and resources (e.g., online resources, electronic health records, 3D/augmented reality) provide a virtual "space" in which learning is fostered.

The scoping review identified 68 studies of LEs that offered insights regarding the four components described above. In general, the authors found a lack of agreement on the following: how the studies defined LEs, what constituted a valid study design, and what were useful measures of LE performance. They also noted the major interventions to improve LEs evaluated by the studies including accreditation regulations, curricular interventions, faculty/staff development, grading practices, instructional interventions, placements, physical and virtual spaces, and support services. The results reflect the complexity of LEs, the need for conceptual clarity, and a paucity of rigorous research.

The second paper, *Toward Exemplary Learning Environments for the Health Professions*, described a vision for what may be possible. It was authored by Sandrijn van Schaik, MD, PhD, of the University of California, San Francisco; Susan Reeves, EdD, RN, of Dartmouth-Hitchcock Health; and Linda Headrick, MD, MS, FACP, of the University of Missouri-Columbia. According to the authors, such a vision needs to be actionable and embrace the organizational complexity of health care and health professions education. Using concepts from complex adaptive systems, the authors described a powerful vision for innovation and change built around four so-called "simple rules":

1. Health care and health professional education share the goal of improving health for individuals, populations, and communities;

2. In exemplary LEs, learning is work and work is learning;

3. Exemplary LEs recognize that collaboration with integration of diverse perspectives is essential for success; and

4. The organizations and agents in the LEs continuously improve and innovate by learning about themselves and the greater system in which they learn/work.

For each of these concepts, the authors described how the current state of health care and health professions education diverges from this vision for the future and provided ideas about how to reach the vision using specific examples from the literature.

In addition, case studies from health care and education organizations that have worked to improve their LEs serve as examples for those aspiring to create similar changes. Each of the three case studies developed for the conference focused on an institutional commitment to improve health professions learning environments. One described the efforts of Aurora Health Care, an integrated health care system in Milwaukee, Wisconsin, to design "vibrant clinical workplace learning environments to improve patient care, promote continuous learning, and support well-being." Another detailed a series of events that included Hurricane Katrina and the closure of a public health system in Baton Rouge, Louisiana, and that ultimately resulted in the transformation of a tertiary community hospital into an academic health center at Our Lady of the Lake Regional Medical Center. And the third featured the University of Rochester Medical Center's efforts—led by its Institute for Innovative Education—to reimagine the architecture of its LE.

CONFERENCE DISCUSSION

Several cross-cutting themes related to exemplary LEs ran through the conference discussion. These themes, described below, give added meaning and urgency to the recommendations set forth in this conference report.

- **Everyone who participates in health professions learning environments shares the same goal: better health for all.** This shared goal—and social contract—is the purpose of the entire health professions education/health care delivery system enterprise. Movement toward this goal can help bring together the different perspectives that exist within these complex organizations. In the process of creating an exemplary LE, recommitting to this shared goal can help diffuse stalemates and reinforce the compromises necessary to achieve change in structures and culture.

- **Rigorous research and expanded scholarship focused on evaluating and continuously improving health professions learning environments are needed immediately.** This is exemplified by the fact that there is no single

agreed upon/commonly used definition of "learning environment" and "learners" within and across the health professions. In fact, the conferees found that the lack of a common lexicon initially inhibited their discussions and they, thus, came together around the definitions contained in this report.

- **Exemplary learning environments—and the organizations of which they are part—are fully committed to diversity, equity and inclusivity.** This means that the executives who lead organizations that include health professions LEs should be held accountable by their governing bodies for ensuring the quality and integrity of their LEs. The full range of human diversity—including race, ethnicity, gender, age, sexual orientation, physical ability, and socioeconomic background—must be reflected in the organization's LEs and fully integrated into its mission, culture, policies, and procedures at the macro, meso, and micro levels. A commitment to diversity, equity, and inclusion in LEs ensures excellence and is essential to developing a health professions workforce that adequately reflects and serves society at large.

- **In exemplary learning environments, all participants—including board members, executives, administrators, practitioners, educators, staff, and students as well as patients, families, and community members—are teachers *and* learners.** They share a dedication to lifelong learning as well as responsibility for the creation and maintenance of an exemplary LE. In particular, patients, families, and community members—when viewed as participants in health professions learning environments—can become more activated, knowledgeable, and empowered to share their expertise. These perspectives are critical to successfully improving systems of care as well as to achieving excellence in the care of individuals.

- **Exemplary learning environments support the well-being of all participants.** In addition to improved health for individuals, families, and communities, the well-being of learners, teachers, and practitioners is one of the outcomes of an optimal learning environment. Individual well-being is powerfully shaped by the LE.

Conference participants reached consensus around the following vision for exemplary LEs, originally put forth by van Schaik, Reeves, and Headrick in their

commissioned paper, *Toward Exemplary Learning Environments for the Health Professions*.

The authors of the vision statement below also provided this context: exemplary LEs include "health professions students, health care professionals, non-clinical faculty, staff, and patients and families. Collectively, they and the organizations within which they learn, work, and seek care collaborate to advance their capabilities and create an inviting learning environment that fosters well-being and health for all."

VISION

Exemplary learning environments prepare, support, and inspire all involved in health professions education and health care to work toward optimal health of individuals, populations, and communities.

Throughout the conference, the dialogue illuminated many of the essential characteristics of optimal LEs, which are:

1. Values-driven, with frequent discussion and reinforcement of values
2. Inclusive, encouraging a broad diversity of voices and valuing all who participate
3. Relationship-oriented, including nurturing learners' relationships with health professions team members as well as patients, families, and community members
4. Committed to the health and well-being of all participants
5. Connected with organizational leadership to align mission, values, and resources
6. Committed to continuous improvement

7. Broadly defined to include the physical and virtual spaces and organizational infrastructure

8. Transparent, with all relevant stakeholders represented at the table, contributing to decisions and helping to resolve conflicts

9. Igniters of passion and purpose in learning

By discussing, describing, debating, and defining exemplary LEs and exploring their potential for improving the health of the public, the conferees reached consensus around the following recommendations. They are generally organized around the four components of LEs: personal, social, organizational, and physical/virtual spaces, with the organizational and physical/virtual components supporting the social and personal components.

RECOMMENDATIONS

I. Engaging Academic and Health Care Organization Governance

Governance bodies and executive leadership of organizations responsible for health professions education and health care delivery should ensure positive learning and work environments and be held accountable for allocating the resources necessary to achieve this.

Governance refers to the policy-setting and oversight body to which management is accountable. While the form of governance can vary greatly across diverse academic and clinical organizational structures, its leadership remains ultimately responsible for LEs.

Actionable Recommendations

1. *Leaders in governance and management should develop and maintain the knowledge and skills needed to ensure high-performing learning environments.* This requires thoughtful assessment of board members' competencies for oversight of learners' needs and experiences in the organization. Where multiple entities (e.g., health professions education programs and health care organizations) share oversight of the same LE,

executive management should work toward optimal alignment of equitable policies that affect the LE.

2. *Governing boards should assess the quality of learning environments annually, set expectations for management for the coming year, and recommend actions designed to improve them.* Sustaining vibrant LEs calls for an annual review of each LE, which includes understanding the LE culture; educational programming to support the LE; and educational outcomes, including the well-being of learners, faculty/mentors, and workers. LEs are complex and therefore require a measurement framework that is multi-dimensional. Examples of performance areas that governance might consider in a measurement framework include the following:

    a. Quality of the learning culture
    b. Learning outcomes and competencies across different members of the work group
    c. Engagement of patients, educators, and practitioners in safety and quality improvement
    d. Interprofessional collaboration
    e. Well-being
    f. Professionalism

II. Engaging Executive Leadership to Provide Organizational Support

Executive leaders of health professions education and health care organizations should create cultures in which resources, policies, and processes support optimal learning environments across the continuum of health professions education.

Health professions learners, educators, and practitioners work and learn in a variety of locations and organizations. These organizations are responsible for creating LEs that facilitate learning at all levels from pre-licensure to graduate and continuing professional education. The following recommendations intentionally sharpen an organization's mission to improve the health of individuals, populations, and the communities it serves through optimization of its LEs.

Actionable Recommendations

1. *Executive leaders of health professions education and health care organizations should create and sustain a just, inclusive, and civil culture that fosters respectful relationships in learning environments.* Such a culture ensures equitable treatment of all, successful integration of diverse people and perspectives, and respectful interactions that support learning and work. In this culture, faculty members and supervisors use role modeling and mentoring to foster opportunities for all LE participants to build welcoming and inclusive relationships. Further, executive leaders should pay attention to the well-being and resilience of learners, educators, and practitioners. To these ends, executive leaders can do the following:

    a. Support attendance at team-training programs that develop trust, knowledge, and skill in recognizing, responding to, and mitigating implicit and explicit bias for all LE participants.

    b. Implement evidence-based strategies that have effectively promoted workplace civility and psychological safety, such as the U.S. Department of Veteran Affairs' Civility, Respect, and Engagement at the Workplace (CREW) program.

    c. Administer policies and procedures that explicate expectations about behaviors reflective of a just, inclusive, and civil culture, as well as interventions with individuals manifesting behaviors that are inconsistent with this culture.

    d. Administer policies and procedures for the recruitment of individuals who reflect the population being served and the cultivation of an empowering environment that supports success.

    e. Implement specific plans for leadership development, particularly among under-represented groups.

    f. Establish human resource policies that support hiring talented people who manifest attitudes and behaviors associated with a just, inclusive, and civil culture.

2. *Executive leaders of health professions education and health care organizations should adopt and sustain a culture that promotes inquiry, equity, quality, and safety in clinical learning environments.* Promoting inquiry, quality, and safety within health care is essential to fostering habits of improvement, preventing errors, and advancing the overall quality of health care. Organizations should develop structured and disciplined cultures of inquiry and equity that foster improvement at the individual, team, and enterprise levels. To these ends, organizations can:

    a. Collect performance data on individuals and teams, on LEs, and on institutional outcomes to drive continuous improvement.

    b. Enhance and value all learners' active participation in health care quality and improvement activities.

    c. Identify or develop tools and resources to improve communication within, among, and between clinical teams and patients about various aspects of care.

    d. Identify or develop and sustain specific approaches to reducing workforce burnout. To achieve this, more research is required to understand the multidimensional causation of burnout within LEs.

    e. Integrate and support interprofessional education and competency development within the organization.

3. *Executive leaders of health professions education and health care organizations should support the training and development of health professions learners across all levels and disciplines as a means of enhancing learning environments.* Mastery of competence requires the investment of time and effort from teachers, mentors, preceptors, and supervisors.

4. *Executive leaders of health professions education and health care organizations should coordinate resources and create balance between service and academic responsibilities for faculty and learners.* Adequate time, space, and resources are needed for high-quality teaching and supervision of health professions learners. There must be an appropriate balance between service obligations and educational opportunities through the management of clinical productivity. Resources should be allocated as needed to assure the well-being of all participants.

III. Creating Physical and Virtual Spaces for Learning

Those in positions of responsibility for learning environments in health professions education and health care organizations should ensure appropriate, flexible, and safe spaces (physical and virtual) for learning.

Learning environments in health professions education and practice may include classrooms, laboratories, simulation centers, clinical facilities, community organizations, and virtual learning platforms. They exist in physical structures that range from mobile health vans and homeless shelters to large and complex health care facilities. Virtual formats include online learning systems, teleconference facilities, virtual reality platforms, and electronic health record systems. Active learning occurs formally and informally on multiple levels that span rural, urban, and suburban areas locally, nationally, and internationally. These learning spaces should ignite passion and drive to optimize learning. Flexibility in the design of these various spaces allows for broader utilization of diverse learning and instructional needs as they change over time.

Actionable Recommendations

1. *Organizations should ensure that learning environment spaces (physical and virtual) purposefully address the key elements of safety, engagement, connectedness, support (infrastructure), access, and climate.* See Table 1 on the following page for more on these core elements.

2. *Organizations should structure learning environment spaces to optimize (a) the co-construction of learning among all learning environment participants and (b) a just, inclusive, and civil culture that fosters mutual respect and inclusion.* Co-construction of learning should include educators, practitioners, learners, patients, families, and community members—with assurances that all roles and voices are visible and heard.

3. Organizations should design learning environment spaces in flexible and adaptable configurations to continuously improve the health and well-being of all participants.

4. Organizations should include all relevant stakeholders in design, implementation, and evaluation of learning environment spaces.

Table 1: Core Elements of Learning Environments with Illustrative Examples of Sites Where Learning Occurs

		Core Elements of Learning Spaces		
		SAFETY	**ENGAGEMENT**	**CONNECTEDNESS**
	DESCRIPTION	Learners must feel welcomed, respected, and assured of safeguards to protect their physical and psychological safety.	Learning environments (LEs) should facilitate learner engagement and promote collaborative learning.	LEs must facilitate a sense of belonging within the learning community and promote the social construction of learning that happens when learners and educators feel connected.
Illustrative Examples of Learning Environment Sites	**CLASSROOMS**	Maintain up-to-date physical plant; ensure lighting in and around buildings; provide escort services after hours; ensure evacuation procedures and alarm systems	Encourage team-based learning, flipped classrooms; case-based learning; learner-generated assignments	Personalize learning materials; co-create learning experiences
	LABORATORIES	Need personal safety protection equipment; ensure safety protocols and resources; provide escort services after hours	Engage learners in each stage of research process	Offer regular lab meetings with whole team; provide guided mentorship by post-doc/senior learners
	SIMULATION CENTERS	Provide up-to-date equipment; ensure first aid supplies available and evacuation protocols are known	Offer experiential learning that includes repeated practice, direct observation, and feedback	Use first names; offer team training, where appropriate
	VIRTUAL RESOURCES (online learning, EHR, social media)	Provide secure log-in protocols and secure transmission of educational and patient information; provide guidelines for respectful discourse	Provide electronic learning platforms that include discussion boards, peer learning groups, blogs, social media	Create discussion boards and other means of communication to connect the learning community; provide introductions in video conferences; create work teams that share common goals
	CLINICAL SITES (formal and informal)	Provide lockers, personal space, badges, access measures; ensure policies to protect learners from abusive behaviors; offer escort services after hours	Include learners in all stages of care and engage them in bedside teaching, procedural training, point of contact teaching, conferences, and huddles; seek input from learners at all stages	Introduce each member of the team; clarify tasks and communication protocols for sharing information with team members; identify tech resource supports
	COMMUNITY SITES (local, regional, national, global)	Ensure community partners have established safety protocols; certify safe housing, meals, and service opportunities; follow international travel warnings	Offer service learning opportunities (as opposed to pure observation); ensure understanding of social determinants of health and cultural sensitivity	Create dedicated time to learn local culture and create opportunities to share own experience/ perspective; ensure appropriate language skills for communication

The following table provides descriptions and illustrative examples of how the six core elements can be implemented.

Core Elements of Learning Spaces		
INFRASTRUCTURE	**ACCESS**	**CLIMATE**
Spaces require infrastructure support to optimize resources, including support staff, hardware and software, facilities improvement and maintenance, leadership, financial support, and accountability structures.	Learners and educators need access to a variety of spaces, technology, and resources to support learning. Consider ADA compliance and health equity issues.	In the design of facilities and virtual spaces, consider sensory cues of art, music, institutional symbols, history, and collaboration—all of which create a tone. These should represent diverse perspectives that promote a feeling of inclusion.
Provide media and technology support (e.g., media presentations, video conferencing)	Offer room scheduling technology; ensure technology-rich environments when needed (e.g., easy video conferencing); ensure ADA accommodations	Provide inclusive art on the walls; imagery used in slides; visual representation of teams—all of which depict and affirm diversity
Ensure appropriate lab equipment, storage and bench space that matches research requirements	Ensure proximity to collaborating labs, eating and social areas, and core research resources shared among the research community; ensure ADA accommodations	Create dedicated group work spaces between labs to facilitate networking and sharing of ideas
Provide simulation specialists, simulation and gaming technology	Provide simulation technology that matches learning needs; ensure ADA accommodations	Ensure that mannequins and equipment reflect diversity
Support learning management systems and support staff; create a learning space within the electronic health record (EHR)	Provide visual, auditory, and physical accommodations (e.g., offer closed caption on videos and multimedia materials)	Utilize websites that are diverse in perspective, sources, and content
Provide dedicated learning spaces proximal to bedside; ensure IPE spaces for team huddles and rounds	Offer electronic resources and learning portals to augment clinical instruction and patient education	Offer pictures on walls that show diversity; provide auditory cues where appropriate
Ensure local support staff and resources to facilitate experiential learning; provide transportation, food, and lodging, as needed	Create memoranda of understanding between programs and partners that outline issues of access and support, as well as finances to support expenses (e.g., travel, housing) where appropriate	Integrate objectives focused on local culture into curriculum; ensure faculty discuss climate issues with learners

IV. Providing Faculty and Staff Development

Leaders of health professions education and health care organizations should ensure continuous learning and development opportunities for their faculty and staff to improve learning environments.

Organizational leaders should promote environments that value learning and are just, inclusive, and civil for all who learn and work in health care, including patients, families, and community members. Learning can bring joy, stimulate vitality, and build resilience, and all participants should be simultaneously considered teachers and learners. High-performing learning environments contribute to the pursuit of the quadruple aim, the conceptual framework that encourages not only efforts to promote population health, improve the patient experience, and deliver value, but also the need to create joy in work for health care providers. Faculty and staff development is a powerful tool for improving learning environments and should be employed to create a culture of inclusion and joy.

Actionable Recommendations

1. *Organizational leaders should ensure that structures and processes exist to provide faculty and staff development to improve learning environments and create a culture that is just, inclusive, and civil.* This should include, at a minimum, development of skills that enable faculty to do the following:

    a. Set clear expectations and incorporate learners' goals and objectives

    b. Appreciate and ensure diversity, equity, civility, and inclusion within the LE, including the development of skills around engaging historically marginalized groups

    c. Understand health disparities and social determinants of health

    d. Teach and model respectful communication skills

    e. Demonstrate interprofessional competencies

    f. Demonstrate professionalism

    g. Encourage self-awareness and reflective practice

2. *Organizational leaders should provide resources for the professional development of those with formal teaching roles and responsibility for educational design and assessment of learning outcomes.* This includes consultation from expert educators as well as adequate time, appropriate recognition, and rewards for attention to learning and well-being.

3. *Organizational leaders should monitor key aspects of learning environments (e.g., evidence of respect/non-discrimination, collaboration, safety, and improvement culture) and provide feedback to faculty and staff in order to drive improvement as well as future faculty development offerings.* Organizational leaders set the context for everyone's learning when they use data about LEs to continuously improve.

V. Promoting Research and Scholarship

Those in positions of responsibility for learning environments should be committed to continuously evaluating, improving, and conducting research on those learning environments.

A solid evidence base of research on LEs is needed in order to guide interventions intended to improve them. Thus, LEs should be the focus of sustained and well-funded evaluation and research. Studies of LEs should use rigorous research methods that are well designed, executed, and disseminated.

Actionable Recommendations

1. *Investigators should focus research and scholarship on ways of understanding and improving learning environments.* Studies of LEs should be guided by the framework described in the commissioned review paper by Gruppen et al. previously summarized in the "Background" section of this report. Recognizing the complexity of LEs, the elements in Table 2 (see following page) should be considered when designing evaluation, research, and scholarship.

2. *Investigators should use rigorous methodologies consistent with research questions and outcomes to be evaluated.* A broad range of methodologies should be considered when investigating and improving LEs (qualitative, quantitative, and mixed methods). Prior studies have largely focused on learner perceptions of LEs. Future studies should elucidate the contributing

Table 2: Elements to Consider in Designing Studies of LEs and Interpreting and Reporting Results

Components of Learning Environments	Elements to be considered
Personal	• Who are the individuals ("learners," e.g., trainees, teachers, supervisors, staff, patients, etc.) in the LE being studied? • How are LEs described, taking into consideration elements of diversity and equity (e.g., personal histories, race/ethnicity, disability, gender identity, academic and/or work backgrounds)? • How would the individuals describe themselves? • How will individual learning, or performance, be assessed? • What are learners' perceptions of the LE?
Social	• What types of interpersonal interactions, including collaborations and conflicts, occur in the LE (consider patients, as well as intraprofessional, interprofessional, and staff members in the LE)? • What are the instructional strategies and pedagogical approaches used in the LE (consider formal, informal, and hidden elements)?
Organizational	• What organizational structures, practices, language, rituals, policies, norms, and routines are being investigated? • How aligned are the educational and clinical missions and practices? • What are the organizational resources, structures, and leadership? • What populations are served (patients, learners)?
Physical and Virtual Spaces	• What are the locations and qualities of the LE being studied (classroom, virtual, simulation, clinical workplace)? • What characteristics of the physical/virtual space influence learning? • What is the role of technology in the LE?

elements to positive and negative LEs, and where possible, incorporate the voices of participants in LEs. Investigators should clearly describe the interventions studied and select research methods that are rigorous and relevant to the question. Journal editors are encouraged to require authors to define what they mean by "learning environment," and describe their specific LE(s).

3. *Organizations that collect information on learning environments should, where possible, make disaggregated data accessible to evaluators and researchers for subgroup analyses.* To address diversity, equity and inclusion goals, investigators should collect data to examine the potential differential impact on subgroups. Thus, organizational data collected on LEs should be disaggregated, where feasible, to enable subgroup data analyses.

4. *Academic and health care organizations, professional and accreditation organizations should advocate for government and foundations to increase their funding for learning environment studies.* There is very limited funding available from federal and state governments or from philanthropic foundations to study LEs. Advocacy is needed to improve funding for this important area of scholarship.

VI. Setting Policy

Health professions education and health care organization leaders and accreditors should engage in policy advocacy for improvements in health professions learning environments.

Enhancing the quality and performance of health professions LEs will require efforts beyond individual organizations. There must be advocacy for new policies aimed at funding, supporting, measuring, and improving LEs for health professionals to help them achieve their full professional potential. Health professions membership organizations and accrediting organizations (for professional learning and health care organizations) must form coalitions and partnerships to address state and federal governments' funding issues and other policy restrictions to creating optimal LEs.

Actionable Recommendations

1. *Health professions education and health care organizations, the federal government, and foundations should work together to establish a sustainable collaborative to advance the nation's learning environments.* With nearly all LEs serving as shared—and sometimes contested—spaces, it is essential to find mechanisms for collaboration on improving LEs. The National Collaborative for Improving the Clinical Learning Environment (NCICLE) is an example of a recently organized collaborative. Such a collaborative could explore how to create optimal LEs and advocate for expanded federal government support of health professions education.

2. *Health professions education and health care organizations should collaborate around a shared purpose—improved health outcomes—and align educational actions and resources.* They also should reach out to all other organizations that have a stake in the success of health professions education. Patients, families, and community members should be involved in shaping LEs to reflect the communities being served.

3. *Health care accreditors (both for professions and health care organizations) should establish ongoing collaborative efforts to minimize conflict and maximize alignment of learning environment standards.* Historically, each of the health professions has established standards for the LEs in which its learners participated. Across health professions, these standards have sometimes worked in harmony and sometimes in conflict. Relevant accrediting bodies should develop an ongoing collaborative effort to streamline and harmonize accreditation standards for their respective and often overlapping LEs.

4. *Federal agencies concerned with health should create and fund programs to accelerate excellence in our nation's learning environments.* While LEs powerfully shape the professional development of health professionals, there is a paucity of well-designed research that guides either best practices or innovation due to lack of funding. Studies of LEs to date have primarily relied on local funding and led to single program and single learning environment studies. Larger studies are needed to examine and compare multiple LEs and interventions designed to improve them. Such studies will only occur with large-scale funding from federal entities (such as the Centers for Medicare and Medicaid Services, Health Resources

and Services Administration, Veterans Affairs Administration, and the Department of Defense) and/or foundation support.

Conclusion

This is a critical moment in health professions education reform. To achieve the goal of aligning education and health care delivery to improve the health of the public, we must focus more attention on the environments in which both learning and work occur. Patients, learners, educators, and practitioners will all be the beneficiaries of this endeavor. The recommendations from this conference serve as an urgent call-to-action for health professions education and health care organizations to transform the environments in which current and future generations of practitioners, educators, and learners work and learn—with the ultimate goal of better health for all.


David

INTERVENTIONS DESIGNED TO IMPROVE THE LEARNING ENVIRONMENT IN THE HEALTH PROFESSIONS

A SCOPING REVIEW

Commissioned Paper

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ABSTRACT

Purpose. To identify and describe interventions designed to affect the learning environment (LE) in health professions education, summarize factors that influence the LE, and determine gaps that require additional research. The LE can be thought

of as a dynamic and complex construct co-created by people in a particular setting. A positive LE represents a welcoming climate for learning, which enhances satisfaction, well-being, academic performance, and collaboration, while a negative LE restricts participation and learning, leading to emotional exhaustion, depersonalization, and burnout.

Method. A six-step scoping review methodology was followed to identify and report on literature that describes interventions affecting the LE in health professions education: 1) Identify the research question; 2) Identify relevant studies; 3) Select studies to be included; 4) Chart the data; 5) Collate, summarize, and report results; and 6) Consult with stakeholders.

Results. 2,201 unique citations were identified and reviewed using titles and abstracts. 240 full-text articles were retained for detailed review, resulting in the inclusion of 68 articles. Study results are reported in relation to essential components of the LE: personal, social, organizational, and physical and virtual spaces. Results of four different types of studies of the LE are described: specific *interventions* impacting the LE; *comparisons* of perceptions of the LE by two or more different groups; *associations with other variables,* such as well-being, with the LE; and *descriptive* studies of the LE. Major influences included accreditation regulations, curricular interventions, faculty/staff development, grading practices, instructional interventions, placements, physical and virtual spaces, and support services; and are reported along with specific interventions.

Conclusion. These results reflect the complexity of the LE and the need for conceptual clarity. Since the quality of the evidence was not evaluated, the identified influences should be viewed as potential opportunities to improve the LE.

INTRODUCTION AND PURPOSE

Educational learning environments (LE) dramatically affect the way participants think and feel, engage and work. Positive LEs support learning and are welcoming, collaborative,[1–3] and respectful, while negative or "chilly" LEs[4] are destructive and restrict participation and learning. LEs describe the dynamic, co-constructed perceptions, experiences, and behaviors of participants in the physical and virtual spaces within which learning occurs. But more importantly, LE also refers to the tone of the educational climate or culture and the routine way people interact. LEs

affect a wide variety of factors important to learners and providers alike: burnout, depersonalization, and emotional exhaustion; satisfaction and well-being; identity formation; performance; and collaboration.[1,2,5,6] While interventions designed to improve LEs for health professionals have targeted many of these factors, which interventions have been studied? Given the diversity of ways LEs have been defined, how can these interventions be identified and categorized? If we could find such interventions, we could better target efforts to improve the learning environment for all. The purpose of this scoping review is to identify and classify interventions designed to improve the environment for learning in the health professions.

By interventions, we mean the introduction of a planned new activity (e.g., near-peer coaches) or organizational change (e.g., curriculum, training site, duty hours) that is anticipated to have an impact on the learning environment. Our primary purpose in this review is to identify interventions that could improve the LE, but we also recognize that it is important to understand the factors that influence the LE, whether included in formal interventions or not. Thus, we cast our net more broadly than just a focus on interventions per se.

The learning environment, which appears frequently in the health professions education literature, is a complex theoretical construct that lacks a unified definition.[7–9] The conceptual ambiguity surrounding this term has arisen, in part, from the varying disciplines and associated theoretical lenses used to investigate this phenomenon (i.e., anthropology, education, psychology, and sociology). The LE can describe personal experiences and perceptions (psychology and education), social interactions (sociology and education), organizational culture and practice (anthropology and sociology), and physical facilities and online spaces (sociology and education) within which learning occurs. It can be associated with formal and informal learning experiences that occur in classroom, online, simulation, and clinical settings.

The LE is often used interchangeably with such terms as *atmosphere*, *educational environment*, *learning climate,* and *organizational culture*. The LE has been defined as "a set of features that gives each circumstance and institution a personality, a spirit, a culture, and describes what it is like to be a learner within that organization."[10] However, just what these features are is inconsistent from one situation to another and from one study to another. The LE can be thought of as a

complex psycho-social-physical construct co-created by individuals, groups, and organizations in a particular setting, and shaped by contextual climate and culture.[11]

There is little disagreement that the LE is important, linked to various educational outcomes,[8,9] and the focus of a number of accreditation regulations (e.g., LCME, ACGME, GMC). While the perceived importance of the LE has led to numerous efforts to measure it,[12] there is still a lack of clearly identified, evidence-based interventions or conditions that positively impact the environment for learning in the health professions.

CONCEPTUAL FRAMEWORK FOR THE LEARNING ENVIRONMENT

Although many authors do not provide an explicit theoretical perspective on the LE in their studies, we believe that the LE can be best understood and studied through the lens of sociocultural learning theories that include situated cognition, situated learning, ecological psychology, and workplace learning. The LE is conceived by different people in different ways, is dynamic and emergent, and is co-constructed through interactions and activity. Within the situated learning framework, learning involves acculturation into a new knowledge community or community of practice through active participation—initially as a legitimate peripheral participant and emerging into a full participant.[13] Ecological psychology and workplace learning emphasize that social interaction is facilitated through affordances in the learning/working environment (tools, scaffolded relationships, tasks, language, concepts) and the active engagement of learners (through their agency, engagement, and emerging autonomy).[14] Situated cognition theorizes that learning is social and involves an interaction between persons and environment—thus linking learning, situations, and culture. Specifically, knowledge is embedded in the activity, context, and culture in which it is learned.[15]

Each of these theories emphasizes the importance of interactions and collaborations with others "as the means for students' learning/participation, both through learning knowledge and skills from others, and through becoming familiar with the norms, cultural beliefs, and attitudes existing in the communities to which they (the learners) are being introduced."[16] However, the LE construct extends beyond typical sociocultural frameworks to include intra-individual psychological characteristics (learning preferences and history) as well as institutional culture,

organizational structures, and physical and virtual spaces in which students learn. It should be emphasized that the LE is not "owned" by any particular theoretical perspective. Neither is the LE often a central concern, which leaves the construct in something of a theoretical limbo.

Components of the Learning Environment

Lacking a canonical theory of the LE from the health professions education literature, we synthesized multiple conceptual frameworks[8,16–21] and identified four overlapping and interactive core components (Figure 1).

1. *Personal Component.* The individual learner interacts with the LE through activity, develops perceptions of the LE, and engages in personal growth through clarity about goals and selection of relevant and meaningful learning; and, in the process, develops professional identity and increasing autonomy.

2. *Social Component.* Learners engage with others and navigate multiple relationships, shaping their perceptions of and experiences with the LE. These relationships include peer-to-peer (competition, cooperation, shared values, and learner culture), learner-to-faculty/staff (trust, feedback, communication, instructional strategies, mentoring), and learner-to-patient (responsibility, acceptance, and trust). All these social relationships influence what and how students learn.

3. *Organizational Component.* Organizations provide structure, guidance and support for learning, including curriculum resources and artifacts, geographic placements, accreditation rules as well as organizational practices, culture, and policies (orderly environment, rule clarity, duty hours, regulatory environment, teacher control, curriculum, placements, technology infrastructure). One example of this is the Clinical Learning Environment Review (CLER) implemented by ACGME. The underlying premise of the CLER program is that the educational program and patient care will be improved if constructive actions are taken regarding patient safety, health care quality, care transitions, supervision, fatigue management, and professionalism.[22,23] We also include placements in the community (geographical settings/locations) in this organizational component as well.

4. *Physical and Virtual Component.* Learning and practice take place within physical spaces of educational and practice settings. Similarly, informational infrastructures and resources (e.g., online resources, electronic health records) also provide a virtual "space" in which learning is fostered or obstructed.

These components serve as an organizing framework for the diverse and often implicit definitions of LE for this review, but they do not constitute a complete theory of the learning environment in the health professions education. Such a theory will require considerable debate and discussion within the community. Nor are our categorizations of individual studies definitive; most studies include elements from more than one component.

Figure 1. Four interactive components of the learning environment: personal, social, organizational, and physical & virtual.

Studies of the Learning Environment

We conducted a scoping review of the literature to identify and characterize interventions that appear to affect the LE in order to better prepare health professionals for delivering quality patient care and engaging in a fulfilling practice. Recognizing that different phases of training are done in very different LEs, this review includes pre-clinical, clinical, simulation, and online LEs. The research questions are:

- What interventions affect the LE in the health professions?
- What components of the LE are targeted by these interventions? Which are ignored?
- What are the theoretical and practice gaps that require additional research on LE interventions?

METHODS

We chose a scoping review to determine the extent of the literature on LE interventions and associated factors, which our preliminary search indicated might not be extensive enough for a full systematic review of the literature. Additionally, we did not set out to evaluate the efficacy of the influences, but rather to characterize for the health professions education community the types of interventions used to improve the LE. To guide this scoping review, we utilized Levac's[24] modified version of Arksey and O'Malley's methodological framework[25] for scoping reviews. This framework includes six steps, which we used to organize our methods (Steps 1–3) and results (Steps 5–6).

Step 1: Identify the Research Question

Based on several conference calls, we collectively discussed and agreed upon the purpose and rationale for this review, which informed the formulation of our research questions. In our discussions, we considered the population, types of relevant interventions, and impact on the LE.

Step 2: Identify Relevant Studies

We assembled a research team with expertise in health professions education, clinical medicine, and information science. All team members had interest and experience in health professional LEs as well as experience in conducting literature reviews in health professions education.

LM, a health professions education researcher trained in information science, collaborated with a medical librarian to search and manage results from PubMed, Embase, Scopus, CINAHL, and ERIC. With input from the team, search strategies were crafted using Boolean operators to combine controlled vocabulary terms (e.g., medical subject headings) and key words for all relevant concepts (search details available in Appendix 1). Our searches were carried out beginning in August 2017 and were finalized October 11, 2017. The searches focused on journal articles written in English. No date limits were set and both quantitative and qualitative studies were included.

Step 3: Select Studies to be Included in the Review

The research team collaboratively determined inclusion criteria based on our research questions. For inclusion, articles needed to describe a study of an educational intervention or associated factor that measured outcomes related to the learning environment and that targeted health professions trainees and/or practitioners. Therefore, we excluded articles only focused on measuring the LE and/or that did not include a clearly identified intervention on the LE.

Our initial study selection, based on titles and abstracts, was an iterative process conducted over regular phone meetings. To ensure concordance on the inclusion criteria, we participated in several rounds of selecting studies as a group. In total, each reviewer examined approximately 500 titles and abstracts. When moving to independent selection, we continued group discussions for any studies for which inclusion was uncertain. If consensus was unmet based on the title and abstract, the full text was reviewed and consensus was achieved.

Step 4: Chart the Data

We collectively created a data-charting form, which was adapted from a data extraction tool utilized by the Best Evidence Medical Education Collaboration for knowledge syntheses in health professions education[26] and tailored to our research

questions. Before implementation, we tested the form on four citations as a group to ensure agreement. Upon agreement, we each independently charted data for approximately 50 articles with one of the authors (DI) reviewing an additional 40. Following data charting, we held weekly phone calls to pose questions and ensure consistency in how we extracted study information.

Step 5: Collate, Summarize, and Report Results

Our database search identified 2,201 unique citations; 68 met the inclusion criteria. See results.

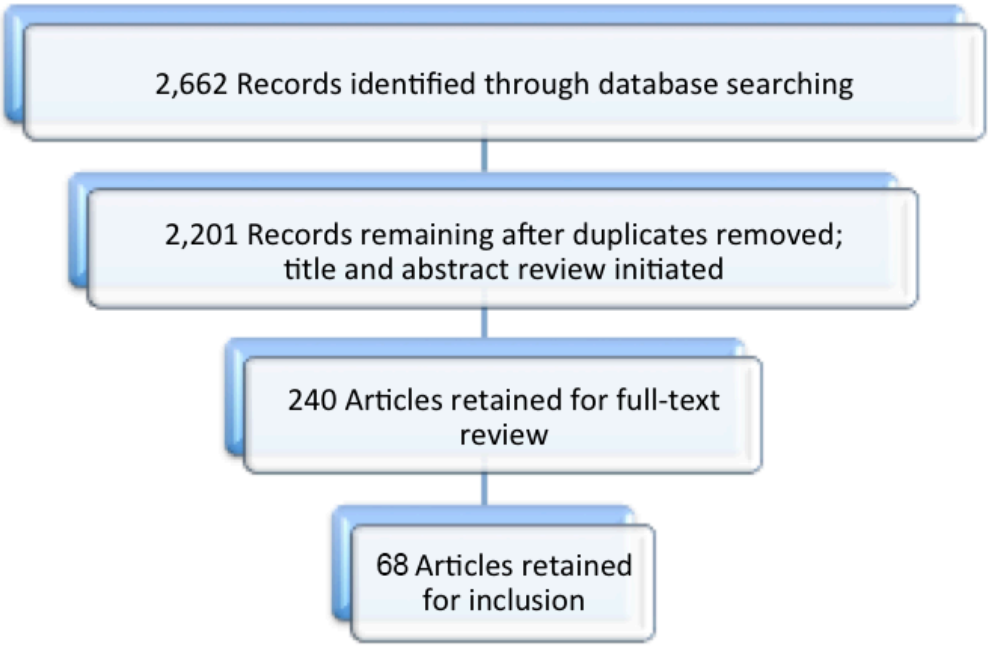
Step 6: Undertake Consultations with Stakeholders

This will be completed at a conference convened by the Josiah Macy Jr. Foundation in April 2018 to identify policy recommendations for improving the LE for the health professions.

RESULTS

Our search retrieved 2,662 articles (PubMed=1,491; CINAHL=77, ERIC=132, Scopus=244, Embase=718); with duplicates removed there were 2,201 unique citations. Based on examination of all titles and abstracts, 240 full-text articles were selected for review. Following full-text review, 68 articles were retained for inclusion (Figure 2). In the set of studies, there were 18 nations represented and six professions studied (medicine n=54, nursing n=11, dentistry n=1, pharmacy n=1, veterinary n=1, chiropractic n=1). Pre-clinical and clinical students were the primary population (n=45), but several studies also included residents (n=12) and/or faculty members (n=4). In some cases, studies included more than one population, setting, and/or profession.

Figure 2. Review and selection of articles on learning environment interventions in health professions education.



We identified four approaches to the study of interventions in the LE. First, there were studies designed to assess the impact of a specific intervention or series of interventions on the LE. These included studies of changes in duty hours, curricula, placements, and faculty development and their impact on LE. These we termed **interventional** studies. Second, investigators compared two different groups' assessments of the LE related to instructional formats, curriculum models, geographical placements, and grading practices. We titled these **comparison group** studies. Third, one or more variables of interest, such as resilience, burnout, mistreatment, achievement, and well-being, were associated with perceptions of LE. We called these **association** studies. Fourth, descriptive studies using qualitative methods illuminated participant perspectives and identified themes associated with interventions in the LE, such as establishing a welcoming environment and teaching culture, continuity of participants, and availability of learning/practice space. We termed these as **descriptive** studies. Each of these four approaches offers important insights into interventions impacting the LE. The results of the review are organized around these four approaches to studying LE interventions.

Interventional Studies

Sixteen studies described specific interventions to improve the LE (Table 1). One study aimed at the personal component, three studies addressed the social component, and twelve examined the organizational component; none targeted the physical/virtual component. In the personal component, time spent by students on direct patient contact is positively related to their perceptions of the quality of the LE. In the social component, a formative assessment tool supported students' clinical learning and improved perceptions of LE, and supervision by the same preceptor created a more supportive relationship.

The organizational interventions can be clustered into changes in duty hours (mixed response of impact on LE), curricula (preparation for clerkship program, teamwork skill training, and mistreatment program improved LE), and faculty development (faculty development, train-the-trainers, and teaching skills workshops all improved LE).

Table 1. Themes from 16 studies of interventions to improve the learning environment in the health professions.

LE Components *Citation, Nation, Profession*	*Interventions*	*Findings (+, =, -)*
PERSONAL		
Van Hell (2009)[27] The Netherlands Medicine	Students tracked their allocation of time to clerkship activities and perceptions of LE	(+) Student time spent on direct patient contact is positively related to their perceptions of the LE quality.
SOCIAL		
Cottingham (2008)[28] USA Medicine	Implemented a school-wide culture change project using appreciative inquiry and focused on everyday relational patterns	(+) Student satisfaction with educational experience rose sharply and reflective narratives described significant constructive change in the LE.
Engstrom (2017)[29] Norway Nursing	Introduced a formative assessment tool for students, preceptors, and nurse teachers in mid-course and final assessments	(+) Assessment data supported students' clinical learning, structured content of conversations, and improved perceptions of the LE.
Sundler (2014)[30] Sweden Nursing	Paired nursing students with a personal preceptor throughout rotation or a nurse preceptor of the day	(+) Students with the same preceptor throughout were more positive about the supervisory relationship and pedagogical atmosphere.
ORGANIZATIONAL		
Edafe (2013)[31] UK Medicine	Introduced pre-clinical FAIRness (feedback, activity, individualization, relevance) teaching methods course in preparation for first clinical rotation	(+) FAIRness group students felt more integrated with the teams and less impacted by lack of structure and demoralization than control group.

LE Components *Citation, Nation, Profession*	*Interventions*	*Findings (+, =, -)*
Henderson (2010)[32] Australia Nursing	Implemented a staff development program for capacity building in nursing	(+/-) Students rated the psycho-social LE higher during intervention than prior to or post intervention.
Hunter (2004)[33] USA Medicine	Utilization of hospitalist vs. non-hospitalist teachers on inpatient medicine rotations	(=) No significant differences in LE, education time, teaching style, evaluation, feedback, and contributing to student growth and development.
Lachance (2014)[34] Canada Medicine	Implemented 16-hour workday	(-) Surgical residents and professors perceived duty hour restrictions negatively impacted the LE; professors more so than residents.
Lau (2017)[35] USA Medicine	Implementation of a surgical rotation-specific program focused on mistreatment of learners	(+) Students reported improved understanding of mistreatment, increased opportunities to share experiences, and a more supportive environment. The number of mistreatment reports decreased annually following implementation.
Moutier (2016)[36] USA Medicine	Launched a multi-pronged institutional change campaign targeted at faculty to improve healthy, respectful learning environment	(+) Faculty reported declines in derogatory comments, anger outbursts, and hostile emails or speech post intervention, as well as improvement in work productivity as a result of diminished disruptive behaviors.
Moystad (2014)[37] Norway Dentistry	Implemented a faculty development program for clinical teachers	(+) Participants perceived improvement in LE and increased collaboration and calibration among teachers.

LE Components *Citation, Nation, Profession*	*Interventions*	*Findings (+, =, -)*
Nishioka (2014)[38] USA Nursing	Implemented dedicated education units (DEU) for students	(+) Students perceived clinical learning experiences and mentoring relationships in DEUs more highly than students in traditional units.
Rubak (2008)[39] Denmark Medicine	Offered a three-day train-the-trainers course for medicine and surgery faculty	(+) Participants reported an improved knowledge of teaching skills and perceptions of the LE compared with control group.
Schumacher (2014)[40] USA Medicine	Implemented 2011 ACGME duty hours	(-) Over half of residents reported worsening care continuity, handoffs, and senior resident workload and four aspects were unchanged, including supervision and quality of care. Most residents reported amount of sleep unchanged.
Spickard (1996)[41] USA Medicine	Held three-hour teaching skills workshops for residents designed to help participants provide feedback and create a constructive LE	(+, =) Student ratings of residents' abilities to create a constructive LE and provide feedback were higher for participants than non-participants; overall ratings of teaching unchanged.
Wallin (2015)[42] Sweden Medicine and Nursing	Implementation of a three-day education module for training surgical teams of specialist nursing students and residents in safe teamwork skills in an authentic operative theater	(+) Participants perceived the safety climate, teamwork climate, and readiness for interprofessional learning more positively than conventional program participants.
PHYSICAL AND VIRTUAL SPACES		
None identified		

Comparison Group Studies

Comparison group studies were the most common of the four approaches and also quite diverse in how the comparison conditions were defined. Some were naturally occurring differences in the LE (e.g., in two different clinical sites) whereas others were side effects of events or changes (e.g., institution of team-based learning). These 29 studies were sorted by personal component (one study), social component (three studies), organizational component (23 studies), and the physical/virtual component (two studies). (See Table 2.) Within the personal component, nursing students with and without prior experience with elder care perceived the nursing home LE similarly. In the social component, distance learning compared with local live learning were perceived similarly, yet learners tended to prefer traditional classroom environments. Blended learning, the combining of online and in-person learning, was preferred to traditional instruction.

In the organizational component, geographical placements were compared (rural/remote preferred to metropolitan referral centers) and curriculum models contrasted (integrated and problem-based preferred to traditional discipline curriculum). Also, school features, the presence of learning communities, and pass/fail grading practices effects on LE were explored. In terms of their effects on the LE, highly rated departments had legitimacy, good clerkship arrangements, and a focus on personal development and engagement of learners; schools with learning communities had more positive student perceptions of LE than schools without learning communities; and students in schools with grades had higher stress, emotional exhaustion, and depersonalization than students in pass-fail schools.

In the physical/virtual component, medical students had higher overall satisfaction than residents with Veterans Affairs hospital training, although students' satisfaction declined over time while residents improved. The LE for obstetrics and gynecology residents in community hospitals was perceived to be better than at tertiary care/referral hospitals.

Table 2. Themes from 29 comparison studies of the learning environment in the health professions.

LE Components *Citation, Nation, Profession*	*Comparison Groups*	*Findings (+, =, -)*
PERSONAL		
Carlson (2014)[43] Sweden Nursing	Prior experience working in elder care vs. no prior experience working in nursing homes	(=) Students with and without prior experience with elder care perceived the nursing home LE similarly. The overall LE in nursing homes rated highly and the supervisory relationship had the highest impact on perceptions of LE.
SOCIAL		
Buxton (2014)[44] USA Pharmacy	Live local continuing education program vs. distance webcast program	(=) Both groups were satisfied with what they learned, but local group was more satisfied with the learning experience.
Elison-Bowers (2008)[45] USA College students	On-site, remote-site vs. traditional college student perceptions of LE	(=) No differences among groups in any of the four domains of student/teacher interactions, course structure, physical LE, and overall satisfaction with course. Students tended to prefer traditional classroom environment.
Makhdoom (2013)[46] Saudi Arabia Medicine	Face-to-face instruction vs. blended learning (electronic and face-to-face)	(+) Blended learning was perceived to be better than traditional learning in all domains of the LE, except for social interactions, and in all types of examinations.

LE Components *Citation, Nation, Profession*	*Comparison Groups*	*Findings (+, =, -)*
ORGANIZATIONAL		
Auret (2013)[47] Australia Medicine	Metropolitan vs. rural/remote clinical placements for residents	(+) Teaching, learner autonomy, and support all rated highly in the interns' responses and the rural rotations scored higher in teaching and support when compared with urban rotations.
Bennett (2010)[48] UK Medicine	Tertiary referral hospitals vs. smaller hospitals	(+) Year 3 students' perceptions of atmosphere, teaching, and learning were higher at smaller sites.
Bisholt (2014)[49] Sweden Nursing	Hospital department, community-based care, primary care, psychiatric care settings	(+) Nursing students rated LE highest in hospital departments and lowest in psychiatric care settings.
Boor (2008)[50] The Netherlands Medicine	Highest vs. lowest scoring OB/GYN departments on LE	(+) Differences identified across departments in student perceptions of LE. Characteristics of departments (legitimacy, clerkship arrangements, focus on personal development) and of students (initial initiatives, continuing development, clerkship fatigue) were major themes. The amount and nature of participation played a central role in all themes.
Condon (2017)[51] Australia Medicine	Large metropolitan hospitals vs. smaller rural hospitals	(+) Greatest satisfaction with the LE and highest examination scores were associated with rural clinical sites and small cohorts of students from single school.

LE Components *Citation, Nation, Profession*	*Comparison Groups*	*Findings (+, =, -)*
Conner (2016)[52] USA Veterinary Medicine	Required academic hospital veterinary emergency and critical care rotation vs. an elective community hospital emergency and critical care rotation	(+) Students preferred the elective emergency rotation where they had more hands-on experience seeing emergencies with ample opportunities to practice client communication and common emergency procedures.
Denz-Penhey (2010)[53] Australia Medicine	Larger vs. smaller rural and remote longitudinal integrated clinical clerkship sites	(=) No differences in perceptions of LE between large and small remote sites; ratings higher than metropolitan sites.
Edgren (2010)[54] Sweden Medicine	Two different stages in curriculum reform, moving more toward a student-centered curriculum	(=) LE remained high during the change process, although students perceived the lack of a support system for stressed students and the lack of feedback and constructive criticism from teachers.
Finn (2014)[55] Ireland Medicine	Traditional discipline-based vs. new systems-based, student-centered, integrated curriculum	(+) Greater satisfaction with LE in new curriculum; students perceived better opportunities to develop interpersonal skills, ask questions, and learn about empathy.
Henderson (2006)[56] Australia Nursing	Three supervisory models: traditional facilitation, individual preceptor, and clinical education unit (CEU)	(+) Greatest satisfaction with the preceptor model (because strong, supportive relationships can develop); least with facilitation model; CEU model most sustainable model.

LE Components *Citation, Nation, Profession*	*Comparison Groups*	*Findings (+, =, -)*
Kaufman (1996)[57] Canada Medicine	Traditional discipline-based curriculum vs. problem-based learning (PBL) curriculum	(+) Students perceived their pre-clinical LE more positively in PBL curriculum than traditional, especially for subscales on enthusiasm and democratic decision-making, but were less positive about student-interactions.
Kelly (2012)[58] Ireland Medicine	Hospital vs. general practice placements for clerkship students	(+) General practice attachments rated higher than hospital attachments in overall LE.
Moore-West (1986)[59] USA Medicine	Primary Care Curriculum (PCC) vs. traditional curriculum	(+/-) Student perceptions of distress in the first two years were less in PCC than traditional curriculum. Students from both curricula perceived the emotional climate and interpersonal relationships among students progressively declined over time, although PCC student perceptions were more positive throughout.
Payne (2013)[60] USA Nursing	Traditional vs. accelerated second degree BSN programs	(=) No differences in perceptions of the educational environment overall.
Prunuske (2013)[61] USA Medicine	Student placements in ambulatory sites with and without residents	(=) Clerkship sites with and without residents provide comparable learning experiences and precepting. Students placed in resident training sites appear overwhelmed by diversity of opportunities and less support than non-resident sites.

LE Components *Citation, Nation, Profession*	*Comparison Groups*	*Findings (+, =, -)*
Reed (2011)[62] USA Medicine	Pass-fail vs. graded evaluation systems among preclinical medical students	(-) Students in schools using grades had higher levels of stress, emotional exhaustion, and depersonalization; were more likely to have burnout; and to have seriously considered dropping out of school than students in schools with pass-fail grading.
Schauber (2015)[63] Germany Medicine	Traditional vs. problem-based learning curriculum	(+) PBL curriculum associated with higher ratings of LE than traditional curriculum. Self-regulatory processes and collaborative learning play crucial roles in students' acquisition of knowledge and perceptions of support regardless of curricular context.
Silkins (2017)[64] The Netherlands Medicine	Comparison of clinical departments by LE groups as perceived by residents: substandard, adequate, good, and excellent performers	(+) Teaching status of the hospital, departments' average teaching performance, and percentage of time spent on educational activities by faculty predicted departments' LE performance as perceived by residents.
Smith (2016)[65] USA Medicine	Learning communities vs. no learning communities	(+) Medical schools with learning communities were associated with more positive student perceptions of the schools' LE compared with schools without learning communities.
Tackett (2015)[66] USA and Malaysia Medicine	Comparison of LE of single curriculum taught at two different schools	(+) Medical students at the end of their first year rated the LE even more positively in Malaysia than in USA partner school.

LE Components *Citation, Nation, Profession*	*Comparison Groups*	*Findings (+, =, -)*
Taguchi (2008)[67] Japan Dentistry	Main dental teaching hospital vs. cooperating community dental hospital	(+) Trainees rated LE higher in cooperating community dental hospital than main teaching hospital.
Widyandana (2011)[68] Indonesia Medicine	Comparison of three clinical settings to learn pre-clinical clinical skills: primary health care, secondary health care, and tertiary health care	(+) Clerkship students rated the LE highest for learning pre-clinical clinical skills in primary health care settings.
Zawawi (2012)[69] Saudi Arabia Medicine	Traditional discipline-based curriculum vs. hybrid problem-based learning curriculum	(+) Students in the PBL curriculum perceived the LE more positively than students in the traditional curriculum.
	PHYSICAL AND VIRTUAL SPACES	
Cannon (2008)[70] USA Medicine	Medical student vs. resident satisfaction with Veterans Affairs (VA) training	(+) Students' overall satisfaction was higher than residents with VA training, although students' satisfaction declined over time while residents' satisfaction increased. The LE domain (as opposed to clinical faculty, working environment, physical environment) had the strongest association with overall satisfaction in both groups.
Diwadkar (2010)[71] USA Medicine	Junior (years 1 & 2) vs. senior (years 3 & 4) OBGYN resident perceptions of the operating room LE in tertiary, regional, and community hospitals	(-) Overall LE, learning opportunities, and workload/ support subscale scores were lower among junior compared with senior residents; and tertiary referral hospital rated lower than community and regional hospitals.

ASSOCIATION STUDIES

We found 14 studies that reported associations of another important variable (such as burnout, career choice, department academic support) with the LE. These studies included seven in the personal component, two in the social component, five in the organizational component, and none in the physical/virtual component (Table 3). In the personal component, resident performance on their certifying exams was positively associated with perceptions of the LE. Similarly, nursing student effort and grade point averages (GPA) were also positively related to perceptions of LE. Student well-being was positively associated with having a community of peers, good quality of life, and less emotional exhaustion and depersonalization. Students with higher resilience levels had better quality of life and better perceptions of the LE. Resident worries about future endurance/capacity predicted exhaustion and lower ratings of the LE.

In the social component, department educational leadership skills were not related to ratings of the LE. In the organizational component, when clerkships were sorted into provision of high and low supervision of students, students perceived that low supervision clerkship sites offered too few opportunities to examine patients independently, insufficient supervision/no feedback, staff lacked motivation to teach and held negative attitudes towards students, the site had too many students, and there was a lack of organization. Residents perceiving adequate support to succeed had less burnout, better resilience, better job satisfaction, better organizational support, and were more likely to have high performance on the in-service exam. Compliance with common program requirements in residency training was associated with better resident perceptions of the LE.

Table 3. Themes from 14 association studies of the learning environment in the health professions.

LE Components *Citation, Nation, Profession*	*Primary Variables*	*Findings (+, =, -)*
PERSONAL		
Baramee (2003)[72] Thailand Nursing	Student effort, GPA, hardiness, perceptions of clinical competence and LE of recent graduates	(+) Student effort, perception of clinical LE, and program GPA had direct effects on perceptions of competence, whereas hardiness had an indirect effect.
Chinthamitr (2014)[3] Thailand Medicine	Resident achievement	(+) Knowledge acquisition among internal medicine residents as determined by board-certifying examination was associated with perceptions of a constructive LE, especially satisfaction with program training structure.
Dahlin (2010)[73] Sweden Medicine	Exhaustion (core to burnout) of first year residents; gender	(-) Resident worries about future endurance/capacity predicted exhaustion, but not performance-based self-esteem. Women's higher exhaustion scores were explained by their higher worries about future endurance/capacity. LE negatively associated with exhaustion.
Mahendran (2015)[74] Singapore Medicine	Career choice; attitudes toward psychiatry	(+) Improvements in attitudes toward psychiatry were correlated with LE when it was perceived to provide inspiration, and enabled students to recognize the merits of psychiatry and effectiveness of treatment although stigma of psychiatry continues

LE Components *Citation, Nation, Profession*	*Primary Variables*	*Findings (+, =, -)*
Skochalek (2016)[75] USA Medicine	Student demographic variables; student attributes	(+) At end of first year, students' perceptions of LE differed across medical schools. Medical school explained 15.6% of variance while student attributes and demographic characteristics accounted for only 2.2% of variance on LE scores.
Tempski (2015)[76] Brazil Medicine	High vs. low resilience levels of students (the capacity to face and overcome adversities, with personal transformation and growth)	(+) Medical students with higher resilience levels had better quality of life and better perceptions of the educational environment.
Yung (1997)[77] China Nursing	Ethical decision-making of nursing students; degree vs. certificate students	(+/=) LE was correlated with ethical decision-making in degree students. No differences in perception of LE between two groups.
SOCIAL		
Tackett (2017)[1] Israel, Malaysia, China Medicine	Student well-being; empathy	(+) Favorable overall LE perceptions and a community of peers were associated with good quality of life, and less emotional exhaustion and depersonalization.
Malling (2010)[78] Denmark Medicine	Leadership skills of clinical consultants responsible for resident education	(=) No relationship between the LE in clinical departments and the leadership performance of the educational leaders.

LE Components *Citation, Nation, Profession*	*Primary Variables*	*Findings (+, =, -)*
	ORGANIZATIONAL	
Cross (2006)[79] UK Medicine	Recruitment and retention of specialists	(+) Specialists identified ongoing struggles with different models of workplace learning in postgraduate education: effects of curriculum structure (survival vs. ownership), nature of learning relationships (dependence vs. empowerment through collaboration), approach to assessment of learning (convergent vs. divergent), and prevailing learning climate (service-led expediency vs. personal growth).
De Oliveira Filho (2005)[80] Brazil Medicine	Compliance with common program requirements (CPRs) for residency training	(-) Violations of Brazil's residency program CPRs were associated with residents' worse perceptions of general quality of life, quality of life in residency, and the LE.
Dolmans (2008)[81] The Netherlands Medicine	Clerkships rated highly vs. poorly on supervision	(-) Students perceived that poor clerkship sites offered too few opportunities to examine patients independently, offered insufficient supervision/no feedback, staff lacked motivation to teach and held negative attitudes towards students, the site had too many students, and there was a lack of organization.
Gruppen (2015)[20] USA Medicine	Institution vs. specialty influence on resident ratings of LE and workload	(+) Institution had greater influence than specialty on resident perceptions of LE and workload.

LE Components *Citation, Nation, Profession*	*Primary Variables*	*Findings (+, =, -)*
Lee (2017)[82] USA Medicine	High vs. low academic resource support (e.g., book stipends, formal in-service review questions, remediation, on-site board prep)	(+) Residents perceiving adequate support to succeed had less burnout, better resilience, better job satisfaction, better organizational support, and were more likely to have high performance on the in-service exam.
PHYSICAL AND VIRTUAL SPACES		
No studies		

THEMES FROM DESCRIPTIVE STUDIES

While the vast majority of studies of the LE were quantitative and used standardized measures of the LE, a few descriptive studies used qualitative research methods to explore learners' perceptions of the LE. We found nine descriptive studies that addressed all four components (Table 4). Student perceptions of a constructive LE were associated with resilience, a focus on personal growth, feeling that they were learning in a meaningful place and becoming part of a community, and that they trusted the system to support them. In the social component, students described constructive LEs as being welcoming with scaffolding relationships and a strong teaching culture. Preceptors were perceived to enjoy teaching and provided appropriate instruction, feedback, and role modeling. A poor social environment was characterized by mistreatment, neglect and negative attitudes toward learners, unclear expectations, insufficient supervision, and too few opportunities to examine patients independently. In the organizational component, the teaching arrangements were well-organized, and there was continuity of participants. Smaller and more rural clinical sites were perceived to be better, as was a problem-based learning (PBL) curriculum. Destructive organizational attributes included lack of clear expectations for learners, failure to integrate students into teams, too many students, and lack of organization. In the physical/virtual component, availability of adequate space for students to interview patients was identified.

Table 4. Themes from 9 descriptive studies of interventions in the learning environment in the health professions

LE Components	*Themes from descriptive studies of the learning environment (+, =, -)*
Personal	(+) Resilience[83] (+) Personal growth[84] (+) A "meaningful" place[84] (+) Being part of a community[84] (+) Trust in a regulated system to support them[84]
Social	(+) Staff welcoming of learners[2] (+) Scaffolding relationships[84] (+) There is a strong teaching culture[2] (+) Preceptors enjoy teaching[2] and invest time in doing so[85] (+) Teachers role-model skills[2] and values,[85] observe and give feedback to learners for improvement,[2,86] provide clear expectations for learning[2] (+) Multiple levels of learners together[2] (-) Mistreatment, neglect of learners, negative attitudes toward learners, unclear expectations for learners[6] (-) Insufficient supervision/no feedback,[2] too few opportunities to examine patients independently,[2] staff unmotivated to teach and held negative attitudes toward students[2]
Organizational	(+) Teaching arrangements well organized[2] (+) Continuity of participants (teachers, learners, patients)[83] (+) Smaller, rural clinical sites perceived as better[51] (+) PBL perceived as less stressful and more meaningful than traditional curriculum[59] (-) Unclear expectations of learners[2], failure to integrate students into surgical teams[6], too many students[81], lack of organization[81]
Physical and Virtual Spaces	(+) Learning spaces are available[83]

DISCUSSION

The vast majority of studies included in this scoping review reported on interventions and influences that had a positive impact on the LE in 18 different countries representing medicine, nursing, dentistry, pharmacy, and veterinary medicine. All four types of studies (interventional, group comparisons, associations with another key variable, and descriptive) described influences on one or more components of the LE. Most studies were focused on the organizational component, followed by the social component and the personal component. Very few studies examined the impact of the physical or virtual space component.

Our scoping review sought to answer three research questions, the first of which was what interventions affect the LE in the health professions? A synthesis of the reported interventions aimed at influencing the LE are reported in Table 5. There were seven classes of influences on the LE (accreditation regulations, curricular interventions, faculty/staff development, grading practices, instructional interventions, placements, physical and virtual spaces, and support services) and 20 specific targets for possible interventions. Since the strength of the interventions displayed in Table 5 were not assessed, the list should be viewed as potential opportunities for improving the LE.

Table 5. Selected targets for possible interventions to improve learning environments derived from 68 reviewed studies in the health professions.

Class of Influence	*Possible Interventions*	*Supporting Studies*
Accreditation Regulations	• Structure of work hours and intensity • Focus on well-being	Lachance (2014)[34] Schumacher (2014)[40] Tackett (2017)[1] De Oliveira Filho (2005)[80] Dolmans (2008)[81]
Curricular Interventions	• Include content on well-being, adaptability, preparation for transitions, clarity of expectations, and roles • Create continuity of experience	Sundler (2014)[30] Hunter (2004)[33] Conner (2016)[52] Edgren (2010)[54] Finn (2014)[55] Kaufman (1996)[57] Moore-West (1986)[59] Schauber (2015)[63] Zawawi (2012)[69] Cottingham (2008)[28]
Faculty/Staff Development	• Conduct faculty/staff development workshops on learning climate, setting expectations, providing feedback, promoting well-being, serving as a positive role model, preparing for teamwork	Edafe (2013)[31] Henderson (2010)[32] Moystad (2014)[37] Rubak (2008)[39] Spickard (1996)[41] Wallin (2015)[42]
Grading Practices	• Implement pass/fail grading system	Reed (2011)[62]

Class of influence	*Possible Interventions*	*Supporting Studies*
Instructional Interventions	• Establish positive interpersonal relationships and welcoming environment • Create a community of peers and peer coaching/teaching programs • Offer adequate supervision and feedback • Ensure support in times of transition • Emphasize meaning in work • Support emerging autonomy • Communicate clear expectations for learning and performance • Utilize blended learning methods • Eliminate mistreatment and disrespect	Lau (2017)[35] Moutier (2016)[36] Wallin (2015)[42] Carlson (2014)[43] Buxton (2014)[44] Makhdoom (2013)[46] Smith (2016)[65]
Placements, Physical and Virtual Space	• Create longitudinal placements • Consider rural, community placements • Provide adequate physical space for learning and patient care • Offer adequate online learning resources and virtual learning spaces	Buxton (2014)[44] Elison-Bowers (2008)[45] Auret (2013)[47] Bennett (2010)[48] Bisholt (2014)[49] Condon (2017)[51] Denz-Penhey (2010)[53] Kelly (2012)[58] Silkins (2017)[64] Taguchi (2008)[67] Widyandana (2011)[68] Cannon (2008)[70] Diwadkar (2010)[71] Gruppen (2015)[20]
Support Services	• Create coaching, mentoring, and peer support programs to sustain personal well-being, adaptability, and resilience	Van Hell (2009)[27] Nishioka (2014)[38] Smith (2016)[65] Dahlin (2010)[73] Tackett (2017)[1] Tempski (2015)[76] Lee (2017)[82]

The second and third research questions were:

- What components of the LE are targeted by these interventions? Which are ignored?

- What are the theoretical and practice gaps that require additional research on the LE and its dynamics?

These two questions are addressed in relation to each of the four components of the LE.

Personal Component of LE

The personal component of our LE model describes how individual learners interact with the LE, develop perceptions of the LE, and engage in personal growth and develop professional identity. It describes the psychological, experiential, and perceptual dimensions of a particular setting. Interventions or factors positively associated with the personal component of LE included time focused on direct patient care, having a community of peers, a good quality of life and high levels of resilience, learning in a "meaningful" place, and trust in a regulated system to support them. Factors with negative associations were poor quality of life leading to more emotional exhaustion, depersonalization, and worries about future endurance and capacity. These factors are less about interventions and more about the psychological characteristics of the learners and their perceptions of the environment.

Sociocultural learning theories associated with situated learning, situated cognition, ecological psychology, and workplace learning explain these findings.[13–15] A supportive learning community encourages participation and scaffolds learning in the context of the setting. Motivation theory, which emphasizes autonomy, purpose/goals, mastery, and relatedness also connect with these recommendations.[87,88] Learners are intrinsically motivated to learn, develop autonomy, pursue a goal and purpose larger than themselves, and work collaboratively with others, especially if they are supported in the process.

Social Component of LE

Studies exploring the social component of learning reinforced the importance of interpersonal relationships in fostering a constructive LE. These relationships

include teacher-and-learner (e.g., face-to-face or blended instruction and longitudinal clinical mentoring), learner-to-learner (e.g., peer instruction and support), as well as faculty-to-faculty (e.g., leadership performance). Studies did not address the learner and patient relationship. These studies also underpinned the importance of longitudinal relationships as well as the value of setting and revisiting expectations about performance and relationships. The descriptive studies highlighted the role of a strong teaching culture, strong role-model skills and values, multiple levels of learners working together (e.g., near-peer teaching), as well as the need to avoid mistreatment, unclear expectations, and insufficient supervision without feedback. Teamwork and its relationship to LE were not explicitly addressed in the studies included in our review. These findings are consistent with situated learning (communities of practice and legitimate peripheral participation), situated cognition, and deliberate practice theory, as noted above.

Organizational Component of LE

The organizational component of the LE model was most frequently studied through comparative studies of contrasting LEs. Frequently, these contrasting environments were "natural experiments" rather than carefully designed studies specifically of the impact on the LE. Many of these were comparisons of alternative curricular models (e.g., problem-based learning, team-based learning) or specific curricular interventions (e.g., augmenting feedback, faculty development, team-work skills) or larger settings of school comparisons (e.g., rural vs. urban, alternative clinical settings within a larger academic institution). The uncontrolled and non-randomized nature of these studies limits the confidence one can place in the results, but the evidence is generally positive in indicating that some environments are perceived as better than others. These include the following:

- Courses or innovations to augment feedback, increase respect and well-being, and reduce mistreatment;
- Faculty development programs focused on aspects of the LE rather than specific teaching skills;
- Structural features like duty hour implementation, grading systems, supervisory models, and dedicated educational units; and
- Rural settings, smaller clinical placements, learning communities, and elective rotations, which may be surrogates for learners receiving more attention.

Given the diversity in study outcomes, disciplines, countries, and focus, it is not surprising that the results are often mixed. There is not a critical mass of studies on any given variable to provide convincing conclusions.

Understanding the dynamics of how organizational features relate to the LE clearly builds on the theories of sociocultural and interpersonal interactions cited in the sections on the personal and social components of our model. However, the organizational component also leads to considerations of institutional and organizational culture that are seldom cited in LE studies. Organizational change,[89,90] leadership models,[91] and systems science[92] are a few of the conceptual domains that may be relevant and beneficial for better understanding how the LE functions at higher level human systems.

Physical and Virtual Space Component of LE

The physical/virtual space component of the LE encompasses the physical spaces of educational and practice settings in which learning and practice occur, and the virtual or online learning spaces. We identified three studies, two of which were comparison studies[70,71] and one a descriptive study,[83] all of which were conducted in the US. Within these studies, physical components of the LE are peripheral rather than the main focus of the study. For example, in a survey of 125 Veterans Affairs hospitals, physical space is one of four investigated subdomains that are associated with the LE.[70] This study notes that for residents and medical students the maintenance and cleanliness of hospital facilities impacts the LE.

The limited coverage and lack of identified studies suggest a gap in the health professions literature and opportunities for future research. Health professions education researchers might refer to other fields, such as environmental psychology and higher education, as they have long studied the physical/virtual components of the LE and recognized the impact of space on learning.[93] Furthermore, a need for knowledge about physical/virtual components of the LE will become more pronounced as health professions education institutions implement blended learning.[94,95] Using blended learning approaches, faculty intentionally plan their teaching to engage trainees online and in-person to optimize the affordances of both modalities. While blended learning moves some of the learning out of the physical space and into the ether, it underscores the need for those opportunities in the physical learning space to directly support small-group learning. In addition, as interprofessional education and practice increase, new spaces for conferences and huddles in the workplace will be needed. Ambulatory clinic space is also required

for medical student practice, especially in the early stages of learning when they are inefficient.

We note that the physical and virtual space component received the least attention of the four components in our organizational framework, especially given the amount of time, energy, and financial resources devoted to fundraising campaigns targeting expanded and improved physical spaces and online courses.[96] This lack of coverage may in part reflect the absence of sociocultural theoretical stances, where the location and its interaction with participants is a key element. Indeed, we suspect that clarity on definitional and theoretical stance would lead to more (needed) investigations of this component.

RECOMMENDATIONS

We have several recommendations that arise from this review:

1. There is a significant need for theoretical development to provide a more comprehensive framework for both defining the learning environment and studying its impact on various educational outcomes. The need for better definitional and theoretical clarity became evident early in our review process. This lack of clarity led to challenges in constructing our literature search as well as in synthesizing our findings. We believe that enhancing the definitional and theoretical clarity of the LE is a critical next step to improve our understanding of interventions, the components to target, and addressing practice gaps.

2. Similarly, the over-reliance on learner self-reported perceptions as a measure of the learning environment needs to be supplemented by assessment methods that better address other viewpoints and the characteristics of the LE at the group and institutional levels. Reviews of assessment instruments are available and note the lack of consistent theoretical frameworks.[12,16]

3. There are several gaps that warrant research attention: exploring the patient's impact on the LE, investigating how interprofessional and intraprofessional teams influence the LE as well as the design and testing of interventions that are inclusive of multiple components from our model

would be worthy of future investigations. Similarly, potential interventions to improve the LE should carefully consider creating a community of peers, ensuring support especially in times of transition and stress, emphasizing meaning in the work, and supporting personal resilience and autonomy. Physical and virtual spaces as settings for learning are also underrepresented in the literature.

4. Educational scholars and practitioners must recognize that the contextual, background nature of the LE makes it a construct that may or may not be explicitly identified in individual studies. For example, our search returned only two articles[34,40] on resident duty hours as an element of the LE. There are, obviously, many more articles that examine the impact of duty hour changes on educational outcomes, but these are seldom labeled as "learning environment" and were thus missed in our search. Care must be taken to search more broadly in a given LE intervention to include articles that do NOT mention "learning environment."

LIMITATIONS

A particular challenge of conducting a comprehensive literature search for a construct like the LE is that it has no uniform definition and is often a background phenomenon rather than an explicit component of a study. This challenge meant crafting a search strategy that was focused on the inclusion of the term "LE" and several synonyms. Despite our best efforts, we may have failed to retrieve all relevant articles on the LE because we did not use the right terms (LE or its synonyms). Additionally, we restricted our search to English language journal articles and thus may have excluded relevant research in non-English languages. Since the review was focused on interventions that impact the learning environment, studies that described the LE or validated a LE instrument were excluded. Some of these may have provided further insights into interventions.

CONCLUSIONS

The context in which people learn clearly has an impact on the learning process and its outcomes. This context includes numerous factors at the personal, social, and organizational levels. It also includes physical and virtual spaces. Because of this scope, discussing all these factors under the term LE would appear to be a

gross over-simplification. We argue that research in this area can only progress if investigators and practitioners become clear and precise about what they mean by LE. Clarity and precision will be facilitated by the development of more detailed theoretical models and congruent assessment tools. For example, the model we have developed from this review would suggest that authors should address the "personal learning environment" as distinct from the "social learning environment," the "organizational learning environment," or the "physical and virtual learning environments." Such distinctions are necessary to advance future research on the LE by focusing on a subset of components, variables, and/or interventions rather than the enormity of all possible contextual influences. Similarly, because the specific LE in a given study is defined by the educational purpose, actions, and outcomes, further theoretical development of the LE concept must incorporate these foreground educational issues in order to understand the dynamics of the LE "background."

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APPENDIX 1 - SEARCHES

Database: ERIC via ProQuest interface / Date: 10/11/2017

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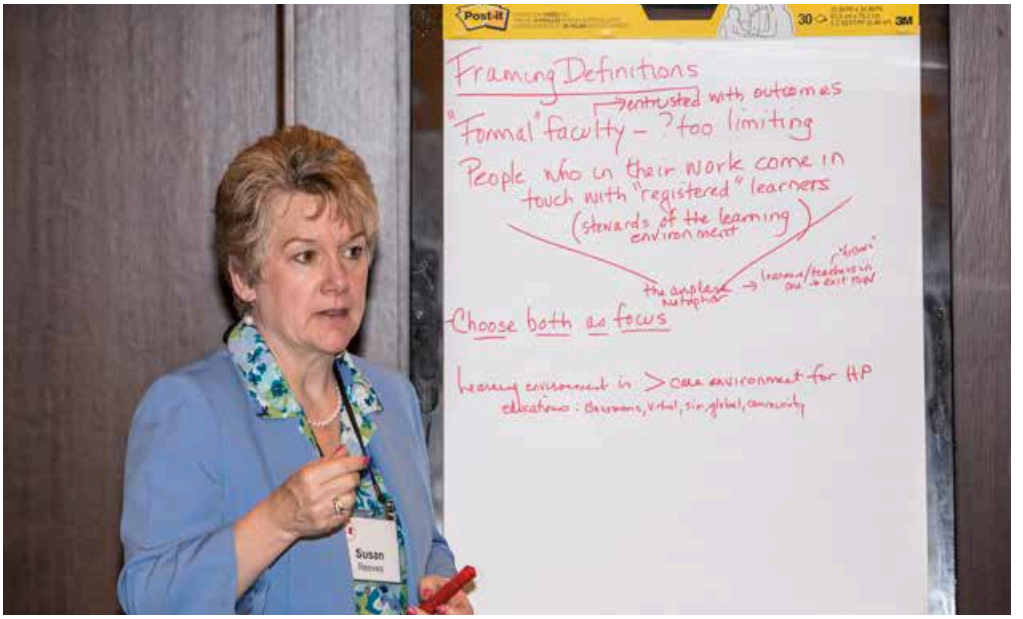
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Susan

TOWARD EXEMPLARY LEARNING ENVIRONMENTS FOR THE HEALTH PROFESSIONS

Commissioned Paper

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ABSTRACT

In this paper, we propose a vision for exemplary learning environments for the health professions in which everyone involved in health professions education and health care collaborates toward optimal health for individuals, populations, and communities. Using principles from complex adapative systems as a guiding framework for our vision, we postulate that exemplary learning environments will follow four "simple rules." These are:

1. Health care and health professions education share a goal of improving health for individuals, populations, and communities;

2. In exemplary learning environments, learning is work and work is learning;

3. Exemplary learning environments recognize that collaboration with integration of diverse perspectives is essential for success; and

4. The organizations and agents in learning environments learn about themselves and the greater system they are part of in order to achieve continuous improvement and innovation.

For each of the simple rules, we describe how the current state diverges from our vision for the future and provide ideas about how to reach the vision using specific examples from the literature. In addition, we identify potential targets for assessment to monitor the success of exemplary learning environments.

INTRODUCTION

VISION

Exemplary learning environments prepare, support, and inspire all involved in health professions education and health care to work toward optimal health of individuals, populations, and communities. The learning environment includes health professions students, health care professionals, non-clinical faculty, staff, and patients and families. Collectively, they and the organizations within which they learn, work, and seek care collaborate to advance their capabilities and create an inviting learning environment that fosters well-being and health for all.

In this paper we articulate a vision for exemplary learning environments for health professions education. We started with preliminary ideas on how to define learning environments and what characterizes positive learning environments. Through repeated discussions within our author group and with colleagues at our institutions and across the country, we created and refined definitions and identified a

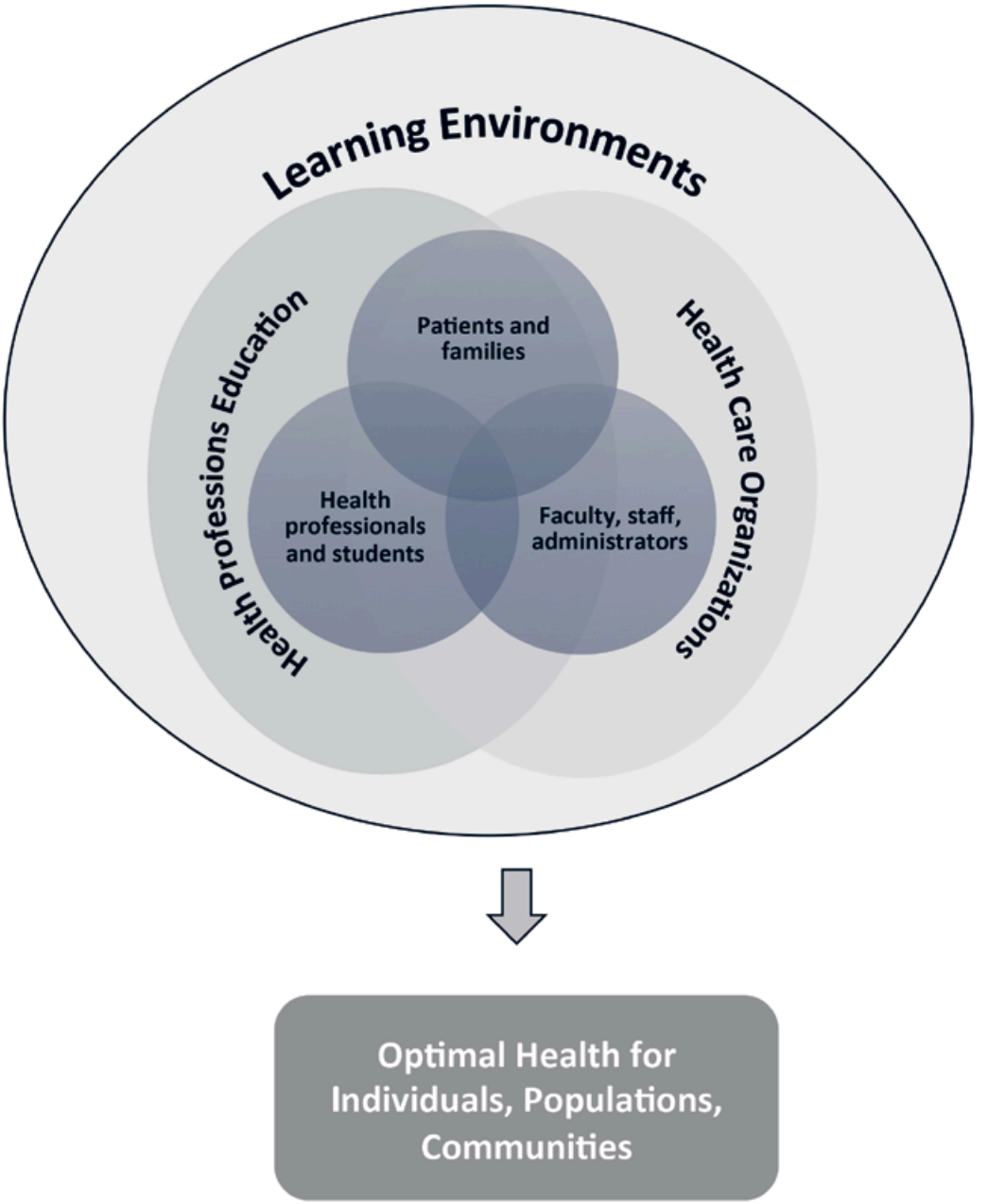
framework to guide the formulation of aspirational goals. We consulted the literature to place these goals in the context of the current state of learning environments and offer actionable ideas to close the gap between what is and what could be.

GUIDING FRAMEWORK AND DEFINITIONS

We can conceptualize any learning environment for the health professions as a facet of a complex adaptive system, defined as "a collection of individual agents with freedom to act in ways that are not always totally predictable, and whose actions are interconnected so that one agent's actions changes the context for other agents."[1] The agents in this complex adaptive system include health professions schools and programs; health care organizations; and all stakeholders, from students to leaders to patients (Figure 1, on the following page). Using concepts associated with complex adapative systems to guide our thinking allows us to embrace the complexity of learning environments and identify ways in which our vision can be accomplished. An important characteristic of complex adapative systems is that order, innovation, and progress can emerge naturally from the interactions within a complex system, with each agent following a set of simple, shared rules. "Simple rules" are defined as minimum specifications which allow each agent in a complex adapative system to behave adaptively in the system.[2] For example, Plsek and Wilson propose that 21st century health care systems have simple rules such as "care is customized according to patient needs" and "decision-making is evidence-based."[2]

Exemplary learning environments are a vision for the future, but we postulate that once they exist, they will follow a set of four simple rules as outlined in Table 1. As a word of caution, "simple" does not mean that it will be easy to reach this future ideal. We outline some challenges that need to be overcome and as we discuss each of the four simple rules, we propose approaches that might help us reach the vision. Before we delve further into this, we provide key definitions to clarify our scope.

Figure 1: Exemplary learning environments prepare, support, and inspire learners to work towards optimal health



Definitions

We define **learning** as **a process that leads to change, occurs as a result of experience and interactions with others and the environment within which learning takes place, and increases the potential for improved performance, future learning, and discovery**. This definition of learning, adapted from Ambrose et al.,[3] has three critical elements: 1) Learning is a process, not a product. It takes place in the mind and with others. That it occurs is inferred from products (or performances); 2) Learning involves change in knowledge, beliefs, behaviors, attitudes, or values, that evolves over time; and 3) Learning is the direct result of how learners interpret and respond to their experiences, conscious and unconscious; is influenced by social interactions and the environment; and can be co-constructed.

We define **learning environments** broadly, to acknowledge that the pursuit of health takes place in an immeasurable number of environments. These include physical spaces, virtual spaces, and socio-cultural environments within which learning takes place (Table 2).

We define **learners** as **all participants in the learning environment** that co-construct the learning environment. Thus, learners include health professions students, health professionals, faculty and staff of learning insitutions, health care systems staff and administrators, and patients. Learners also include organizations in health professions education, e.g., health professional schools and health care organizations. Learning organizations, as described in the business literature,[4] facilitate their members' learning and continuously transform themselves. In health care, this idea is conceptualized as the "learning health care system," in which research influences practice and practice influences research.[4] Our inclusive definition of learners has implications for whom we include in our work to transform learning environments. For the purpose of clarity, we use the word students to indicate learners who are enrolled in formal health professions education programs, which, for medicine, includes residents.

SIMPLE RULES IN EXEMPLARY LEARNING ENVIRONMENTS

Guided by three principles observed in all complex adaptive systems, we describe four simple rules that we see as particularly relevant to learning environments.[1,2] In this section, we outline each of these four rules, provide a brief description of how we believe the current state falls short, and follow with actionable suggestions for bridging the gap between the current state and our vision.

Health care and health professions education share a goal of improving health for individuals, populations, and communities.

The vision for exemplary learning environments

Health care and health professions education both work to improve health. Health care focuses on those currently in need; health professions education prepares to meet future needs. Reflected by the first principle in Table 1, working together as a system requires a shared goal.[5] The Deming concept of "constancy of purpose" is a component of sustainably high quality.[6] The value of clear goals is borne out in studies of high-performing health systems, including academic health systems.[7–10] In a commentary for the National Academy of Medicine, Kirch and colleagues argue that achieving the health outcomes our patients value and deserve requires a shared commitment across practice, education, and research.[11] Clinical learning environments that model high-quality practice have a profound influence on the values, attitudes, and behaviors of future health professionals.[12,13]

The gap between our vision and the current state

The organizations that play key roles in health professions learning environments often are structurally independent, with separate governance, leadership, and funding. Even when their stated missions are similar and synergistic, there often are important differences in accountability, strategic operations, and finance. For instance, efforts to bring learners together for interprofessional education almost always face dissimilarities in education routines, academic calendars, curricular mandates, and accreditation requirements. This is true even when the education programs are part of the same university.[14] In the authors' own experiences at different institutions, health systems are tempted to exclude students from innovations to achieve effective and efficient care. Given what we know about complex adaptive systems, it is not surprising that even the most beautifully

designed patient care processes may experience disruption when instructing students is introduced as an add-on rather than planned-for event, from the start.

Everyone brings to the learning environment a set of assumptions derived from prior knowledge and experience. At various times over the years, common dogma held that education innovation must deal with the "zero-sum" challenge of an already-packed curriculum, that students introduce inefficiencies into clinical encounters with little added value, and that patients cannot judge quality in health care. Such assumptions, especially if unspoken and unexamined, impede collaborative efforts to create learning environments that contribute to improving health.

Closing the gap

In exemplary learning environments, convergence of mission between health care and health professions education is accomplished through the following strategies: 1) alignment of structures of care and education, including leadership; 2) letting go of assumptions rooted in traditions, both about what we need to learn and what learners can contribute; and 3) engaging patients as active contributors to the learning environment.

Alignment of structures of health care and health professions education is a priority for exemplary learning environments, creating gains in effectiveness and efficiency to improve health system competitiveness and academic excellence.[15,16] There are close connections between clinical and education leaders, with the shared goal of providing high-quality, safe care for current and future patients.[17,18] Medical school deans and hospital chief executive officers work collaboratively to support the teaching mission through financial support, mentoring, faculty development, recognition, and academic advancement.[19] Nurse educators work with health care leadership to create a work environment for staff nurses that supports both the nurses themselves and nursing student education.[20]

There are several examples consistent with this vision: new leadership roles at the University of Chicago and the University of Pennsylvania that "bridge" education and clinical care through dual reporting to top medical school and health center officials;[21,22] the Department of Veterans Affairs Chief Resident in Quality and Patient Safety Program invests in developing future leaders and teachers in quality and patient safety;[23] and multiple schools have introduced faculty promotion criteria in medicine that recognize quality improvement and patient safety contributions,

including Harvard University; University of California, San Francisco; University of Toronto; and others.[24] In nursing, examples can be found in various academic-practice partnerships that improve nursing education while also benefiting health care systems.[25] One such partnership model is the dedicated educational unit, which engages staff nurses in nursing education. When applied to rural health care settings, this model solves shortages in both nursing coverage and clinical learning experiences.[26] Exemplary learning environments follow the recommendations of the National Collaborative for Improving the Clinical Learning Environment (NCICLE) by implementing strategies to ensure that new clinicians, including students, are prepared to fully participate in patient safety activities.[27]

Letting go of assumptions rooted in traditions is part of Lewin's classic "unfreeze-change-refreeze" theory of change.[28] Armstrong and Barsion identified "questioning, breaking out of the status quo, and considering new possibilities" as important to innovation in health care education.[29] Challenging previously held assumptions, leaders in exemplary learning environments embrace integrated approaches to learning, both in the classroom and the clinical setting. Such approaches introduce important new content more quickly and effectively than older education models.[30–32] Collaborative design, with unified goals and attention to roles and preparation, makes it possible even for novice learners to add value to care.[33–36]

Patients and families bring an influential perspective to the improvement of care and education. Their very presence in leadership discussions serves as a reminder that our primary goal is optimal health for individuals, populations, and communities. Partnerships with patients and families contribute to improvements in direct care, organizational design, health policy, and health professions education.[37] Through co-execution, co-planning, and civil discourse, patients and professionals achieve effective "co-production" of desired health outcomes.[38] Such conversations require mental and emotional readiness to engage, the ability to reframe challenges into opportunities for improvement, and the habit of listening and learning from everyone.[29] The gains can be remarkable, such as the ImproveCareNow collaborative's two-fold achievement of higher proportions of children with inactive inflammatory bowel disease while fewer were taking prednisone.[35,39–42] These partnerships are in line with the Josiah Macy Jr. Foundation's bold vision that "individuals, families, and communities are understood to be the very reason our health care system exists, and that those who are caring, teaching, learning, or

otherwise working within the system must partner fully and effectively with them to foster optimal health and wellness for all."[39]

In exemplary learning environments, learning is work and work is learning.

The vision for exemplary learning environments

In exemplary learning environments, learning and work are always co-constructed by those who learn and work in a particular environment. Such environments are defined as "*learning*-centered," moving away from the contemporary concept of "*learner*-centered" environments. Learner-centered approaches can conflict with the need to be patient-centered, efficiency-centered, and health outcome-centered. *Learning*-centered environments allow all involved to learn while simultaneously focusing on patient care. Being learning-centered also shifts the emphasis to the quality of learning. The thoughtful alignment of learning with the work involved in achieving health for all leads to meaningful experiences for everyone, as exemplified by the collaborative care model described by Uhlig and Raboin.[43,44] When educational opportunities occur in the course of the work, those involved (teachers, students, and patients) collaborate to create intentional and explicit space for learning. An intentional approach to learning supports the development of reflective practitioners, who gain excellence and joy through purposeful lifelong professional development. This acknowledges that, for anyone who seeks excellence, learning is never done, regardless of seniority, expertise, or role.[45] There is support for quality of learning through explicit attention to quality of teaching and practice.

The gap between our vision and the current state

Many health professions curricula continue to distinguish between "pre-clinical years" for learning foundational sciences and "clinical years" for learning with patients in the workplace. Classroom courses are often not meaningfully threaded through clinical experiences. Within the clinical environment, conferences and other didactics are typically removed from clinical work processes. And, though clearly shown to be of value to patients, it remains challenging to meaningfully involve patients and families in clinical rounding processes that also benefit learners.[46–48] Many clinical workplaces struggle to integrate learning and education as essential features; they often feel like "extras." Perceptions that one has to "stop to teach" lend credence to the belief that teaching and learning slow one down and make

work less productive. Preparation for teaching is often absent or inadequate. Many teachers emulate their own teachers rather than using evidence-based approaches.[49] Most learning environments fail to use structured mentoring or feedback processes to aid teacher self-awareness and reflection, and standards to determine whether teacher qualifications are lacking. Learners in the clinical workplace may be so busy with work that doesn't contribute to learning that the educational value of the experience is undermined. Workplace stressors, such as documentation requirements and relative value unit (RVU) production, exacerbate the situation for both teacher and learner. Insufficient resources in both academic and clinical settings has led to rising levels of clinician burnout,[50,51] and resiliency training is virtually absent.

Closing the gap

Exemplary learning environments thoughtfully align learning with the work of patient care, following the example set by the quality improvement model of Exemplary Care and Learning Sites (ECLS).[52] In ECLS, the work of improving care (and learning about improving care) is undertaken in a contemporaneous manner with the "doing" of the work. Similarly, in exemplary learning environments, learning is integrated into the day-to-day activities of clinical care. Exemplary learning environments operate under organizational mission statements that boldly declare "learning happens here" and that all are expected to learn. Questions such as "What do we hope to learn today?"; "What should we try to learn today?"; and "What did we learn just now?" are commonplace before, during, and after classes, meetings, rounds, and patient interactions. Identifying opportunities for learning and preparing learners for such opportunities are considered core teaching competencies. Creating intentional space for learning involves commitment of time. Innovative learning-while-working approaches, such as alternative ways to conduct rounds, mitigate potential impact on work production.[53] Learning environments invest in research to determine best practices for such approaches, guided by the "wicked questions" framework, which promotes thinking about paradoxical opposing-yet-complementary strategies.[54]

An intentional approach to learning allows for the implicit to become explicit, modeling of behaviors, and naming of phenomena as they occur. This allows learners to process new ideas in the moment and in context. Such practices aid with learner metacognition, the higher-order thinking that enables understanding, analysis, and control of cognitive processes essential for effective lifelong learning.[55] Teachers also engage in this intentional approach to learning and receive guidance

to develop teaching skills and apply evidence-based education practices. Feedback to encourage further development of teaching skills is an integrated part of promoting teacher excellence.

Leaders of exemplary learning environments reduce or eliminate non-value-added activities that detract from the intended goal. They provide appropriately matched resources so that the demands of both education and patient care missions can be met. Examples include the introduction of scribes and other ways to reduce the burden associated with the electronic health record,[56] and technology that allows for teaching *while* documenting. Such initiatives prevent burnout and promote well-being by supporting personal development and growth, creating space for mindfulness and reflection, and providing resilience training for all. Interventions are in place to recognize and neutralize the effects of individuals who, because of their personal lack of joy in work, poison the learning environment for others.

To support these efforts, leaders in exemplary learning environments embrace learning as a core value of leadership. Leadership may even include new roles that focus on the learning environment, e.g., "chief learning officers" (CLOs).[57] CLOs are responsibile for enabling and facilitating the development of exemplary learning environments. CLOs report to the overall leadership of the academic and clinical organization, and are supported by "unit learning officers," who reinforce the mission at the work-unit level.

Exemplary learning environments recognize that collaboration with integration of diverse perspectives is essential for success.

The vision for exemplary learning environments

Exemplary learning environments are inclusive and welcoming; integrate diverse perspectives to promote collaborative learning and practice; and prepare learners to care for diverse patients, populations, and communities. The literature clearly documents the positive effects of teamwork, collaborative practice, and shared decision making.[58–61] Diverse composition of health care teams improves teamwork,[62] and diversity in learning environments promotes learning.[63,64] There is mounting evidence that disparities in health resulting from disparities in health care are at least in part due to the underrepresentation of minorities in the health professions.[65,66] Hence, exemplary learning environments attend to diversity, promoting excellence and ensuring the inclusion of health professionals needed to achieve optimal health for all.

The gap between our vision and the current state

Despite increasing awareness that diversity matters, meaningful inclusiveness and effective collaboration remain largely elusive. For example, there continues to be underrepresentation of ethnic minorities in the health care workforce,[64,67] of men in nursing,[67] and of women in academic leadership roles.[68] Conflicts and turf wars between and within professions continue to hamper interprofessional collaboration.[69,70]

The organizational psychology literature proposes that the term diversity represents three distinct constructs: 1) Variety: differences in information, knowledge, or experience among members of an organization or group; 2) Separation: differences in position or opinion among members; and 3) Disparity: differences in concentration of valued social assets or resources.[71] Diversity as variety ensures a broad range of knowledge, skills, and experience, which positively impacts creativity, learning, and decision-making.[72] This explains the positive impact of interprofessional teamwork on patient care[62,73] and underlies the effects of diversity on learning.[63,64]

These positive effects may, however, be countered by the impact of diversity as separation. Diversity as separation explains how people categorize themselves and others, often following stereotypical patterns, to belong to either an in-group or out-group. This can lead to conflict, discrimination, and poor teamwork.[72] In health care, social categorization may perpetuate silos between professions and impede interprofessional collaboration.[74–76] Stereotyping of certain professional roles may lead to perceptions of "fit" that limit diversity if elements of class, gender, or ethnicity are part of the stereotypes.[74] For example, ideas about nursing as "women's work" are a deterrent for men to apply to nursing school.[77]

Diversity as disparity recognizes that diversity frequently implies status differences.[78] Status disparity is prominent in health care, leads to power differentials between professions, and creates another barrier to effective interprofessional collaboration.[70] Power differences can be a barrier to interprofessional education and may perpetuate existing hierarchies.[79] Status disparity tends to determine leadership, and who is in charge may lead to continued disparity. The health professions have a long tradition of autocratic and hierarchical leadership. Leaders are typically male physicians and long-tenured nurses who get selected because of their academic or clinical success rather than their leadership skills. Efforts to increase the number of women in leadership roles

in medicine have fallen short of expectations. This can be, in part, attributed to systematic disadvantagement of women and lack of institutional support, i.e., support from existing leadership.[80]

The three diversity constructs described above may have different and sometimes opposing effects on learning environments. They explain some of the tensions between the ideals underpinning interprofessional education and the reality of the clinical workplace.[81] Interprofessional education supports diversity as variety, whereas the clinical workplace is often entrenched in diversity as separation and disparity. This creates unintended messages about the values of the learning environment that can interfere with attracting learners from diverse backgrounds.

Closing the gap

Exemplary learning environments promote collaboration and integration of diverse perspectives by supporting diversity as variety, while countering diversity as separation and disparity. To foster diversity as variety, they create opportunities for collaborative practice and learning. They expand on existing interprofessional education programs[82,83] and create workplace-based learning activities that include practicing clinicians. Simulation-based team training, as successfully implemented in some clinical environments,[84,85] can provide a model. Learning focuses on improving collaboration in daily practice through strategies such as perspective taking and conflict management, and includes explicit discussions about hierarchy and power.[81,86] To further promote variety, inclusion of diverse members of the learning environment in all committees, teams, and other groups is deliberate, with the goal of representation that reflects the composition of the populations served.

To counter diversity as separation and disparity, exemplary learning environments engage in activities that reduce bias and break through stereotypes. These include training programs that create awareness of implicit bias and develop skills to recognize and respond to microaggressions,[87] following the example of initiatives such as the diversity, equity and inclusion training implemented at the University of California, San Francisco, as part of the "Differences Matter" program.[88] Learning materials showcase examples that are nonconforming with existing stereotypes, for example male nurses and female surgeons, or a male patient presenting with anxiety and a female patient presenting with acute coronary syndrome. In team-based learning activities, learners in exemplary learning environments can cross over traditional in-group/out-group barriers by practicing leadership roles aligned with their skills and knowledge, not just their professional backgrounds. In addition,

emphasis on common goals helps mitigate diversity as separation. For example, shifting from profession-based goals (surgeon removes a tumor, nurse treats pain, physical therapist mobilizes the patient) to team-based goals (provide safe and effective care for the patient) shifts professional identities away from professional silos towards a common identity of "health care member."[89,90]

A positive diversity climate creates so-called "psychological safety," defined as people's confidence that they can express their ideas without negative consequences.[91] Psychological safety promotes learning,[92,93] creates positive experiences, and can change perceptions of fit for those considering to join the learning environment.[91] Hence, inclusive learning environments not only promote diversity by attracting learners from diverse backgrounds, but also promote learning itself by providing affordances and creating a climate that invites and engages learners.[94] This can result in a positive reinforcing cycle in which a culture of inclusivity leads to positive learning experiences that invite engagement and thus increase inclusivity.

To support inclusion and diversity and all their beneficial effects on patient care and learning, exemplary learning environments embrace collaborative approaches to leadership that emphasize inclusiveness and relationships.[92,95,96] This follows general trends in our society toward what has been called "new power," which values collaboration, sharing, and transparency, as opposed to the exclusivity, authority, and confidentiality of "old power."[97] Formal leadership training and competence in collaborative leadership are required to become part of a leadership team, and the ivory towers of old power are dismantled because the leaders have the courage to step aside and empower others.

The organizations and agents in the learning environments learn about themselves, and the greater system they are part of, in order to achieve continuous improvement and innovation.

The vision for exemplary learning environments

Educational institutions for health professionals and health care organizations are "learning organizations" that facilitate learning by all involved and continuously transform themselves. In learning organizations, people are continually discovering how they create their reality and how they can change it, and, as a result, such organizations are both adaptive and creative.[98] Such adaptivity and creativity are essential for learning environments in health professions education because of

rapid changes in health care and the ongoing need to advance medical knowledge. To guide continuous process improvement, these learning organizations measure key elements of the learning environment along with learning and health outcomes. In complex systems, change emerges from interaction between agents, is often non-linear and unpredictable, and thereby can be innovative and creative. Thus, exemplary learning environments are adaptive to change and support innovation.

The gap between our vision and the current state

Increasingly, health professions education utilizes outcomes-based assessments to clarify and measure competencies expected from learners at different levels of learning and in different skill domains.[99,100] However, such assessments mostly focus on individual attainment of clinical expertise and overlook skills needed to adaptively respond to the ever-changing health care environment. Also lacking are assessments of the ability of individuals and teams to function collaboratively in complex health care systems.[101] Few organizations routinely collect meaningful data regarding the practice of learners after graduation to inform improvements in education and the learning environments.[102] Moreover, routine assessment to ensure that learning environments produce the desired outcomes at a societal level is lacking. Outcomes could include measures of health care quality, population health, and alignment of number of graduates in each profession/discipline with societal needs.[102–105] Clear standards for such outcomes have not yet been established. Current accreditiation standards for health professions education focus on learning processes and increasingly on characteristics of learning environments that are thought to support learning, but not on outcomes at the societal level. Similarly, accreditation standards for health care systems do not take into account their contributions to the development of future health professionals. Thus, education leaders make decisions about education programs while overlooking the impact on health system outcomes; health system leaders make decisions about clinical care while forgetting the potential impact on education.

While recent efforts by the Accreditation Council for Graduate Medical Education, the American Medical Association, and other organizations to promote education reform are laudable,[106,107] health professions education, historically, has been slow to respond to changes in health care. Curricular reform in medical education typically takes the form of episodic, major institutional change, which often takes several years to complete and usually only affects the pre-clinical years.[108,109] Societal needs have long been a driver of the content of health professions education, yet health care organizations struggle with recent graduates who are not prepared for current

best practice. An example is the 10+ year delay between initial awareness of the opioid epidemic and incorporation of comprehensive curricula regarding opioid prescribing into medical school.[110,111]

Attention for scholarship and discovery in health professions education dates back to Flexner and Florence Nightingale,[19,112] and many health professions schools have programs to develop clinician-scientists. For those who do not participate in such programs, however, exposure to patient-driven inquiry is becoming more limited because of increasing focus on efficiency and clinical protocols.[113] In today's health care, many problems are complex and have no obvious or even known solution, increasing the need to create bridges between patient care and scientific inquiry. This has led to the idea that all health professionals should have the necessary critical thinking skills and an "inquiry habit of mind," "the ability to identify the limits of current knowledge, formulate key questions, and apply research-based strategies for seeking answers."[19,114,115]

Closing the gap

Exemplary learning environments are shaped by routine, data-driven continuous process improvement, so ingrained in the culture of everyday learning and practice that every stakeholder participates in data collection, reflection, adaptation, and innovation. Existing data collection gets expanded to include more comprehensive and informative data on individuals and teams, on learning environments and on institutional outcomes. These data inform a cyclical process of analysis, reflection, and process improvement, analogous to plan-do-study-act (PDSA) cycles, at the individual, team, and organizational levels. This approach expands the concept of "learning health care systems," in which research influences practice and practice influences research,[116] to "learning learning environments," in which research, practice, and education all influence each other. The four simple rules outlined in this report inform the assessments (Table 3).

At the individual level, assessments measure competency against established organizational practice standards for all learners across professions and levels of learning. Examples include "physician dashboards" that assess adherence to protocols and comparison to practice standards[117,118] and learner dashboards for students.[119] Assessment of collective competence is added to individual assessments in recognition that patient care outcomes are often the result of collaborative practice.[120] Competency data inform learning plans created by

individuals and teams, guided by coaches, following the successful examples of coaching programs at various institutions.[121,122]

This process follows the framework of "master adaptive learning," a recently coined term to describe lifelong learning in the health professions.[123] Master adaptive learning integrates the construct of the reflective practitioner with self-regulated learning and adaptive expertise. It describes a metacognitive process that involves purposeful planning of learning based on assessment, feedback, and reflection. Planning is followed by learning, experimenting with what was learned, and adapting new knowledge and skills to actual practice. This process allows for development of routine expertise, needed to function efficiently on everyday tasks, as well as adaptive expertise, required to respond to new problems.[123] The focus on adaptive expertise includes the expectation that all learners develop habits of improvement and inquiry to help devise and implement changes that improve patient care and health.[19]

Routine assessments of learning environments expand beyond availability of learning opportunities and perceptions of stakeholders regarding the learning climate and include objective data measuring achievement of the unified overall mission. At the institutional level, data collection on the performance of graduated learners and their impact on the health of society is standard practice. These data inform curricular reform as well as recruitment and admission practices. In addition, the organizations in exemplary learning environments collaborate in regular review of shared outcome data to guide adaptations and ensure ongoing alignment of goals. For example, curriculum committees review patient care outcomes in a health system to inform revisions in curricular content and format, and patient safety committees review clinician competencies to inform patient care practices. Similar reviews guide prioritization and resource allocation to promote innovation and discovery.

All these continuous improvement processes leverage existing technologies, which, following recommendations in a prior Macy Foundation report, are integrated in such a way that data collection and sharing across organizations and systems is feasible.[124] Accreditation of exemplary learning environments is based on comprehensive review of all outcome data collected across all organizations and programs, all professions, and the continuum of learning, and includes learner, learning environment, and institutional outcome data.

SUMMARY AND CONCLUSIONS

In this paper, we have articulated a vision for exemplary learning environments that prepare, support, and inspire people to work toward optimal health of individuals, populations, and communities. We have stated that learning environments for the health professions are part of complex adaptive systems that include health professional schools and programs, health care organizations, and stakeholders who range from students to leaders to patients. We define learning as a process that leads to change, occurs as a result of experience and interactions, and increases the potential for improved performance, future learning, and discovery. We set such learning as a goal for everyone in the learning environment, both individuals and organizations.

We believe that this vision can be achieved with health professions education, health care systems, and the people they serve coming together to work toward a shared mission; to integrate learning into work and work into learning; to incorporate diverse perspectives and create an inviting, inclusive climate; and to learn from and about themselves in support of continuous improvement and innovation. For each of these four "simple rules" of exemplary learning environments, we described the gap between the vision and the current state and strategies for closing the gap. Those strategies include managing across silos, guided by patient, population, health system, and education outcomes. We hope that if we embrace the ideas above we will look at learning environments in the future and observe that our proposed simple rules are no longer ideals, but the minimum specifications that determine the direction, boundaries, resources, and permissions within the complex system that serves both current and future individuals, populations, and communities.

Table 1. Principles of Complex Adaptive Systems and Simple Rules for Exemplary Learning Environments[1]

Principle	Simple Rule	Strategies to Achieve the Vision
Goals and resources within a complex adaptive system are established with a view toward the whole system, rather than artificially allocating them to parts of the system.	Health care and health professions education share a goal of improving health for individuals, populations, and communities.	• Alignment of structures of care and education, including leadership • Letting go of assumptions about what we need to learn and what learners can contribute • Engaging patients as active contributors to the learning environment
	In exemplary learning environments, learning is work and work is learning.	• Alignment of work and learning • Intentional approach to learning to support development of reflective pracitioners • Supporting personal development and growth to prevent burnout and support well-being
The interactions within a complex adaptive system are often more important than the discrete actions of the individual parts.	Exemplary learning environments recognize that collaboration with integration of diverse perspectives is essential for success.	• Creating opportunities for collaborative practice and learning • Deliberate inclusion of diverse members of the learning environment in all teams and groups • Engaging in activities that reduce bias and break through stereotypes • Embracing inclusive leadership models
Complex systems and the agents that constitute the systems can change over time. Change emerges from interaction between agents, is often non-linear and unpredictable, and, thereby, can be innovative and creative.	The organizations and agents in the learning environments learn from and about themselves, and the greater system they are part of, in order to achieve continuous improvement and innovation.	• Collecting data on individuals and teams, on learning environments, and on institutional outcomes to drive continuous improvement • Promoting master-adaptive learning: adaptive process of learning relevant to practice that involves purposeful planning based on assessment, feedback, and reflection • Fostering habits of improvement and inquiry

1 "Simple rules" are defined as minimum specifications that allow each agent in a complex adaptive system to behave adaptively in the system. See references 1 and 2.

Table 2. Categories of Learning Environments with Examples

Physical	*Virtual*	*Socio-cultural*
Classrooms	Websites	Social networks
Simulation centers	Videos	Mentoring relationships
Clinics	Podcasts	Organizational culture, practice, policies
Hospitals	Games	
Shelters	Social media	
Home environments	Electronic health records	
Libraries		

Table 3. Example Targets for Assessment in Exemplary Learning Environments

Simple Rule	Potential Targets for Assessment
Health care and health professions education share a goal of improving health for individuals, populations, and communities.	• Patient outcomes (quality, safety) • Population health measures • Distribution of health care workforce in relation to societal needs
In exemplary learning environments, learning is work and work is learning	• Occurrence and effectiveness of workplace learning activities • Impact of learner integration on patient care outcomes • Well-being
Exemplary learning environments recognize that collaboration with integration of diverse perspectives is essential for success.	• Diversity of learner population, health care workforce • Prevalence of collaborative practice models • Perceptions of inclusive and inviting learning/workplace climate • Quality of teamwork
The organizations and agents in the learning environments learn from and about themselves, and the greater system they are part of, in order to achieve continuous improvement and innovation.	• Learning outcomes for individuals and teams (competencies) • Effectiveness of learning strategies • Health care system performance measures (quality, safety, patient satisfaction) • Completion of projects that lead to innovations, research, and discoveries

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INTENTIONALLY DESIGNING LEARNING IN THE CLINICAL WORKPLACE AT AURORA HEALTH CARE

Case Study

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INTRODUCTION – PROBLEM

Health care settings, which often serve as the clinical training environment for health professions students, must focus on the Quadruple Aim for health care: (1) improving the health of populations; (2) enhancing the patient's experience of care; (3) reducing the per capita cost of care; and (4) improving the work life of clinicians and staff.[1] Despite numerous organizations echoing the urgent need to align educational and clinical outcomes as well as the need to refocus attention on health and health care outcomes,[2-8] health professions education programs rarely work with these settings to align health care needs with education in the clinical workplace.[2] It is clear what needs to be done. The question is: how can we more deliberately design health professions education across both the continuum of education (students, graduate trainees, practicing clinicians) and across professions to achieve the Quadruple Aim for health care and improve the workplace-learning environment?

To answer this question, we drew upon two principles adapted from continuing professional development (CPD)[6] and one realization about practice. The first principle embodies the call for education to "be grounded in the everyday workplace." This grounding requires that education be "integrated into the health care system, oriented to patient outcomes, guided by multiple sources of performance and outcome data, and team-based." The second principle dictates that these programs should use quality improvement (QI) principles and strategies. Our educational programs should be the collective responsibility of all "health professions, CPD provider organizations (and trainees' sponsoring health professions schools), regulators, and the health system."[6] Through our previous work, we came to realize that many of the attributes of well-being, both from an individual and organizational perspective, are synonymous with strong learning environments. To support well-being in the clinical learning environment, our health professions education programs must have a clear, shared purpose: optimal care for patients and communities by all health care professions. Our programs must then be designed to demonstrate continuous growth (in competence, learning, inquiry, curiosity), learner autonomy (offering increasing control over key decisions affecting them as individuals), and connectedness (to self, patients, and the team) in a safe, respectful, supportive culture (requiring aligned structure and processes).[9-12]

Our organization, Aurora Health Care, is actively working to craft vibrant clinical workplace learning environments to improve patient care, promote continuous learning, and support well-being. This case study focuses on the clinical workplace learning design process and lessons we are learning through implementation. We begin by providing a brief overview of Aurora Health Care followed by a discussion of our redesign goals and guiding principles. Next, we provide examples of two education initiatives that were intentionally designed to align learning in the clinical workplace with education goals. We conclude with lessons learned.

BACKGROUND

Aurora Health Care (AHC) is a private, not-for-profit integrated health care organization with services in more than 30 counties throughout eastern Wisconsin and northern Illinois. Over 33,000 caregivers, (including 1,800 employed physicians and close to 1,000 advanced practice providers) serve more than 1.2 million unique patients annually via a comprehensive network of facilities that includes 15 hospitals and more than 150 clinics and 70 pharmacies.[13] Collectively, AHC is the largest clinical training site in Wisconsin, providing workplace learning for more than 4,500 health professions trainees and students each year. Our education programs are broad-based and include medicine, nursing (at the generalist and advanced levels), pharmacy, pastoral care, and medical sonography. We support clinical rotations and experiences for approximately 500 nurse practitioner students, 115 pharmacy students, and over 550 medical doctor (MD) and doctor of osteopathy (DO) trainees each year.

We are a clinical campus for University of Wisconsin School of Medicine and Public Health (UWSMPH) students and serve as the primary clinical training site for UWSMPH's nationally recognized Training in Urban Medicine and Public Health (TRIUMPH) Program in Milwaukee and the Wisconsin Academy of Rural Medicine (WARM) Program in Green Bay. At the graduate medical education (GME) level, we sponsor 11 specialty training programs with >150 residents/fellows per year. At the continuing medical education (CME/CPD) level, over 2,400 physicians participated in at least one AHC-sponsored CME activity in 2016. This includes Maintenance of Certification (MOC) Part IV improvement in medical practice activities, one of the four required elements that physicians must complete for specialty (re)certification.[14] As an American Board of Medical Specialties (ABMS)-approved portfolio program sponsor, we can design and deliver our own improvement in practice activities.

Joint accreditation is a strategic priority as a single pathway for providing interprofessional continuing education in nursing, pharmacy, and medicine.[15]

Our Goal

Our overall goal is to align health professions education with patient/health care/health system needs through systematic intentional design, implementation, and evaluation of our clinical learning environments situated in our clinical workplaces.

Our Clinical Workplace Learning Environment Design Assets

Our assets start with a long-standing commitment to health professions education in a clinical environment recognized for outstanding clinical quality/care. Our C-suite leaders (including our chief executive officer, chief medical officer, and chief nursing officer) as well as our clinical teachers and caregivers are committed to actively preparing the health care workforce of the future.

Senior educational leaders including physicians, nurse practitioners, pharmacists, and educators are actively designing education—applying the sciences of learning and improvement—to support learning in a busy clinical workplace. As one colleague described it, her overall educational role is to be a *"learning design architect and engineer"* who optimizes patient care and learning. Paralleling this leadership commitment, we have a cadre of clinical teachers dedicated to providing the highest quality care for patients while providing education for their current/future colleagues. They serve diverse populations in a variety of clinical settings that are located in 30 Wisconsin-Northern Illinois communities. The richness of our clinical platform and our commitment to health professions education allows us to pilot clinical workplace learning initiatives in selected sites.

Our Guiding Clinical Learning Environment Design Principles and Processes

Learning and learners in our clinical workplaces should add value by improving health for patients and/or improving the health system's priority areas.[8] In this environment, learning must be patient-centered and explicitly designed to optimize quality, safety, and the experiences of both the patient and the health care team members,[16] including trainees. Using a competency-based model, we started by identifying the health needs of the patients, populations, and the health system[17] and incorporated future job roles and competencies, such as team-based care and

data dashboards.[18-19] We then sought to align education across the continuum to address the identified needs, build connections that would improve and sustain team performance, enhance efficiency, and optimize the allocation of resources.[20] Throughout this process, we considered the well-being of both teachers and learners.[1] Beginning with the end in mind, our evaluation focused on Kirkpatrick's "results" level, those desired outcomes and leading indicators of clinical care that provide evidence of learning and behavior change.[21]

This case study describes how we are intentionally designing clinical micro-learning environments in our Milwaukee-based primary care residency clinics. We began our work by reaffirming that the best way to achieve optimal health care in our clinical training learning environments was to ensure alignment between health care system and medical education needs across the continuum of physician education, and then expand our focus to include interprofessional education collaborative practice (IPECP). We selected pilot clinical workplace sites that already had health professions trainees actively participating in direct patient care. We knew that the education and clinical leaders at these sites and their teams valued their roles as health professions educators **and** as patient care providers. Equally important, they were willing to collaborate on the (re)design of our pilots, which were informed by the sciences of learning, well-being, and improvement, so that we could build on successes and learn from challenges.

PROOF OF ALIGNMENT CONCEPT: TWO INTENTIONAL DESIGNS FOR LEARNING IN THE CLINICAL WORKPLACE

Phase 1: Aligning Education across the Continuum of Physician Education

Clinicians and their trainees work and learn in the same clinical environments. To begin, we had to recognize the "collisions" between the two contexts (AHC's clinical workplace and the learning environment expected by our trainees and their sponsoring schools). Making these differences visible (see Table 1) enabled us to identify common ground.

Table 1: Identifying Differences in Key Constructs from Perspectives of the Clinical Workplace and Trainee's Sponsoring Organization

Key Constructs	*Existing Clinical Workplace at AHC*	*Trainees' Sponsoring Schools Ideal/Expected Workplace*
Location	Clinics and hospital inpatient services	Clinic/hospital and college/ university
Primary focus	Patient	Learner
Organizational accreditors and regulators	Joint Commission, Centers for Medicare & Medicaid Services (CMS) Professional certification and licensing requirements	Education accreditation for each professions' school/ program Professional licensing and certification requirements
Physical and virtual spaces	Designed to optimize patient care (e.g., exam/staff rooms, secure computers)	Designed to optimize education (e.g., team conference and huddle rooms, internet access)
Leaders	Clinical and administrative	Health professions educators and academics
Learners and learning	Licensed and employed health care professionals Desire to optimize patient/ population care Engage in inquiry/curiosity via workplace learning or formal education Need to meet hospital, licensing, and board recertification requirements	Learners "in training" Desire to meet "competencies" and graduation requirements ultimately to optimize patient/population care Engage in inquiry/curiosity via directed and informal learning as time available Need to meet initial licensing and board certification requirements
Teachers	Typically professional peers within or across professions	Licensed professionals within trainee's profession; vetted by trainee's school

Key Constructs	*Existing Clinical Workplace at AHC*	*Trainees' Sponsoring Schools Ideal/Expected Workplace*
Well-being	Addressed via patient safety and quality lens for optimal patient care Focus on engaging/retaining workforce Strategies aimed at individual and organizational levels Evaluated by return on investment for teaching roles	Addressed by education accreditation Focus on creating a vibrant, respectful learning environment Teaching perceived as honor; "valued" intrinsically thus recognized with minimal or no compensation/buy-out of time

To align learning and health needs we created an Integrated Workplace Matrix[22] with the continuum of physician education levels on the "x" axis (medical student, residents/fellows, and practicing physicians engaged in CME/CPD) and existing education initiatives at each level and AHC priorities on the "y" axis. Education and clinical quality leaders used this matrix to identify training gaps and opportunities using existing clinical data sets. For example, AHC clinical quality metrics revealed an opportunity to improve asthma care in our primary care clinics that serve as sites for medical student and resident training. We linked this identified gap in asthma care to the competency expectations by training level (medical school, residency program) and by respective accreditation standards and milestones (e.g., ACGME and LCME management of patients with chronic disease). Identifying these commonalities allowed us to align, design, and evaluate physician education across the continuum[23] as we focused around a clinical care need, in this case, asthma.

Family physicians and residents completed a Maintenance of Certification (MOC) Part IV-approved improvement in practice activity focused on asthma via our online learning management system. (Note: MOC completion is a requirement for family medicine residents to sit for their initial board certification examination.) Clinic leaders reinforced the commitment to high-quality asthma care, as all clinic members are accountable for meeting quality metrics. As an integral part of our health care team, third-year medical students on their required primary care rotation received a one-hour orientation on asthma care, including their expected

role(s) when seeing patients with an established asthma diagnosis. An example of a key role: on every patient seen with an asthma diagnosis, students are expected to obtain an asthma control test (ACT) and report any score below threshold. One hundred percent of third-year medical students reported obtaining the ACT as appropriate and were able to see the positive effect on their patient's care. Students valued having a "clearly defined role" that "makes a difference." Eighty percent of residents and faculty completing the module perceived the MOC training as a high return for the time invested; a very positive finding given that many physicians express negative opinions about this specialty board certification requirement.[24]

Clinical quality measures at baseline (January 2013) and post-module implementation (December 2014) were compared on ACT use, asthma action plan (AAP) completion, and percentage of patients on asthma control medication (ACM) in the targeted residency teaching clinics. Clinical quality data demonstrated improvements in all asthma metrics, with average increases of 21% in ACT completion, 34% in use of AAP, and 7% in ACM use. Our metric improvements in asthma care have been sustained through September 2017. The success of this and similarly aligned projects (nutrition,[25] CRC cancer screening[26]) has resulted in strong support by trainees, clinical teachers, and clinical leaders for aligning patient care and learning across the continuum of physician education.

With each success, individuals' "dread" of fulfilling check-box requirements (i.e., learning for specialty board certification and licensure) is being replaced by the realization that learning can be aligned with clinical workplace gaps, occur in "teams," be engaging, and result in improvements in patient care! These realizations align with key characteristics of well-being: purpose-driven work with visible outcomes, engagement with others who share that purpose, support from organizations that recognize and value their work, and autonomy to design medical practice improvements.

Phase 2: Aligning Health Care Needs and Education Across the Professions

Our successes aligning, designing, and evaluating education across the continuum of physician education with clinical quality needs supported our move to the next phase of our goal: aligning healthcare needs and interprofessional education and collaborative practice (IPECP) in the clinical workplace.[27]

Getting Started – Review the Literature

We began our IPECP journey with a literature search that included a review of guidelines and references from the National Center for Interprofessional Practice and Education,[27] as well as informal conversations with knowledgeable interprofessional education (IPE) colleagues. Typically, reports on IPE focus on education in classroom and simulation settings rather than in the clinical workplace. To address this gap, we collaborated with IPE colleagues nationally to identify best practices for IPECP in the clinical setting and subsequently published our findings.[16] With this as background, we then created an Interprofessional Clinical Learning Environment Checklist (see Figure 1) to guide our initial IPECP design efforts in three major areas: people, which included leaders and teachers across professions; clinical site readiness; and process, emphasizing rapid-cycle improvements—i.e., Plan, Do, Study, Act (PDSA)—and workflows.

Figure 1: Interprofessional Clinical Learning Environment Checklist[28]

Interprofessional Clinical Learning Environment Checklist	
✓ if yes	*Key Features to Consider/Discuss when Considering IPE in the Clinical Workplace*
PEOPLE: LEADERSHIP AND TEACHERS (ACROSS THE PROFESSIONS)	
	1. Leaders and teachers actively champion and support IPE in the clinical workplace
	2. Leaders see trainees as adding value to patient care by aligning patient and educational priorities
	3. Delineate various IPE trainees' scope of practice and align with accreditation & supervision requirements
	4. Providers in the clinical workplace embrace IPE and the principles of patient-centered collaborative care
	5. Adapt existing evidence-based educational strategies approaches to support IPE (e.g., case conferences, clinic huddles)
	6. Teacher development resources/training available for on-site and web-based IPE, oriented with option for continuing education credit
CLINICAL SITE READINESS	
	7. Clinical workplace provides patient-centered care using a collaborative practice, team-based approach with multiple professions active at the site
	8. Sufficient clinical workspace to accommodate multiple health professions students (e.g., desktop/mobile workstations to access/review EHR, size/# of clinical and/or patient care rooms, debriefing areas)
	9. Clinical teachers available in each IPE profession
	10. Experienced clinical teacher(s) in at least one profession
	11. Provide ongoing feedback to IPE trainees and end of experience final assessments
	12. Patients willing to see interprofessional trainees
PROCESSES: RAPID CYCLE PDSA & WORKFLOWS	
	13. Workplace providers and trainees consider workplace-based IPE as opportunity for rapid cycle PDSA
	14. IPE can "start small," be tested, and "spread" results consistent with IHI Improvement Model
	15. Workflows for IPE clinical placements and onboarding to health care system and site

Checklist Domain 1: Engaging People–Clinical and Education Leaders, Teachers, and Staff

We selected one of our primary care residency clinics as our pilot site as its leaders and teachers actively champion and support IPE and collaborative practice in the clinical workplace with nurse practitioner, pharmacy, and medicine learners.

They already knew, through past participation in our physician continuum activities, that aligning patient care and educational priorities can result in achieving improved outcomes and learning. Recognizing that we must start small, they were willing to fail forward by building on what we learned and to "spread" results consistent with Institute for Health Improvement's Model for Improvement (a model used for our GME requirements and CME/CPD Part IV activities).

A key element of engagement in our clinical workplace is our focus on optimizing care for patients and sustaining provider and staff well-being. During ongoing discussions with clinical and education leaders specific to Checklist Domain 1, we made three strategic decisions regarding our ambulatory-based IPECP.

First, following the competency-based education precept to concentrate on a patient population need, our health care leaders and educators decided to focus on patients with an identified chronic disease where there was an opportunity for improvement. After reviewing quality data, a consensus emerged that patients diagnosed with diabetes mellitus (DM) who had a Hemoglobin A1c (A1c) ≥ 8.0 provided an ideal opportunity for patient, clinic, education, and professions alignment to improve care (IPECP-DM).

After identifying DM patients as the focus, we engaged clinic site leaders and staff in identifying how the IPECP-DM could be integrated into our existing work flows and expectations (e.g., on time, high quality, safe care, billing, documentation) while allowing learners to meet their other clinical half-day education requirements. Our second set of strategic decisions emerged from these discussions. The profession that the patient was scheduled to see would have primary responsibility for that patient's care, including care management decisions, documentation, and billing. That profession's "staffing faculty member" would serve as the IPECP-DM supervisor to ensure compliance with certifying boards, accrediting bodies, and/or school's supervision requirements. For example, if a patient is scheduled to see the nurse practitioner (NP) trainee, then the NP faculty has primary responsibility for

that patient's care and for staffing the IPECP-DM discussion with the medicine and pharmacy trainees.

Our third strategic decision associated with Checklist Domain 1 focused on IPECP teacher preparation, emphasizing the primary profession's faculty/staffing role. We knew that all pilot clinic faculty members in each of the three health professions recognized the importance of collaborative care, were supportive of trying innovative interprofessional approaches, and had previously consulted with the other professions about patients informally during the clinic. We also knew that all family medicine faculty members in the pilot clinic completed a one-hour per month longitudinal faculty development course focused on instructional design (from gap identification to evaluation). These factors allowed us to keep our IPECP teacher preparation simple with a single emphasis on the primary profession's faculty role. Simply put, the primary faculty's role was to engage and "invite" each involved profession's trainee(s) to highlight one or two key contributions for improved patient care during the faculty's "staffing" discussion with the primary profession's learner. Methods for this focused IPECP-DM faculty development occurred through discussions of the IPECP-DM fact sheets and flow diagrams at the start of clinic, one-on-one coaching, and/or through huddles held during staffing breaks in the clinic.

Checklist Domain 2: Facilities/Clinical Site Readiness

Our clinical/education leaders are also experienced clinical teachers for one of three professions—medicine, pharmacy, and advanced practice nursing (nurse practitioners)—and are co-located in our family medicine residency clinic. While these groups engage in collaborative care in this setting, it is typically in the form of a "curbside" consult, since teaching/staffing occurs in the same room or by referral, with each profession seeing the patient independently. This clinic was ideal for IPECP because it already had an active teaching site with multiple professions, and patients served by the practice were accustomed to health profession trainees.

As the IPECP workflow was successively refined, challenges began to emerge related to exam room size and faculty and trainee schedules. The exam rooms were not able to accommodate all care team members as well as patient and family members at the same time. Thus, we adapted the clinic's video precepting approach to allow other professions' trainees to observe the primary trainee's interaction with the patient and family using a shared screen and three-way headphone. A second challenge was that not all professions were present on

the same half day; starting times and clinic appointment lengths vary in order to facilitate patient flow and staffing levels. To overcome these scheduling challenges, we agreed to implement IPECP-DM on half-days when at least two professions and their teachers were available.

Checklist Domain 3: Processes – Rapid Cycle PDSA and Workflows

The culture of our clinics includes a commitment to continuous QI. All providers and staff members receive monthly quality and patient experience metrics to monitor their progress towards their goal of providing optimal care for patients. Our physician resident programs have adopted the Institute for Health Care Improvement's (IHI) Model for Improvement and all pharmacy residents, like our medical residents, are required to do a QI project; as such, the notion of starting small with rapid cycle PDSA cycles is embedded in our culture. Clinical placements for nurse practitioners and medical students occur through a central clinician student services office and all trainees receive health care system and site onboarding.[29]

Our health professions teachers have multiple responsibilities, including seeing their own patients, teaching core curriculum sessions, staffing at multiple locations, and serving on committees; therefore, the cadre of teachers varies daily and weekly. In addition to knowing who would be there on any given day, other challenges emerged; these are outlined in the questions below:

How do we ensure effective communication among participants?

In this clinical learning environment, one of our concerns centered on ensuring effective communication. Convening a meeting of all leaders and participants was nearly impossible given the varied hours that different professions saw patients as well as their other professional and family commitments. As part of our well-being strategy, we do not schedule early or late meetings. Since digital and paper inboxes and bulletin boards are often full, we wondered how we could keep participants and key stakeholders connected and up to date. Multiple strategies have been effective for us, including IPECP-DM detailing where project leaders check in with participants to provide updates on workflows and schedules as well as providing opportunities for participants to identify concerns and solutions. Standing meetings such as huddles, resident and faculty meetings, or clinical practice committee meetings have also been used as an effective vehicle for communication. And

finally, email updates in the form of frequently asked questions provide an additional communication channel.

How do we assure that IPECP-DM workflow is accurate?

Because of the communication strategies outlined above, faculty members know that the workflow is updated on a regular basis, incorporating new ideas and concerns. The current workflow is reviewed at the start of each IPECP session with the involved professions' faculty and trainees.

How do we maintain participants' enthusiasm as we balance "let's just do it" with "what's taking so long?"

Balancing participants' "just do it" desires with the project team needs for ensuring a "reasonable chance of success" has meant that we don't always have the textbook perfect instructional design in place or follow our timelines. For example, our first implementation was planned for late October, but at the last minute, the clinic schedules of key players changed, so we delayed the rollout until mid-November.

What and how much data is "good enough" to allow us to continue improving?

Obtaining data is an essential but often resource-intensive activity; as such, we sought to use existing data sources and align with other data requirements when possible. For example, we used selected items from clinic metrics and employee surveys to learner assessments, rotation evaluations, and ACGME annual surveys. This approach provides longitudinal data without additional burden. In a perfect design, our pre- and post-data would be easily available and matched to implementation timeframes, but as learners change rotations and teachers' schedules shift, this continues to be a work in progress. We are using a PDSA approach to evaluate our progress, using data that we consider directionally correct to guide next steps. Additional information on our IPECP evaluation can be found in the Appendix.

Our pilot results demonstrate the value of this IPECP workplace education on our faculty members and their trainees. Our workflow worked. Patients whose A1c $\geq$ 8.0 were seen by the primary profession clinician. The students from other professions observed via video link in the staffing area. All involved actively participated in staffing discussions facilitated by the primary profession's faculty.

Time-based metrics, including patient visit, staffing, and discharge from clinic time, occurred within the scheduled timeframe. All students contributed to the debriefing results, consistent with collaborative practice. For example, during the first IPECP-DM staffing discussion, the pharmacy student proposed an alternative diabetic medication to alleviate the patient's stomach distress and non-compliance. The primary profession's staff and other team members were not familiar with the proposed medication and, based on this new knowledge, they prescribed it for the patient. The success of this new approach quickly spread through the clinic establishing positive perceptions about the IPECP-DM rollout!

Much to our delight, participants in the clinical workplace were enthusiastic! Trainees requested the opportunity to participate in more IPECP-DM. Peer learning occurred as the observing students began to chat among themselves about medications, how to increase patients' commitment to their health, and/or noting how to complete a particular exam proficiently and efficiently. Overall, the staffing faculty reported that participation in the IPECP session was a good use of their time (mean score of 4.5 on 5-point scale where 1 = strongly disagree to 5 = strongly agree), as did trainees (mean score of 4.6). We are learning that a key success factor is patient selection. If patients have complex problems with significant psychosocial issues, there is often less opportunity for collaborative practice in the limited time window of staffing.

LESSONS LEARNED

Our experience in planning and implementing innovations designed to align health system clinical quality needs with clinical learning environments has provided many insights; we highlight some of the lessons learned below:

1. Integrating clinical education into complex systems

Our clinical workplaces are complex microsystems. We seek to standardize many components to optimize quality, safety, and efficiency. As in any complex system, variation exists. Besides patient complexity and uniqueness, other drivers of variation stem from several sources, including social determinants of health, practitioner and staff competence, expectations, intrinsic motivation factors, tolerance for ambiguity, and schedule variation. When you add trainees to this vibrant, complex environment, you are adding even more variation. Yet adding

trainees to this environment achieves what Lave and Wenger framed as situated learning: authentic participation in a real world environment to advance both their content/procedural and tacit knowledge (e.g., language, behaviors, roles).[30] Reframing these complex environments as opportunities to focus on achieving a shared common purpose—high-quality, safe care for patients and well-being for learners, teachers, and staff—sets the stage for key stakeholders to intentionally design the clinical workplace-learning environment.

2. Health professions educator as clinical learning environment architect/ engineer for clinical workplace learning

Our success to date can be attributed, in part, to the recognition that health professions educators have a new role: clinical learning environment architect/ engineer (see Figure 2). This role echoes ACGME's President and CEO Thomas Nasca's vision for the Clinical Learning Environment Review (CLER), which "… is to advance clinical learning environments that meet the public's need for physicians who are prepared not only to deliver excellent technical and humanistic care but also to participate in or lead constructive change in the quality and safety of our delivery system throughout their careers."[31]

What are the key elements of this new health professions educator role? At this point, we believe there are two key elements to the educator role. First, it is important to have an articulated in-action model of workplace learning as purpose- and meaning-driven. In this model, learning is the means to achieve our purpose of safe, high-quality patient care (the kind you want for your family) in a vibrant, continuously improving, engaged environment. Second, educators must be adaptive experts in education. They must design curricula based on the realities of clinical care while being skilled at working in fast-forming teams to optimize the learning opportunities in active clinical settings. More specifically, as an adaptive expert educator situated in a clinical workplace, the educator must have the ability to work collaboratively, solve problems creatively, and resolve unpredictable situations with aplomb. Agilely persistent and patient, the educator must be willing to redesign the learning environment, building on lessons learned (not failures) to optimize learning and patient care, secure in the knowledge that each intentional education step counts. In summary, clinical learning environment architects must work at all levels of the learning environment: personal, social, organizational, and physical/virtual to achieve success.

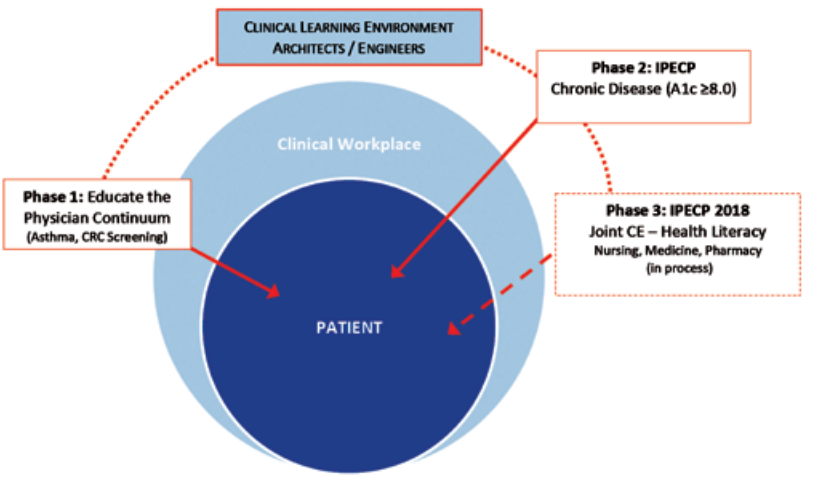
3. Clinical learning environment design must start with a culture of safety and well-being

Learning and practice are optimized when we combine safety and well-being to design a blame-free environment that is psychologically safe, respectful, focused on competence, and with a sense of perceived autonomy balanced with collegiality amongst its members who have a shared purpose. We continue to explore how to align these cross-cutting elements from patient safety, well-being, and education to create win-win opportunities as we design our clinical learning environments.

4. Build and leverage synergies in continuing education/professional development

As physicians are required to participate in MOC activities, building programs that provide MOC credits is a mutually beneficial situation. In partnership with our CME/CPD office, we secured American Board of Family Medicine MOC Part IV approvals that prepared us to successfully obtain certification (and recertification) as an ABMS Portfolio Provider during Phase 1. Additionally, we are actively working toward Joint Accreditation to support pharmacy, nursing, and physician continuing education credits through a single, streamlined process. Our CPD steering committee, co-chaired by a senior system leader in quality, includes senior hospital, patient safety, pharmacy, physician, advanced practice, and service line/education leaders, positioning us for success in Joint Accreditation and interprofessional education collaborative practice.

Figure 2: Emerging Role for Health Professions Educators
Need to Align Patient, Clinical Workplace, and Learner Needs (across the continuum and professions) to Meet the Quadruple Aim for Health Care



5. IPECP is just one means to support achieving the Quadruple Aim

We remind ourselves and other stakeholders that interprofessional education and collaborative practice is not an end in itself, but is one strategy to achieve the Quadruple Aim in health care. *"The value and success of interprofessional care is measured by how well it achieves these aims."*[32]

6. Co-locating professions is a place to start IPECP, but…

Through the lens of co-located learners, we have identified additional opportunities (e.g., AHC's national, monthly "Most Difficult Geriatric Fellows Case Conference")[33] that would require only a modest intentional redesign to highlight IPECP competencies[34] for participating trainees at more junior levels *and* across professions. Co-location of students in clinical settings is often dependent on teacher availability and the requirements of the various professions, which may limit IPECP opportunities. For example, the students' sponsoring organization/ professional accreditation requirements typically define who can provide direct supervision of a trainee (e.g., pharmacy with pharmacy) and type of location (e.g., nursing placements are typically in hospital, not ambulatory, settings). Thus, while one place to start may be co-locating the professions, another place to start may be considering cross-cutting topics (e.g., health literacy) that can be planned collaboratively and then accredited by each profession for continuing education and for trainees.

7. It takes a team…

While we are formally recognizing the individuals listed in Table 2 as active contributors to the design of our phase 1, phase 2, or our efforts to characterize lessons learned, the number of individuals involved has been much larger. From consultations with the leaders of trainees' sponsoring organizations and the learners themselves, to caregivers in our clinics and those in our education and quality/ safety offices, these small initiatives succeed based on the contributions of many.

Table 2: Project Team Members [✓] and Co-Leads [*] by Job Title/Contribution Phase in Alphabetical Order

Name	*Job Title at Time of Activity*	*Phase 1*	*Phase 2*	*Lessons Learned*
Andy Anderson, MD, MBA	Chief Medical Officer – System & Executive Vice President; Associate Dean for Milwaukee Academic Campus-University Wisconsin School of Medicine & Public Health	*	*	*
Jacob Bidwell, MD	Designated Institutional Officer – Graduate Medical Education	✓		✓
John Brill, MD, MPH	Medical Director – Clinician Student Services	*	*	*
Chris Casselman, MA	Supervisor Clinical Operations – Family Care Center		✓	
Michael Conway, MS, RRT	Sr. Quality Improvements Coordinator	✓		
Terry Frederick	Performance Improvement Specialist – CPD	✓		
Jacqueline Gisch, RN, MSN	VP for Quality – Co Chair – CPD Steering Committee	✓		
Vanessa Grunske, PharmD	Clinical Pharmacist Senior		*	
Jennifer Foti, PharmD	Clinical Pharmacist		✓	
Jennifer Hartlaub, DNP, APNP, FNP-BC	Advanced Practice Director – Ambulatory		*	*
Mary Beth Kingston, RN, MSN, NEA-BC	Executive Vice President and Chief Nursing Officer			✓
Wilhelm Lehmann, MD	Chair and Program Director – Family Medicine; Course Director – Colorectal Cancer Screening MOC Part IV	✓	✓	

Name	*Job Title at Time of Activity*	*Phase 1*	*Phase 2*	*Lessons Learned*
Amy Mahlum, PharmD	Clinical Coordinator for Pharm Student & Resident Education		✓	
Colleen M. Nichols, MD	Medical Director – CPD	✓		
Mayra J. Ortega	Medical Assistant – Family Care Center		✓	
Kristin Ouweneel	Manager – CPD	*		✓
Kristin Rivera	Manager Clinician Student Services	*	*	✓
Mark Robinson, DO	Medical Director – Family Care Center		✓	✓
Deborah Simpson, PhD	Director – Medical Education Programs	*	*	*
Lisa Sullivan Vedder, MD	Family Physician – Course Director Asthma MOC Part IV	*		✓

In Summary: We are committed to taking the lessons learned in aligning and synergizing the needs of our patients with education across the continuum *and* professions into other settings and topics—improving the learning environment for all in the process.

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APPENDIX 1: THE INTENTIONAL DESIGN AND EVALUATION OUR IPECP-DM IN THE CLINICAL WORKPLACE

1. Aims [Revised 11.3.2017]

- Implement interprofessional education collaborative practice (IPECP) with physicians, pharmacists, and nurse practitioners for diabetic patients with A1c ≥ 8.0 with scheduled clinic appointments

- Continuously improve and expand IPECP-DM over time to incorporate value-added direct patient care roles matched to learner level within scope of each professions' roles to improve health outcomes for patients with this complex, chronic disease

2. Objectives – IPECP learners and faculty will be able to:

- Describe the scope of their roles and the patient care approach of the other IPECP professions

- Experience/participate in IPECP in a primary care clinic that is part of an integrated health care system

- Identify the "value" of a team-based approach with multiple professions in meeting the needs of patients with complex chronic disease (seeing not just the disease, but the whole person)

- Actively participate as "co-learners" in rapid cycle PDSAs to improve IPECP

- Patient-centered teaching across professions (IPECP faculty)

3. Methods – Rapid Cycle PDSA

- Orient (and continuously update) IPECP-DM participants/stakeholders
- Implement workflow per IPECP-DM vision layout
- Evaluate and revise

4. Evaluation Measures

- Using existing measures provides a low-burden approach to longitudinal data collection, as many of these data points highlight key features of IPECP. Item-level data for key evaluation of IPECP-related objectives (e.g., teamwork, role/scope of professions, quality of care/value added, communication, values) will be extracted and reported in graphic form when possible (e.g., dashboards, run chart), and continuously shared with key stakeholders and participants.
- Clinic Metrics: DM quality-of-care indicators and patient experience comments by provider when available. As IPECP-DM must run seamlessly within existing schedules, clinic on-time appointment metrics and, as project evolves, no-show rates and referrals to diabetic educators may also be monitored. Note that most of these metrics are provided monthly as a rolling 12-month score.
- Survey of Patient Safety: Completed annually by all employees, with clinic-level reports available showing comparisons with aggregate data.
- Employee Engagement Survey: Completed annually by all employees with clinic-level report available compared with aggregate.
- Performance Assessments of Learners: Utilize items on existing assessments as provided by sponsoring organizations including competency-based assessments (e.g., ACGME milestones).
- Rotation/Program Evaluations: Items on existing evaluations completed by learners upon rotation completion.

- TeamSTEPPS® 2.0 Team Assessment Questionnaire (TAQ): Many of the above measures have a significant time lag before results are available. Thus, we sought to use an established tool to gather data from IPECP participants at the end of each half-day IPECP session. As our clinic had previous training in TeamSTEPPS®, we selected the two TAQ domains—"team skill" and "team climate and atmosphere"—as they were most consistent with our workplace focus and objectives. Several items were added to the modified TAQ specific to our objectives and an overall ROI item using the same five-point Likert scale rating as TAQ (strongly agree to strongly disagree).

- Debriefing Huddles: Held at the end of selected IPECP half-day clinics to provide a just-in-time data source using a field notes approach by one of the project team members.

APPENDIX 2: GLOSSARY

ABMS: *American Board of Medical Specialties* is a nationally recognized not-for-profit organization, serving the public and the medical profession by improving the quality of health care through setting professional and educational standards for medical specialty practice and certification in partnership with its 24 certifying member boards.

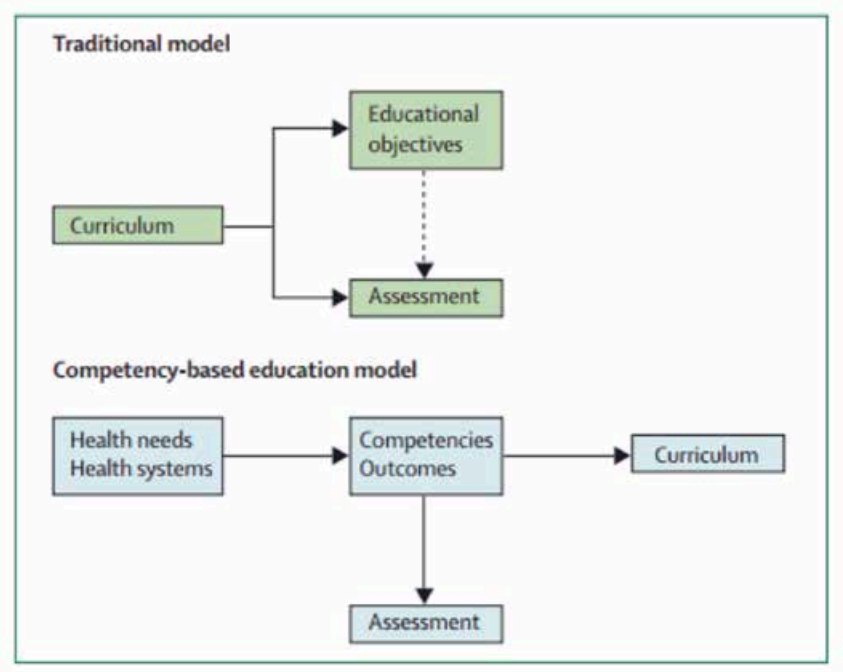
ACGME: *Accreditation Council for Graduate Medical Education* is an independent, not-for-profit, physician-led organization that sets and monitors the professional educational standards for residency and fellowship programs.

AHC: *Aurora Health Care* is a private, not-for-profit integrated health care system providing services in more than 30 counties throughout eastern Wisconsin and northern Illinois.

APPs: *Advanced practice providers* (e.g., nurse practitioners, physician assistants), may also be referred to as advanced practice clinicians.

Competency-Based Approach to Curriculum and Team-Based Learning: This is a disciplined approach to specify the health problems to be addressed, identify the

requisite competencies required of graduates for health system performance, tailor the curriculum to achieve competencies, and assess achievements and shortfalls.[17]



Adapted from Frenk J, Chen L, Bhutta ZA, et al. Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. Lancet 2010;376:1923-58.

CE: *Continuing education*

CP: *Interprofessional (or collaborative) care/practice*, as defined by the World Health Organization, occurs when multiple health professionals provide comprehensive health services by working with patients, families, caregivers, and communities to deliver the highest quality of care across settings.[35]

CME: *Continuing medical education*

CMS: *Centers for Medicare & Medicaid Services*

CPD: *Continuing professional development*

C-suite: C-suite gets its name from the titles of top senior executives which tend to start with the letter "C," for "chief," as in chief executive officer (CEO), chief financial

officer (CFO), chief operating officer (COO), and chief information officer (CIO). Also called "C-level executives."

GME: *Graduate Medical Education* is typically used in reference to education of physician residents and fellows.

IPECP: *Interprofessional education and collaborative practice* is defined by the National Center for Interprofessional Practice and Education (NCIPE) as the nexus of IPE and CP and is cognizant that significant training occurs in the clinical workplace.[27]

IPECP-DM: Aurora Health Care's interprofessional education collaborative practice initiative focused on patients with diabetes mellitus with A1c ≥8.0.

IPE: *Interprofessional education*, as defined by the World Health Organization, "occurs when two or more professions (students, residents, and health workers) learn with, about, and from each other to enable effective collaboration and improve health outcomes."[35]

JC: *The Joint Commission*—formerly the Joint Commission on Accreditation of Healthcare Organizations (JCAHO)—is an independent, not-for-profit organization that accredits and certifies nearly 21,000 health care organizations and programs in the United States. Joint Commission accreditation and certification is recognized nationwide as a symbol of quality that reflects an organization's commitment to meeting certain performance standards.

Joint accreditation: Allows an organization the opportunity to be simultaneously accredited to provide medicine, pharmacy, and nursing continuing education activities through a single, unified application process, fee structure, and set of accreditation standards.[15]

MOC: *Maintenance of Certification* through American Board of Medical Specialties. Physicians maintain their medical specialty expertise by participating in a robust continuous professional development program called the American Board of Medical Specialties Program for Maintenance of Certification. MOC provides physicians a structured approach for enhancing patient care and improving patient outcomes through focused assessment and improvement activities. Board certification is a voluntary process, and one that is very different from medical licensure. Obtaining a medical license sets the minimum competency requirements to diagnose and treat patients; it is not specialty-specific. Board certification

demonstrates a physician's exceptional expertise in a particular specialty and/or subspecialty of medical practice.

NP: *Nurse practitioner*

TRIUMPH: *The Training in Urban Medicine and Public Health* program is a focus within the MD Program curriculum at the University of Wisconsin School of Medicine and Public Health. Students selected to participate in this program are committed to providing health care for medically underserved urban populations and reducing health disparities in Milwaukee, Wisconsin.

UWSMPH: *University of Wisconsin School of Medicine and Public Health's* main campus is located in Madison with statewide academic campus locations in Milwaukee, Marshfield, Green Bay, and La Crosse.

WARM: *The Wisconsin Academy of Rural Medicine* is a rural education program within the MD Program curriculum at the University of Wisconsin School of Medicine and Public Health. Its goal is to address physician shortages in rural areas by admitting and training students who intend to practice rural medicine, ultimately helping improve the health of rural Wisconsin communities.

OUR LADY OF THE LAKE REGIONAL MEDICAL CENTER:

TRANSFORMING A LARGE TERTIARY COMMUNITY HOSPITAL INTO A CLINICAL LEARNING ENVIRONMENT

Case Study

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Our Lady of the Lake Regional Medical Center (OLOL), a member of the Franciscan Missionaries of Our Lady Health System, has served the Greater Baton Rouge area for over 90 years. Since its inception, OLOL has served as a clinical learning environment for nursing students; however, OLOL began educating medical students and residents only 12 years ago. This transition commenced with Hurricane Katrina's devastation of New Orleans in 2005 and solidified in 2013 when the state of Louisiana began closing its public hospitals and entered into

a Cooperative Endeavor Agreement with OLOL. Within this relatively short time, OLOL transformed from a large community hospital to an academic medical center. Inherent in this substantial transformation were challenges, including the rapid expansion of both patients served and learners rotating, incorporating Graduate Medical Education (GME) into the hospital, and blending the cultures of a public institution and a religious-based private institution. The purpose of this paper is to explain the history of OLOL and its transformation from a non-academic entity to an interdisciplinary clinical learning environment. We will describe the challenges that arose throughout the transformation and how OLOL overcame those challenges by focusing on patient safety, quality improvement, research, faculty development, interprofessional (IP) learning and practice, and a shared vision of caring for the underserved.

HISTORY OF OLOL

From the day six Franciscan sisters left the life they knew in Calais, France and arrived in early 20th century Louisiana, they were united in a single purpose: to serve God by caring for the sick and poor. Fulfilling that purpose led the sisters to open the Our Lady of the Lake Sanatorium in 1923 with 100 beds, six surgical suites, and a school of nursing. Historically, the clinical learning environment focused on nurses teaching nursing students. This clinical learning environment was largely physically and socially confined to its own silo, as physicians and other team members were rarely involved in the education of the nursing students.

OLOL's Transformation to an Academic Medical Center

Immediately following Hurricane Katrina in 2005, OLOL accepted displaced residents and faculty from Louisiana State University Health Sciences Center (LSUHSC) and Tulane University Schools of Medicine in New Orleans. Many medical staff were alumni of these programs and were committed to supporting GME by providing clinical rotations on OLOL's campus. Though most programs returned to New Orleans within a year, several continued with clinical rotations at OLOL. After the initial success with GME following Hurricane Katrina, the development of a pediatric residency program seemed like a natural progression bolstered by the fact that OLOL was the largest provider of pediatric services in the region. In 2010, OLOL opened its Pediatric Residency Program, one of only four pediatric training programs in Louisiana.

During 2013 and 2014, Louisiana underwent a historic transformation as nine of its ten LSUHSC public hospitals transitioned to public-private partnerships. Earl K. Long Medical Center (EKL), the state-run hospital in Baton Rouge that served a significant portion of the local indigent population, was set to close in November 2013. This closure had tremendous implications for the residents of Baton Rouge, 26% of whom live in poverty.[1] Planning for the transition of patient care and GME from EKL to OLOL began in 2010 with an agreement between the Board of Supervisors of Louisiana State University (LSU) and the State of Louisiana with OLOL. Prior to its closure, EKL employed 1,000 full-time employees and had approximately 5,000 inpatient admissions and 194,553 outpatient encounters annually.[2] EKL also served as the primary training institution for 191 residents and fellows and 208 learners from nursing and allied health programs.[2]

In March 2013, the state of Louisiana accelerated the transition timeline to April 15, 2013, at which time EKL closed and OLOL assumed responsibility for its extensive network of outpatient clinics around Baton Rouge. The LSUHSC clinics became known as LSUHealth, a division of OLOL. With the transition of LSUHSC's residency programs from EKL, OLOL now serves as a clinical teaching site for 24 residency programs and fellowships. There is now an average of 185 residents monthly on OLOL's campus. OLOL also currently serves as a rotation site for more than 200 medical students annually from LSUHSC and Tulane University. It is also the clinical rotation site for nursing and allied health students from 16 different schools, including the Franciscan Missionaries of Our Lady University.

In addition, OLOL offers comprehensive services including a 1,020-bed hospital with a dedicated Children's Hospital, a 350-provider Physician Group primary care network, two free-standing emergency rooms, outpatient imaging and surgery centers, a critical access hospital, a network of urgent care clinics, and the Franciscan Missionaries of Our Lady University. OLOL is the largest hospital in the state of Louisiana and serves 45,000 inpatients and 350,000 outpatients annually, making it a rich clinical learning environment. There were a number of challenges within this rapid expansion and transition, and our institution learned a number of important lessons that may be valuable to others.

Challenges Faced and Lessons Learned

When OLOL absorbed the LSUHSC GME programs from EKL, the number of learners on campus drastically increased. In fact, the number of medical residents training at OLOL increased by 147% within the first year (2013–2014)[3] and 400%

within six years.[4] Early in the transition, nurses and other clinical staff had many questions about residents' scope of practice in the clinical setting that were addressed with educational meetings with clinical staff. While everyone recognized the importance of integrating clinical service and education, there was little initial consensus about how to achieve that goal. OLOL physicians had thriving clinical practices that enabled them to serve as clinical faculty responsible for teaching residents as part of their clinical duties. However, most of them lacked formal training in supervising and teaching residents, and, initially, there were few formal faculty development opportunities available. Instead, these physicians were required to learn training skills through trial and error and by working with the programs' core faculty, as defined by ACGME. Most of the programs' core faculty transitioned to OLOL from EKL with their respective residency programs. These were academic leaders who were responsible for ensuring residents met all ACGME's educational requirements including didactics, milestones, and scholarly activities. Ultimately, the integration of GME into OLOL required significant flexibility and coordination among everyone.

Initially, determining the appropriate ratio of residents and faculty members that not only maintained patient care and throughput but also provided optimal clinical education was a significant challenge. Resident and faculty staffing schedules were changed monthly in a trial and error process, and residents and faculty provided feedback regarding the schedule adjustments during monthly leadership meetings with physicians and leaders from the clinical enterprise. It took approximately six months to develop schedules that provided a balance with which everyone was comfortable.

While issues regarding schedules were resolved, tensions arose between OLOL physicians who had not previously been involved in teaching residents and the LSUHSC faculty members whose primary focus was resident education. The challenges tended to revolve around routine use of the latest information regarding evidence-based patient safety, quality improvement, and research. Prior to the transition, OLOL's non-faculty physicians completed necessary CMEs, but the duties of their busy practices precluded literature reviews and in-depth reads of the latest scientific evidence as it was published. With prodding from the LSUHSC faculty, over time there has been a shift toward use of evidence-based protocols as standard practice.

These issues outlined above and the opportunities for growth they represented are addressed in a later section. The paper concludes with a discussion involving the OLOL's and LSUHSC's shared vision of caring for the underserved. This belief system has acted as a foundation throughout the transition and is the pillar that ultimately united two very different entities for the good of all Louisianans.

Focusing on Patient Safety Helped Initiate the Process of Establishing a Shared Culture

Core faculty presented an opportunity for a scholarly approach to treatment and focus on patient safety. An interview conducted for this manuscript with OLOL's former Vice President of Medical Affairs, Dr. Richard Vath, revealed that the residency programs' core faculty were intent on using practices with the strongest level of evidence. These academicians taught residents, as well as OLOL's privately employed physicians and medical staff, the importance of staying current with the scientific literature and incorporating practices with up-to-date evidence as early as possible. As a result, daily practice evolved, and standardized protocols were implemented both in the emergency department and on the medical floors. Education that occurs in the clinical areas is accompanied by grand rounds and lectures, which also ensures that everyone is exposed to the latest evidence. This shift had a significant impact on the clinical learning environment because it exposed residents to educated debates about when and how to implement evidence-based protocols, how to interpret literature, and the challenges and advantages of changing clinical practice to incorporate evidence-based medicine.

The Alliance for Independent Academic Medical Centers (AIAMC) presented another opportunity that reinforced a focus on patient safety. OLOL joined the AIAMC in 2013 and was selected to participate in its National Initiative IV focused on patient safety and the clinical learning environment.[5] This initiative, which served to merge the LSUHSC and OLOL cultures early in the transition, focused on the common goal of improving healthcare for all patients. Core faculty, clinical faculty, and residents from a number of programs worked together on the project which involved teaching patient safety and quality improvement during rounds. The faculty were sent short emails with teaching tips and were then prompted via text to teach those topics with the teams. The project, which ultimately won the AIAMC national innovation award, demonstrated better perceived communication and higher self-reported frequencies of event reporting among residents exposed to patient safety discussions prompted by text messages.[6,7]

We continue to build on our early success in patient safety. For example, in 2016, the Accreditation Council for Graduate Medical Education (ACGME) chose OLOL as one of eight sites to participate in their Pursuing Excellence Initiative.[8] OLOL's project focuses on facilitating interdisciplinary learning and patient safety rounds. An important lesson learned through these initiatives is that bringing together individuals from a variety of settings to work towards important patient safety improvements helped break down barriers and remove the "us" versus "them" thinking that impedes collaboration. Anecdotally, debates about how "we" (LSUHSC) do things differently from "them" (OLOL or vice versa) lessened as discussions focused on how "we" as one team need to address important patient safety issues.

Residency Program Requirements Enhanced Quality Improvement

Residency programs must comply with ACGME requirements, one of which mandates that residents "systematically analyze practice using quality improvement methods, and implement changes with the goal of practice improvement."[9] Incorporating quality improvement (QI) into residents' learning experience proved an excellent mechanism for testing protocols and implementing other evidence-based techniques. The provision of data demonstrating that projects improved outcomes on the unit was instrumental in shifting the momentum and acceptance of evidence-based medicine in the hospital.

However, the need for residents to incorporate QI into their learning experience highlighted the lack of a formalized infrastructure at OLOL for aligning resident projects with the hospital's QI priorities. The GME office thus developed the needed infrastructure by working with the hospital's QI Directors and the Vice President of Quality. A process was put in place to examine and archive all QI projects at OLOL, to ensure that residents' projects were aligned with the hospital's initiatives, and to determine each project's need for hospital resources. This infrastructure ensures the maximal use of resources, encourages collaboration, and eliminates redundancies.

In addition, the hospital initiated a local conference during which clinical staff (e.g., nurses, pharmacists), physicians, and residents are invited to present posters to showcase QI projects occurring at the hospital. The GME office also created a Patient Safety and Clinical Quality Improvement Fellowship in 2015 and a Patient Safety and QI Scholar's Track for residents in 2017. Both are funded by OLOL. The

Fellowship consists of one year of structured educational experiences, a mentored QI project, and practicum experience with hospital patient safety and QI working groups. The Scholar's Track grants six residents protected time to complete quality modules and to work with faculty mentors on project identification, data gathering, cycles of improvement testing, and development of sustainability plans. At the end of the year, residents who participate in the track receive a certificate of completion.

Adding significant education and infrastructure for QI affected the clinical learning environment in many ways. First, individuals throughout the hospital, from all medical specialties and types of training (e.g., nurses, pharmacists, physicians, and residents), present at the QI conference, which reinforces the importance of QI projects throughout the hospital. Many of the projects include interprofessional collaboration, illustrating the expansion of the clinical learning environment beyond traditional silos. Our organization is also building a cadre of physicians with additional training in QI to continue to reinforce QI throughout the institution.

Incorporating Research Added Rigor and Visibility

Immediately prior to the transition, there was no research at OLOL. ACGME Common Program Requirements include maintenance of an environment with an active research component,[9] therefore OLOL created and funded an Office of Research and hired its Director in 2011. The Office of Research is responsible for overseeing both clinical research (e.g., pharmaceutical and device trials) and academic research (faculty and resident-driven projects).

In addition, ACGME requires faculty members to maintain an atmosphere of inquiry that includes active research and a curriculum focused on the conduct of research and its application to care.[9] To address these requirements, OLOL invested in six doctoral-trained individuals as Academic Research Directors (ARDs). Each ARD is granted faculty status and assists faculty and residents with research projects. The ARDs promote research by facilitating project design and implementation, ensuring regulatory and ethical standards are met, analyzing data, and helping with the dissemination of findings. Additionally, the ARDs lead journal clubs and research committees and develop curricula to fulfill ACGME research requirements. One major advantage of having doctoral-trained research directors is that research and QI projects became more rigorous. As manuscripts developed with the ARDs were jointly published, other faculty and residents were stimulated to become involved in research; this, in turn, increased the level of scholarly productivity for each of the residency programs. In 2016, OLOL created and funded a Research Scholar's

Track that gives protected time for five to six selected residents to work closely with the ARDs on research projects of interest, to complete research modules, and to engage in scientific writing exercises and dissemination activities.

Faculty Development Enhanced the Clinical Learning Environment

The OLOL physicians, who serve as clinical faculty, are granted little or no protected time for training residents. Originally, modest formal faculty development was available for these clinical faculty physicians. The transition asked private OLOL physicians to donate their time to supervise residents and to learn teaching methods through trial and error. This was quite vexing for a number of physicians. To address this issue, early in its existence the Pediatric Residency Program brought in experts on adult learning who delivered faculty development on weekends. These were attended by 100% of rotation directors and approximately 80% of the clinical faculty. Other physicians learned about teaching residents from the core faculty who transitioned with the EKL residency programs. Ultimately, the vast majority of the private physicians in the hospital are now involved in the clinical training of residents.

The transition created a culture of learning where everyone, from nurses to physicians, was learning new skills. As an example of OLOL's ongoing commitment to faculty development, in 2017 OLOL sponsored an interdisciplinary team of five members including a nurse, a pharmacist, a physician, the designated institutional officer (DIO), and a physician assistant to attend the University of Virginia Center for Academic Strategic Partnerships for Interprofessional Research and Education Train-the-Trainer Faculty Development Program.[10] This team is tasked with creating an IP faculty development plan which will be inclusive of all professions. The goal is to enrich the learning environment by having all medical specialties and levels of training freely share expertise and improve patient care.

Interprofessional Learning and Practice Redefined the Clinical Learning Environment

There is evidence in the literature that IP learning and practice moves away from a strict multidisciplinary hierarchy, encourages open communication, and improves patient outcomes and quality of care.[11,12] While the pediatric, intensive care, and ENT units at OLOL have informally integrated IP practice, in 2016 this process was identified as an area of improvement that needed to be expanded throughout

the hospital. OLOL is moving toward this goal. For example, OLOL applied for and was awarded an ACGME Pursuing Excellence Initiative grant.[13] The project focuses on facilitating interdisciplinary learning and safety rounds throughout the institution by sharing electronic education materials in digest form and by bringing together pharmacy, nursing, physician assistants, physicians, residents, and other professionals to discuss patient safety issues on rounds. As indicated above, OLOL's Division of Academic Affairs has invested in training[10] an interdisciplinary team tasked with the creation of a faculty development plan which will guide implementation of interdisciplinary rounds throughout the hospital.

A Shared Vision of Caring for the Underserved Made all of These Changes Possible

What ultimately resulted in the merging of two very different enterprises was an underlying vision of both LSUHSC and OLOL as having a mission of caring for those most in need. EKL's patient population was primarily indigent with complicated medical conditions and poor compliance. Its outpatient clinics expanded care into impoverished parts of town where individuals struggled to find reliable transportation to their doctors' appointments. Many feared that the closure of the EKL health system would result in the dissolution of these clinics and that they would be unable to continue seeing their healthcare providers with whom they had trusting and long-standing relationships. Prior to the transition, Ms. Stephanie Manson, OLOL's Vice-President of Operations, led many town hall and church-based meetings with the population served by EKL to address concerns in order to gain their confidence that OLOL was prepared to meet their needs. Because many patients sought routine care in EKL's emergency department, these meetings were also an opportunity to educate the public about when to seek primary, urgent, and emergency care. This has resulted in improved access to the right care at the right time.[3]

In response to patient needs, OLOL hired case managers tasked with proactively engaging high-risk patients by contacting patients who missed appointments, rescheduling appointments, and helping to solve problems such as lack of transportation or difficulty filling prescriptions. In addition, an IP team of emergency physicians, hospitalists, residents, nurses, social workers, and when possible, the patients themselves develop care plans for high utilizers of the emergency department. The plans specify treatment modalities and identify treatments that are not empirically supported and will not be provided. In doing this, physicians have conversations with patients about evidence-based medicine and appropriate

utilization of healthcare resources. Additionally, prior to the transition, due to diminished staff and resources, patients routinely waited 10 days to have their prescriptions filled. The average wait period for medication was diminished to 10 minutes after the transition. One of the pharmacies assumed by OLOL filled close to 26,000 prescriptions in the first 100 days of the transition.[14]

Continuing to respond to community needs, OLOL opened an emergency department in 2017 near the site of the former EKL Medical Center. It is housed in a building with urgent care and primary care clinics. Patients are triaged to the appropriate level of care. This again enables providers to teach patients about appropriate level care.

In the months prior to EKL's closing, an average census for the hospital was 30 patients. The high volume, diversity of patients, and illness acuity have broadened the educational experience of those now training at OLOL. Based on testimonials and surveys, the transition has been a positive experience for both trainees and patients.[2,3] The early differentiation of LSUHSC from OLOL physicians has blurred with a clear focus on treating patients, especially those most in need.

CONCLUSION

OLOL served as a large community hospital and the training site for nurses for over 90 years; they were valued by the organization, as the organization's heritage began with sisters who were also nurses. Until 2005, the clinical learning environment involved nurses and nursing students who were mostly trained in silos. Physicians were busy with clinical duties and spent little or no time training learners. Most of the OLOL physicians completed necessary CME courses, but spent little additional time keeping abreast of the most up-to-date literature. Allied health professionals operated similarly. Physicians at OLOL were first introduced to Graduate Medical Education while educating residents and medical students who were displaced by Hurricane Katrina.

In the decade since OLOL began training residents, Graduate Medical Education has driven a number of initiatives that have drastically changed the culture of the institution. A new building was erected and dedicated to house the residency programs and a state-of-the-art simulation laboratory where learners from all medical specialties and levels of training participate in simulation exercises.

The research and QI requirements of ACGME have added significant rigor and measurement to initiatives throughout the hospital. In addition, the responsibility for clinical supervision of residents has prodded many physicians at OLOL to incorporate evidence-based medicine into their practices. The culture and learning environment continues to grow and shift. Our most recent endeavors recognize the importance of tearing down silos between medical specialties and types of training to ensure that everyone is working and learning together, that all expertise is recognized and appreciated, and that the patient is at the center of each interprofessional team.

In sum, the opportunities presented by the transition have resulted in an evolution of OLOL from a static private institution that provided healthcare to an academic medical center that embraces innovation to improve the experiences of patients, learners, and employees. The challenges it faced as it assumed responsibility for a number of residency programs originally sponsored by a public hospital system have been numerous. However, leadership perceived these challenges as opportunities that have ultimately benefited the Louisiana populace and have changed the healthcare landscape in Baton Rouge.

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THE UNIVERSITY OF ROCHESTER MEDICAL CENTER INSTITUTE FOR INNOVATIVE EDUCATION:

REIMAGINING THE ARCHITECTURE OF OUR LEARNING ENVIRONMENT

Case Study

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FACING THE FORCES OF CHANGE

Like all other academic medical centers across the country, the University of Rochester Medical Center (URMC) grapples with the vast changes in health care delivery and pressures to redesign health professions education.[1-3] Responding to these changes has involved a re-conceptualization of what it means to be a learning organization, and inspired a redesign of our learning environment—one that formally began in fall 2011 when our senior leadership envisioned the **Institute for Innovative Education (IIE)**. Our path has not been straight and the vision continues to evolve, but we are creating a new educational infrastructure. Perhaps, even more importantly, we are explicity revisiting and broadening our definition of the medical center as a learning environment for all, including health professions students,

trainees, and workforce members; patients and their families; and learners and stakeholders throughout our region and beyond.

URMC'S JOURNEY

To understand our journey, we need to set the stage. In 2011, we faced many challenges in our pursuit of an integrated educational approach to prepare our future and current workforce in providing team-based care.[1] Like most institutions at the time, we had a siloed approach to educational development and support. Our educational leaders had varying understandings of what constitutes a learning environment; some anchored the learning environment in classroom settings augmented with technology, while other programs saw learning as embedded in the clinical environment and centered on patient care. The University of Rochester identified itself as an innovative educational institution, yet we felt our traditional boundaries being pushed by the need to embrace interprofessional education (IPE); the disruptive innovation of technology; a movement towards adaptive, competency-based education models; and ultimately and most importantly, care delivery redesign.

The promise of the moment, though, was evident. If we could further align educational development and delivery with these transformational changes in health care, we could close the gap between education and practice, ultimately leveraging work *as* learning. We needed transformational change in both spheres—and it needed to be collaborative and committed. Education needed to be re-framed as a catalyst for change. At our institution, this would require a structural reorganization, an evolution in our definition of learning environment, and the evaluation of education as a mechanism for, and strategic partner in, better patient care. Ultimately, we needed to embrace our learners as our strategic advantage.

The learning environment at the University of Rochester Medical Center is a collaborative social structure, defined by our culture, wherein learning, social interactions, and the experiences of our educators and learners occur. Learning in this space is facilitated by, but not limited to, high standards for quality improvement, patient safety, equity, value, evidence-based practice, and team-based care. An integrated web of learning spaces, clinical care locations, educational technology, technology in clinical care, and programmatic support creates a delivery system that facilitates both formal and informal learning and

supports the collaborative social structure. The transformation in our organization represented a shift in our collective thinking—the need to shape the physical learning environment and our educational support to the culturally defined priority (i.e., interprofessional practice) instead of restricting our definition of learning to a fixed, rigid footprint and structure.

ENVIRONMENT RIPE FOR INNOVATIVE CHANGE

Several elements have enabled our academic medical center to innovate as we have strived toward redesigning our learning environment. It begins with our history. Both the UR's School of Medicine and Dentistry (SMD) and its School of Nursing (SON) enjoy long and distinguished histories of curricular innovation. At the SMD, beginning in the 1940s, Dr. George Engel developed the 'biopsychosocial model' of medical training and patient-centered practice, which focused on the interrelationships among biological, behavioral, psychological, and social forces in human health and illness; fostered the skills, attitudes, and behaviors of the humanistic clinician/scientist; and informed a generation of URMC-trained physicians. That early reform was extended in the late 1990s with the Univeristy of Rochester's Double Helix Curriculum, which integrated basic science with clinical medicine across the four-year medical curriculum and culminated in the development of a required fourth-year clerkship—the first of its kind in the nation—to provide medical students with a community-based educational experience. At our SON, Dr. Loretta Ford—founding dean and co-founder of the nurse practitioner model of advanced practice—established the 'Unification Model' in the 1970s, integrating education, practice, and research. These innovations heralded a paradigm shift, facilitating more interdisciplinary collaboration and mutual respect between medicine and nursing.

Over the years, Rochester's pedagogical 'lens' has evolved to focus on instilling in our students—as in our practitioners and educators—a genuine appreciation for and inclusion of the community perspective in their professional thinking. We believe this increases the likelihood they will view patients and families in a broader context, understand and attend to their communication and relationship-building skills, and advocate for the welfare of their patients beyond the office or clinic.

In our hospital system, our institutional core values of integrity, compassion, accountability, respect, and excellence (ICARE) have driven program development,

as best embodied by our patient- and family-centered care (PFCC) program.[4] The URMC PFCC is a broad, interprofessional educational and clinical initiative to achieve the following: 1) educate physicians, nurses, advanced practice providers, and other health care team members, as well as our patients and families, in the behaviors and collaborative practices associated with patient- and family-centered care; 2) review and revise operations to support that fundamental philosophy and involve patients and family members as the central members of the care team; and 3) assure the active identification and implementation of related practices aligned with these values and actualized in the practice environment. When reconsidering our learning environment, these core values are essential underpinnings of our culture of respect and inclusion.

INFRASTRUCTURE FOR CHANGE: OUR ORGANIC GROWTH

In 2011, initial discussions among our education leaders around learning environments recognized the need for centralizing our educational infrastructure to support a medical center-wide simulation center. Within URMC, simulation-based training facilities and related programs were scattered among 22 different departments and schools. As a result, the administrative resources needed to develop programs and maintain equipment were duplicated. Additionally, there was limited sharing of resources or knowledge, resulting in minimal multidisciplinary or interprofessional practice as well as low utilization rates of space, equipment, and staff. Finally, training modules and curricula were developed without centralized support or expertise sharing. The rallying cry by our faculty and educational leaders to centralize simulation inspired novel conversations between clinical departments, SON, and SMD. These interprofessional discussions around shared learning needs spurred broader conversations beyond simulation and began our learning environment dialogue.

Key questions drove this process at URMC: How do we instill humanism and patient-centeredness into a new learning environment? How do we ensure that our students and faculty are best positioned for changes in the academic medical environment? How do we establish curricula that best address changes in health care, research, and education? We questioned how and where education took place outside of our traditional degree-granting and professional development programs, and how to better harness and hone our approaches to those learning

needs. Should education remain dispersed across the medical center, or become a focal point for the center's strategic plan? And if the latter, we needed to make a business case for change that included education as central to the medical center's core mission. Our guiding vision was of URMC as a dynamic learning organization, built with a systems thinking approach, team learning, and a shared vision and commitment to personal mastery.[5]

Emerging from this education strategic planning process was the creation of two key infrastructures that redefined our learning environment: the **Institute for Innovative Education** and **Center for Experiential Learning**.

The Institute for Innovative Education (IIE)

The IIE was developed initially as a board of directors (BOD) of URMC's educational leaders with the aim of integrating technology and the science of learning into existing educational programming, and preparing our learners to be leaders of tomorrow. The IIE BOD was charged with overseeing the following efforts across all our educational programs:

- Incorporation of new technology in practice and in educational delivery
- Implementation of team training for collaborative practice
- Development of new curricula that address, among other things, quality and safety, health economics, and systems training
- Expertise in informatics—educating the next generation on how to utilize "big data"
- Development and implementation of translational research
- Extension of the biopsychosocial model throughout the medical center—building on our patient- and family-centered care framework to teach all URMC providers the art and science of our hallmark philosophy

To address these needs, the IIE BOD implemented the first educational strategic plan focused on the learning needs of URMC as a whole. Connecting to URMC's overarching strategic plan, the IIE advanced the science and delivery of health care (specifically focused on quality and safety), emphasized the training and delivery of

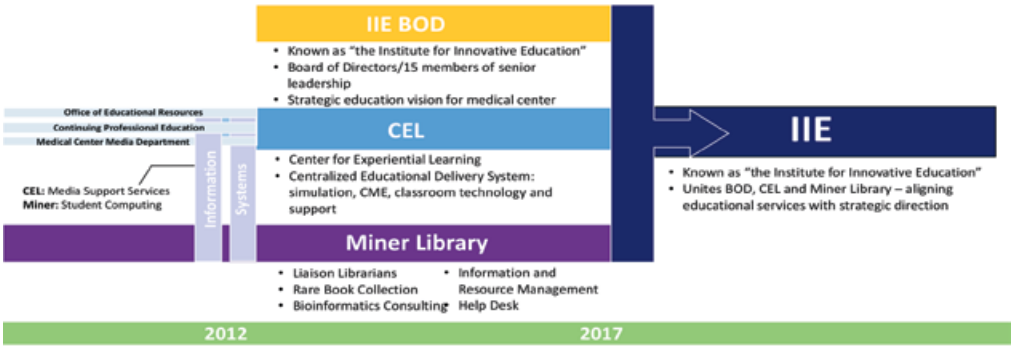
exceptional patient- and family-centered care, promoted excellence in innovation, and aided in attracting and developing a diverse workforce to a supportive environment for personal growth and leadership development.

The Center for Experiential Learning (CEL)

The CEL was created as a centralized educational delivery system to support our schools of medicine, dentistry, and nursing, as well as postgraduate clinical training and continuing professional development. To create this structure, we reorganized the Office of Educational Resources and the Office of Continuing Professional Education to become one unit, which enabled us to pool capital and human resources toward this new vision. Within the first two years, CEL also absorbed the media services in the hospital and grew the simulation program to have dedicated centralized staff. Harnessing these resources in a centralized model, related to the IIE, CEL has become the operating arm to implement the IIE's strategic vision.

Since their inception in 2012, the IIE and CEL have seen unprecedented growth in both services and programs. The CEL supports more than 40,000 educational events and programs throughout the medical center annually, growing beyond simulation (standardized patients, mannequins, and anatomical gift program) to include the continuing medical education office, symposium and event planning, media support, online learning specialists, and classroom technology and support. In 2017, CEL merged with the oldest educational resource in the medical center, the Miner Library, to complete its comprehensive educational offerings (see Figure 1). The IIE BOD continues to drive meaningful programs and support IPE as our key educational strategy across the medical center. While supporting the individual schools by complementing their independent strategic aims and goal development, the IIE has created a mechanism for collaborative curriculum development and has pursued key national opportunities to facilitate our educational transformation. In 2018, the IIE is undergoing a new strategic planning process to further develop our definition of the learning environment, deepen our commitment to IPE, and understand the resources needed to achieve our vision.

Figure 1: *Evolution of the Institute for Innovative Education*



GAP ANALYSIS: DO SERVICES/RESOURCES OR PROGRAMS DRIVE LEARNING ENVIRONMENT CHANGES?

As we were building and growing, we purposefully questioned what was driving the changes in our learning environment: was it the centralized educational services or interprofessional programming and collaborative education development? We quickly realized that both were important in shaping the learning environment. For instance, renovations result in more than a visual change. A universal sense of pride comes from the renovation of space, which reflects the institution's priorities. We focused on our need for fluid spaces to house collaborative learning and technology. New classrooms were created with the vision that they would become hubs, which then supported collaboration in educational delivery. The CEL provides a robust matrix of services including classroom resources (space and classroom technology), simulation, continuing education, media services, educational information technologies, and librarian resources.

Robust educational resources provided by CEL have been essential to support shifts in instructional delivery and learning activities. For example, faculty who have been asked to evolve their teaching styles have needed technical and/or instructional support to do so. Our experience with CEL has also allowed us to evaluate our working hypothesis that the centralization of resources would facilitate IPE. This proved to be true and false. CEL allowed more resources to be available for our IPE programs, but the delivery model did not result in an increase in program development. The hurdles of IPE, such as time, schedules, and

the alignment of educational priorities, still exist. Our resources receive support through differing financial models that need to be negotiated on an ongoing basis. The IIE BOD must tackle those barriers to help push the IPE mission forward.

Challenges

The IIE BOD has always been focused on IPE, but like many programs around the nation, has had both successes and failures in launching sustained programming. Over the past five years, we developed several IPE programs for medical students and nursing students, including the comprehensive assessment interprofessional scenario; inTouch patient portal communication curriculum, addressing disparities in health care, quality, and safety; and the geriatric home visit grant (through the National Center for Interprofessional Practice and Education). After five years, we are seeing that some of these programs are not continuing because of changing alignment of the learning needs, as well as a limited group of faculty drivers to carry on the programming. We need a renewed focus on faculty development so our educators are skilled in teaching IPE. Our current challenge is in successfully transitioning course leadership and developing sustainability models as we continue to identify new IPE opportunities.

Additional challenges, and possibly our greatest opportunities, lie beyond the student level. For instance, leadership training is a challenging topic to address within complex medical centers and to teach to interprofessional audiences. The IIE sponsored a course entitled *UR LEAD* in collaboration with the Hospital Director's Office and human resources. It did not continue beyond the first pilot. We could not reconcile the different learning needs and development of our learners, as well as develop educators that would continue to drive the program. Another initiative launched was IIE's Innovation Grants to fund pilot programs focused on educational interventions around interprofessional collaboration and technology in practice. This had a mixture of success and failure largely because grantees often met with limited local support for—and at times resistance to—implementing their innovations within their microenvironments.

Successes

Our greatest success, and one that has allowed us to reflect and grow as an organization, has been the recognition as one of the eight Accreditation Council for Graduate Medical Education (ACGME) Pursuing Excellence Innovator sites to improve residency training by improving the clinical learning environment of

residency programs. In our application, we proposed embedding residents into our quality teams (UPP: Unit-based Performance Program), so that they could participate in unit-based quality and safety efforts in every specialty across the hospital, from pediatrics to neurosurgery. Initially, training was offered to residents in quality and safety principles, and residents would apply those principles in their role on the UPP teams. Quickly after receiving the award, we realized that this intervention needed to be interprofessional to be successful. Learning for the entire UPP team, as well as the whole unit, needed to be tackled to ultimately improve the learning for the residents. We also realized that we needed to emphasize teaming skills[6] as much as content expertise. This program has evolved to include dyad leadership training for physician-nurse leaders of the UPP teams and workplace learning for the entire workforce in teaming, quality and safety, and improvement processes.

FACTORS FOR SUCCESSFUL TRANSFORMATION

We do believe we have successfully built the infrastructure and shifted the culture to embrace a broader definition of the learning environment within a complex academic medical center. There is still a long distance to travel in becoming a mature learning organization, but essential to our continued journey will be these core factors that we are building upon:

- *Evolving view on learning environments:* For change to occur, it was important to embrace the premise that change was vital for our success. We approached our redesign and strategic planning with curiosity and responsiveness to the pressures of our system and the science of learning. Everyone who comes to our medical center is a learner and a part of our team. This expansive lens allows us to envelop personal experiences as learning experiences; to understand that social interactions and culture impact learning; and to harness these elements, not work against them. We did not set out to change our learning environment with the definition we have now. Our interprofessional learning environment was impacted through responsive adaptation of resources, structure, and strategic vision. From spaces and services, to integration of interprofessional programming, we have developed a new conceptualization of URMC as a learning organization.

- *Strong leadership engagement driving vision:* Essential to our development has been an active board of directors that facilitates our senior leadership in the education conversation. Their support has allowed us to strategically align our services and programs. Essential partnerships have formed with sustained success, in particular the strong relationship between the deans of SMD and SON, as recognized recently by the American Association of Colleges of Nursing. We also have strong leadership support and sponsorship of our Pursuing Excellence grant, as evidenced by the dyad leadership of our chief medical officer and senior associate dean of graduate medical education.

- *Outside institution/national engagement:* When transforming a long-instilled educational construct, it is helpful to connect to national benchmarks for change. Essential for our transformation has been the support and validation received through several grant and award agencies such as the Macy Faculty Scholars Program, the National Center for Interprofessional Practice and Education (Incubator site, Nexus Award, Accelerating Interprofessional Community-Based Education and Practice Grant), ACGME Pursuing Excellence Innovator Grant, and curriculum recognition through the AAMC.

- *Full-service, customer-centric model of service:* Knowledge begets specialization. Health professions education has evolved by having clinicians become educators who drive programming and curriculum development. URMC has benefited from educational specialists who have had a high impact as drivers and architects of the infrastructure and programming. We also invested in staff development as an essential component of changing the conversation around space and services. The frontline team of educators and support personnel have to understand the vision, the definitions of what good learning looks like, and how we are structuring education to meet emerging needs.

LESSONS LEARNED

Over the past six years, we have learned several lessons that we believe could be relevant for other medical centers as they reevaluate and redefine their own learning environments. When restructuring any such fundamental and cross-

cutting initiative, managing the distinction between perceived and genuine needs is critical. For us, space has been one powerful example of this. While our conception of the learning environment has evolved (beyond that of traditional learning spaces), space is fundamental to professional identity, perceived status, and our understandings about institutional priorities. By co-locating clinical care and education in a newly defined, encompassing learning environment, we sought to address issues of hierarchy/relative status and thereby facilitate high-performing teams for better care. However, in our organization, capital funding for educational space and program support comes from different sources. Ideally, these would be coupled to allow more seamless growth and expansion.

Importantly, though, we also learned that the learning environment is, at its core, comprised of people—more so than locations or spaces—and therefore most centrally involves supporting those people. We have had a tremendous evolution in understanding who our learners are and identifying faculty or facilitators to match their learning needs. This has involved somewhat of a shift in emphasis; for example, from a more focused concern with IPE in our health professions schools to a more encompassing emphasis on interprofessional practice and co-involvement in our clinics and community. Moving forward, we would seek to align and harness the full range of our educational resources and learning environments (both within the clinical realm and in classroom settings) to foster interprofessional practice, patient and family involvement, fully engaged care, and cultivation of health.

Finally—and increasingly—we have come to appreciate the important role of the educational specialist, a team member often missing in health professions education reform. It is ever more the case that improving learning and learning environments will require the unique, comparative perspectives and disciplinary insights of staff with broad educational expertise, who are able to foster innovation, harness learning theory into curriculum design, and create the educational service models needed for transformational change.

LOOKING TO THE FUTURE

We have only just begun. The last six years have been the preliminary work for us to really engage in the transformational implementation of a novel learning organization structure. Continued progress will be driven by the implementation of workplace learning that is embedded in unit-based environments throughout our

medical system. By redefining our learning environment to include clinical space, digital connectivity, and embedded teaching and coaching, we will capture learning everywhere it is occurring. This framework, central to our UR Pursuing Excellence program, will serve as a model for other educational initiatives. Fundamental to these changes is identifying that everyone is a learner in our organization. It will require closer collaboration with human resources and patient education to round out our educational delivery and definition of learning environment. The most important factor underpinning our learning organization will be greater integration with learner analytics. Innovation will lie within efforts focused on assessment of performance and connecting performance to clinical outcomes and population management.

Our challenge will be to continue to evolve our financial model to support a centralized and inclusive learning structure. Right now, our infrastructure is predominantly a service model with a small academic profile. We still need to identify a financial model to grow a larger team of educational experts.

Even though we are thinking of a more expansive definition of learning environment, we cannot ignore the dominant role that space issues create in driving the conversation. For instance, we are currently reimagining the library as a physical space that is the heart of the medical center. It needs to represent collaboration and connectivity that underpins the social interactions and personal experiences that support effective learning.

Another challenge, when growing interprofessional programming outside traditional degree granting or training programs, is the need for more space that supports diverse learning activities. We will need to expand our educational classroom environments. Redefining who our learners are and growing our programs mean we will no longer have the space to support all our activities. As a result, we believe that informal learning will become the driver for content delivery and space design. When we align clinical practice and learning it will lead us to new questions: What learning has to be done outside the clinical environment? How does technology support different kinds of learning, including distributed, asynchronous, just-in-time, and social learning? Will online learning become a component of every educational delivery mechanism, and if so, will our digital infrastructure (digital learning environment) be as important as the physical infrastructure? And will that change our financial structure as we reconcile competing demands for a limited resource pool? Finally, how shall we create—and

assess—an interprofessional learning environment that reflects and supports high-performing, collaborative, team-based care?

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Sandrijn
Robin
Kevin
Weiss


Capital investments come from different resources
Business environments

HIGHLIGHTS FROM THE CONFERENCE DISCUSSION

Over the two-and-a-half days of the conference, the 44 conferees participated in both large plenary discussions and smaller breakout conversations that enabled them to draft, consider, and refine a set of consensus recommendations intended to help health professions schools and health care organizations optimize their learning environments. The final recommendations are presented in the "Conference Conclusions and Recommendations" section of this monograph, and below are highlights from the daily discussions that led to the first draft of those recommendations.

During the first full day of the conference, participants discussed two commissioned papers and three case studies—the full texts of which can be found in this monograph—and engaged in breakout groups to prepare for thematic discussions the following day. On the second day, conferees broke into small groups and identified a set of actionable recommendations that they then discussed during a subsequent plenary session. At the close of day two, the conference planning committee became a writing committee and drafted preliminary recommendations based on the two days of discussion. The final half-day was devoted to achieving initial agreement around the draft recommendations, which the planning committee revised, refined, and finalized via conference calls and emails in the weeks following the conference.

DAY 1: MONDAY, APRIL 16, 2018

Opening Remarks and Introductions

Following a welcome reception, dinner, and introductions the evening before, the conference began at 8:00 a.m. on Monday, April 16. In his opening remarks,

Macy Foundation President George Thibault, MD, set the stage for the meeting by placing it in context with Macy Foundation conferences that had taken place over the last decade. The Foundation's previous 10 conferences, he explained, had all focused on improving different elements of health professions education—from transforming primary care to examining interprofessional education to bridging the gap between health professions education and clinical practice reforms to understanding the role of technology in improving health professions education to exploring the need to partner with patients, families, and communities.

"Now, [with this conference,] we want to explicitly identify the learning environments that all those educational elements go into, the environments that make it possible for our learners to thrive, for our faculties to thrive—all with the goal of producing better health for the public," Thibault said. "This is possibly the most important conference we've ever had. It certainly represents the culmination of our previous conferences. Actionable recommendations to improve health professions learning environments will be the great enabler or facilitator of many of our previous sets of recommendations—all of which have been directed toward reforming, aligning, and integrating health professions education and clinical practice to improve the health of the public."

After welcoming the conferees, Conference Chair David Irby, PhD, from the University of California, San Francisco (UCSF) School of Medicine, followed Dr. Thibault's comments, explaining that the first day would be devoted to discussing the required reading for the conference. He noted several pieces of information that he appreciated from the reading, including a few different ways to think about and define the term "learning environment." Referencing a paper that he helped co-author for the conference, Irby suggested that the learning environment is "that which surrounds learning" and the conceptual framework of the four domains (personal, social, organizational, and physical/virtual) would be useful for categorizing everything that surrounds learning. He also compared the process of the conference to playing an accordion—moving from large groups to small groups and back and again as a means of keeping the conversation broad and open to diverse opinions and perspectives while also allowing time to narrow down and focus more intensely on key topics and concepts. Following these opening remarks, two commissioned papers and three case studies were summarized and then discussed by the full group of conferees.

Overview and Discussion of Commissioned Paper:

Interventions Designed to Improve the Learning Environment in the Health Professions: A Scoping Review

Author Larry Gruppen, PhD, of the University of Michigan, presented the commissioned paper, *Interventions Designed to Improve the Learning Environment in the Health Professions: A Scoping Review*. His co-authors were Conference Chair David Irby, PhD, of the University of California, San Francisco; and Steven Durning, MD, PhD, and Lauren Maggio, MS(LIS), PhD, of the Uniformed Services University. Charged by session moderator Kevin Weiss, MD, MPH, of the Accreditation Council for Graduate Medical Education (ACGME), to "bring the paper to life," Gruppen said he wanted to raise some challenges with which he and his co-authors wrestled while writing the paper and with which the conferees would need to wrestle during the conference.

The first challenge: the concept of the learning environment is very poorly defined in the literature and takes on many different forms. "In looking across many different articles on this topic," Gruppen said, "it became clear that the definition of learning environment was whatever the author of each paper said it was. There was no agreed upon definition." Thus, in their own paper, Gruppen and his co-authors proposed a preliminary conceptual framework for learning environments comprised of four overlapping, interactive components: personal, social, organizational, and physical/virtual. "This was a first approximation, to try to bring some order to this concept," said Gruppen. "We look forward to refining it."

The writing group faced another significant deficit in the literature: the empirical literature on learning environments relies almost entirely on learners' self-reports—their levels of satisfaction with their educational environments—as the instrument for assessing the learning environment. "We found that almost everything is from the learner's perspective with very little coming from performance measures or other measures of learning," said Gruppen. "Yes, the learner's perspective is important and valid, but it is very incomplete."

Related to this second challenge, the third challenge Gruppen raised: his group's paper focuses on the perspectives of individual learners interacting within learning environments, while the other papers developed for the conference focused on the learning environment from an organizational or institutional perspective. "We

need to bring those differing perspectives together," he said, "to develop a more complete understanding of learning environments."

After this brief overview of the paper, session moderator Weiss opened the floor to questions. One of the first questions sought to clarify the criteria for including and excluding articles from the authors' literature review. Gruppen explained that only articles containing the term "learning environment" and referencing a defined instrument for measuring the learning environment were included. "Clearly, there is a lot of literature out there about learning environments that doesn't meet these criteria," Gruppen said. "If we were to re-do the paper, we could certainly expand the criteria to capture more of those articles."

Several conferees offered insights about what might be missing from the literature review and how the authors' framework might be improved to place clearer boundaries around what is included and not included in a "learning environment." One conferee, for example, asked the question: "If we think about the learning environment as everything that surrounds and supports learning, how do we know what is not part of that environment?" Another asked about physician and learner wellness: "Is teaching health professions students about personal wellness and resiliency part of the learning environment, or is that outside of the environment—is it what we teach them in order to deal with what happens inside the learning environment?" Others raised concerns about marginalized populations—such as learners and patients from minority groups as well as those learning and working in non-health care roles within health care organizations—and asked where they fit in the authors' framework. "If we're discussing how to create optimal learning environments," said a conferee, "then we need to ensure that all voices are heard, that everyone in that environment is represented in the discussion."

One commenter summed up the issue of defining a learning environment by stating, "It's a little like asking a fish, 'what is water?' They may not be able to tell you the dictionary definition, but just like students trying to describe a learning environment, they can tell you about their lived experiences with it. And you can do lots of different kinds of research to create more understanding of what it is and what it isn't. And the point of inflection, of intervention, should be a combination of what we understand it to be and what they understand it to be."

Overview and Discussion of Commissioned Paper:

Toward Exemplary Learning Environments for the Health Professions

Toward Exemplary Learning Environments for the Health Professions was authored by Sandrijn van Schaik, MD, PhD, of UCSF; Susan Reeves, EdD, RN, of Dartmouth-Hitchcock Health; and Linda Headrick, MD, MS, FACP, of the University of Missouri-Columbia. Dr. van Schaik presented the paper, beginning with an explanation of the charge the authors were given: to describe a vision for an exemplary learning environment in the health professions. According to van Schaik, the authors approached this charge by selecting and applying principles from the study of complex adaptive systems. A complex adaptive system is one in which a perfect understanding of one or more parts of the system does not equal an understanding of the entire system, which is non-linear and dynamic. Applying the principles of such systems to learning environments allowed the authors to come up with a framework of four "simple rules" for exemplary learning environments.

The first principle of complex adaptive systems that the authors explored was this: within such a system, goals and resources are established with a view toward the whole system, rather than artificially allocating them to parts of the system. For the authors, this principle translated into two simple rules for learning environments: first, that health care and health professions education share a goal of improving health for individuals, populations, and communities; and second, in an exemplary learning environment, learning is work and work is learning. "The implications of these two rules," said van Schaik, "are that there is good alignment of patient care and education within the organizational structure, as well as alignment of what is seen as work and what is seen as learning."

Another principle states that interactions within a complex adaptive system are often more important than the discrete actions of the individual parts. According to van Schaik, "This principle gives rise to a third rule that exemplary learning environments recognize that collaboration with integration of diverse perspectives is essential for success. Strategies to accomplish this include creating opportunities for collaborative practice and learning, deliberate inclusion of diverse memberships in all contexts, and engaging in activities to diminish bias and stereotyping and promote inclusive leadership."

Finally, the authors selected a principle that recognizes the role of change in complex adaptive systems. In such systems, change emerges from interaction between agents in the system, is often nonlinear and unpredictable, and as a result, can be innovative and creative. When the authors applied this principle to learning environments, they identified a fourth rule: organizations and agents in the learning environment learn from and about themselves and the greater system they are part of in order to achieve continuous improvement and innovation. According to van Schaik, "Strategies to achieve this vision include comprehensive collection of data on learning environments and on institutional outcomes to drive continuous improvement; promotion of master adaptive learning, which involves purposeful planning based on assessment, feedback, and reflection; and fostering habits of improvement in inquiry."

Following the author's brief summary of the paper, session moderator Stephen Schoenbaum, MD, MPH, of the Josiah Macy Jr. Foundation, opened up the conversation to conferees, several of whom found the paper "inspirational" in articulating a vision for exemplary learning environments. One commenter, for example, said the authors did two important things: "you articulated a target for clinical learning environments"—that everyone in the organization, no matter their role, shares the same goal of improving health for patients, families, and communities—"and you pointed out the interactions that need to happen in order to propel our work forward."

Another commenter appreciated the authors' suggestion that health care organizations create a chief learning officer. "That role, if defined and implemented well, could really help educators become leaders in creating exemplary learning environments and in extending and expanding the concept of a learning organization." And another commenter suggested that what the authors labeled as four simple "rules" for exemplary learning environments could also be labeled as four "values" that can be used to lead and guide learning organizations.

One conferee asked van Schaik how to translate this vision into the empirical studies needed to understand the learning environment better. She responded, "[This] is an aspirational vision, but there is no defined endpoint that says we have reached our vision because it will always be changing and evolving. As a result, I think a rapid cycle approach to methodology that is very much informed by systems science, by implementation science, would be helpful." Her co-author Reeves added, "I think the needed studies lend themselves to more qualitative methods,

thinking about what is the experience of the environment, and also ethnographic type studies that embed the researcher in the environment to actually be able to live in it and describe it. That's probably a good start."

Not all conferees focused on the positive aspects of the paper, however. One spoke up about what is not addressed in the vision paper: "I'm concerned that patients are not central enough to this vision, that it's not clear enough where they fit. And I'm concerned about the greater environment—the huge stressors, the economic stressors, the silos—and all the things that are really hard to fit into the concept."

"I really appreciate the question about patients not being central enough to all these ideas," van Schaik replied. "What we're trying to get across is that patients themselves, and staff and the CEO and everybody else, are also learners [in this vision]. In health care, things evolve so rapidly that no one can afford to not learn. I am sure there are 110 things that have happened to patients over the past 100 years that they initially didn't like, but they had to evolve with the technology.

"And there are demands outside of our control—billing, regulatory things—that will push us in certain directions," she continued, "and then we have to evolve together to learn and adapt to those systems. Of course, always keeping in mind that patient care is the center of all of this."

Overview and Discussion of Case Study:

Intentionally Designing Learning in the Clinical Workplace at Aurora Health Care

Intentionally Designing Learning in the Clinical Workplace at Aurora Health Care was presented by author Deborah Simpson, PhD, whose co-authors were Aurora Health Care colleagues Andy Anderson, MD, MBA; John Brill, MD, MPH; and Jennifer Hartlaub, DNP, APNP, FNP-BC. The case study describes the efforts of Aurora Health Care, an integrated health care system in Milwaukee, Wisconsin, to design "vibrant clinical workplace learning environments to improve patient care, promote continuous learning, and support well-being."

Simpson began with a short anecdote about trainees she worked with years ago in a faculty development class, teaching them the fundamentals of teaching about geriatrics. She said the faculty members did phenomenally well until she observed them in the clinical environment, where they failed to impart to their own students the key principles of geriatrics that they had been taught. "That was pretty demoralizing," Simpson said. "After that, my thinking shifted. I came to understand that we need to start the design of our education from the other end, based on the outcomes we want to see from the clinical environment: improved care for patients and improved health for everyone. That conclusion aligns with what we're discussing here." She went on to explain that in saying 'improved health for everyone' she includes those learning and working in health professions education and clinical care. "If we don't have a healthy team," she said, "then we can't have healthy learning, no matter what."

Simpson said that, in lieu of summarizing the Aurora case study for conferees who had already read it, she would offer a take-away message. "I have the pleasure of working now in an environment [at Aurora Health Care] where there's no question about what the value is . . . we've shifted to valuing health outcomes, and we have the metrics to measure that." She went on: "And, really, our shared value is that it's about the people, it's about the patients and all the people that surround our patients, whether they are learners or [faculty or staff]. And if they're not in a good place, we struggle with having our trainees—they call themselves learners—introduced into those environments. We think about their learning, their growth, their well-being. And we surround them with people who are themselves always learning. That's where we place our emphasis, that we are all always learning."

She went on to explain that one of Aurora's educational goals is to create 'master adaptive learners' who can keep learning no matter the environment in which they find themselves. She also explained that Aurora does not distinguish between a learning environment and the environment of care. "It is a learning environment," she said. "Our patients come to us to get good health care, and we happen to put learners in some of the places [where we have patients]. The primary purpose of those places is always the care of the patient."

In conclusion, Simpson acknowledged the efforts of the ACGME and its Clinical Learning Environment Review (CLER) program for helping to bring Aurora's C-suite leaders on board with the organizational shift in focus. She also mentioned, however, that barriers related to accreditation were among the biggest challenges

the organization faced. She went on to urge others to think about purpose and meaning in health care—"that's why people go into health care and it's what keeps them there and keeps them healthy," she said. "I am astounded at the overlaps in the literature among what we know about well-being and resiliency, good teaching and learning, and health care quality and improvement. I think if we lined all those up, we would have the shared meaning and purpose."

Session moderator Regina Cunningham, PhD, RN, AOCN, FAAN, of the Hospital of the University of Pennsylvania, then opened the floor to questions from conferees. The first question was: do we need to begin teaching faculty how to teach master adaptive learning? "Yes," Simpson said. "It's not just health care that is transforming. Education in its delivery and assessment is also being transformed." Another comment came from Larry Gruppen, who had presented the commissioned literature review earlier in the morning. "[At Aurora], you identified real clinical outcomes related to asthma and diabetes that you can measure—that you can have goals for—and describe the changes in the environment that contribute to those. That is the kind of research on learning environments and the literature that we need to develop." Another conferee, picking up on Simpson's comments about persuading Aurora's C-suite regarding the organizational shift, reiterated that there is a necessary role for leadership—for boards, executives, and managers—in aligning their organizations around shared purpose and values.

Another conferee raised concerns about how to manage physical spaces within learning environments. "[When we talk about] 'any time, any where, any place education,' what we really mean is we want to leverage technology to expand learning opportunities. But I would like to see us also talk about redesigning physical spaces and how to think about that in terms of ensuring safe spaces to learn as well as quality of care and patient safety." Another credited Simpson's case study and presentation with expanding their view regarding master adaptive learners. "What we really need is not master adaptive learners—who learn to do whatever we tell them to—but master adaptive thinkers, who learn how to think critically and figure things out."

Overview and Discussion of Case Study:

Our Lady of the Lake Regional Medical Center: Transforming a Large Tertiary Community Hospital into an Academic Medical Center

The next case study, *Our Lady of the Lake Regional Medical Center: Transforming a Large Tertiary Community Hospital into an Academic Medical Center*, detailed a series of events that included Hurricane Katrina and the closure of a public health system in Baton Rouge, Louisiana, and that, ultimately, resulted in the transformation of a tertiary community hospital into an academic health center. Laurinda Calongne, EdD, presented the case study, which she wrote with colleagues Mandi Musso, PhD, and Pam McMahon, PhD. In discussing the case study, Dr. Calongne shared some of the lessons she, in the newly created position of chief academic officer, learned during Our Lady of the Lake's transition from large Catholic hospital to academic health center.

The first lesson she shared: culture trumps strategy every time. "We have come a long way, but during the transition period, the staff at Our Lady of the Lake were very anxious. Their hospital was the local market leader and they were very concerned about what taking on the indigent population would look like for them," she said. "While the folks at the safety net hospital, Earl K. Long, were not only anxious, but also grieving. They had just lost their hospital. They had lost what they thought was their purpose in caring for the sick and underserved. And, with the merger, they were becoming the little fish in the big pond." Calongne noted that it was not part of the strategy to deal with culture change, but culture change became a major factor that they were forced to deal with anyway.

Another lesson learned: "Relationships and respect have to be at the forefront of everything you do," Calongne said. "That means understanding people and the dynamics, identifying the change champions, the early adopters and early innovators, who can help influence the resistors. The social systems theory approach really worked; I found myself being more of a licensed clinical social worker than a doctor of education."

A third important lesson: aligning your initiative with a burning platform. "For my accreditation colleagues in the room, a large part of what we were able to do was because we had the accreditation standards. So because ACGME says you must have a scholarly atmosphere, that residents must do research, it really helped me

drive that issue with Our Lady of the Lake," which was resisting the new research agenda because it conflicted with the hospital's religious mission.

And the biggest lesson, according to Calongne: "I had to learn how to speak their language. By 'their' I mean that I am part of the C-suite now. I had to get out of academic speak and demonstrate that I understand what 'return on investment' looks like. It means always tying initiatives to the impact on patient care, and understanding quality dashboards and workforce development, that Louisiana is third in the nation in the aging of our physician workforce. It means always tying these things back to the costs and benefits to our system."

Session moderator Linda Headrick, MD, MS, of the University of Missouri-Columbia School of Medicine, then invited questions from the conferees. The first comment focused on the reaction of the nurses to the merger—how they handled the culture change, suddenly having to learn alongside other health professions learners with different roles, different responsibilities, and different educational agendas. Calongne responded that they identified nurses who were interested in helping lead the change and arranged for them to serve as mentors to the medical residents. The academic health center also reduced the number of nursing schools with which it had relationships, focusing only on those that would help it enhance health professions education.

Several conferees appreciated the case study's highlighting the need not only to understand culture change but also to understand the value of diversity and inclusion in all roles and positions and at every organizational level. Picking up on this theme, one commenter noted that those who led the transition did not place an undue burden on individuals who are minorities to then speak for or represent the entire minority population. The same conferee also said that Calongne's lesson about learning to speak a new language resonated deeply.

"I also had that experience when I moved to the dean's office," the conferee said, "and I learned that I had to shift from a qualitative, principles-based language to a highly quantitative language." She also mentioned that ACGME's annual survey of residents has given her, as a medical school dean, invaluable quantitative data to share with the C-suite when talking about the learning environment. "It tells you how many residents feel too intimidated in their daily learning environments to speak up or speak out," she said, "because that is a question on the survey."

Overview and Discussion of Case Study:

The University of Rochester Medical Center Institute for Innovative Education: Reimagining the Architecture for Our Learning Environment

Sarah E. Peyre, EdD, authored and presented the final case study, *The University of Rochester Medical Center Institute for Innovative Education: Reimagining the Architecture for Our Learning Environment.* Her co-authors were University of Rochester colleagues: David R. Lambert, MD; Kathy Rideout, EdD, PPCNP-BC, FNAP; Diane M. Hartmann, MD; and Mark B. Taubman, MD. In introducing the case study, Dr. Peyre explained that the University of Rochester Medical Center is one of only 13 U.S. academic medical centers where the medical and nursing schools are under the same organizational structure as the clinical enterprise—and they all share the same continuously connected building.

"So there are a lot of opportunities for alignment inherent in that set up," Peyre said. The medical center created the Institute for Innovative Education (IIE) to explore those opportunities, including around shared curricular needs and shared resources. "We started by focusing on things we could touch and feel, highly visible things," Peyre said. "We weren't using the language of learning environments at the time, but the work did have a ripple effect on our culture."

According to Peyre, a success indicator for IIE not discussed in the case study was that it has reduced some of the barriers that otherwise would have hindered departmental efforts to implement interprofessional education programs. "But we're still wrestling with time—time for our faculty," Peyre said. "We can build these beautiful spaces and digital learning is becoming more important, but we haven't yet figured out time." Another challenge is one Peyre referred to as looping—going back, looping back, and making sure that everyone is brought along and none fall behind. "In our case, we began with the medical and nursing schools in 2012–13, asking how can we co-locate learning between them? That involved a heavy lift with the clinical enterprise and medical school in 2013–14, and now the nursing school is indicating that they feel forgotten, that we haven't brought them along with the same level of attention to their particular needs. So we're working on that."

Peyre went on to explain, "I think we put a lot of emphasis on structure, on the physical components. That was a way of making learning visible. But learning is a sociocultural construct, so we need to focus on that, on the stuff that isn't as visible

or tangible." Peyre also mentioned a concern about wellness and resilience in the learning environment, stating, "We're thinking specifically about how to build longitudinal relationships, and I think that that could be one of the many keys" to facilitating wellness and resilience. She concluded, "I hope this case study resonates with you as a story of master adaptive leadership. We have longevity in our C-suite, but I have seen [our leaders] change and grow and really become servant-leaders—and I think that is the key to our success."

Session moderator Joanne Disch, PhD, RN, FAAN, of the University of Minnesota School of Nursing, then invited the conferees to join the discussion. First up was one of Peyre's colleagues and co-authors, Dr. Mark Taubman, who explained why the IIE focused on structure, space, and other physical aspects. "We couldn't announce a culture change," he said. "We're already undergoing a culture change in health care broadly. It's happening every day, and it has been for years. We couldn't ask for more culture change because everybody is going through too much already." He went on to say that, by focusing on space, they were able to create an environment that touches everybody in the institution. It was a specific project that everyone could see and have input into, and that had easily identifiable costs.

A conferee asked specifically if the co-location of the medical school, nursing school, and hospital at the University of Rochester helped with what the team was trying to achieve. Peyre responded, "We are a collection of micro-cultures. I'd like to say that being co-located helps, but I still think we struggle with different languages and expectations and assumptions."

Plenary Session Overview: Reports from Breakout Groups and General Discussion of Themes of the Day

Following discussions of the commissioned papers and case studies, conferees were assigned to small breakout groups to focus on specific topics and explore themes relevant to possible recommendations. The groups were assigned different domains of the learning environment: personal, social, organizational, physical, and virtual. After these groups met, the afternoon plenary discussion featured brief reports from each of the five breakout groups and a general conversation about the primary themes of the conference so far.

Group 1: Personal Components of Learning Environments

The first breakout group to summarize its discussion had been asked to consider individual learners and the personal components of learning environments. The group's reporter explained that the group began by agreeing on language—deciding to refer to all individuals as "learners" no matter their formal role or title, and that "learning" actually refers to the journey of lifelong learning. The group also explored how organizations could better support lifelong learning by assessing people according to their labor and investment (i.e., using a Likert scale to rate their effectiveness) rather than by productivity measures (i.e., how many grant dollars they brought to the institution).

The group recognized the importance of shared team goals that individuals should agree to and work toward, as well as the importance of self-awareness of the part of each individual team member. Individuals need to understand what they bring to relationships with patients and with other team members—and they need to know when they are capable of being effective on their own and when they need assistance. Finally, the group discussed power and hierarchies and the need for individuals to be able to speak up and out, to admit when they don't know something.

Finally, the group discussed what attributes are desirable in individuals and in learning environments. "We thought the attributes that a person should possess include inquisitiveness, resilience, tenacity, self-awareness, interpersonal skills, and passion," the group's reporter said. "And the learning environment should lend itself to bringing forth all these attributes, and that everybody at the end of the day should have the same shared goals and shared purpose."

In response to the group's presentation, several conferees concurred with the list of desired individual attributes (one person added systems thinking and leadership skills to the list), but also raised the reality that health professions learning environments can sometimes destroy those very attributes in people. While it is important to identify individuals with those attributes, it is equally or possibly more important that the learning environment is a healthy one that supports and fosters the continued development of desired attributes in learners. Another conferee raised the issue of character formation. We tend to think of character as something an individual has or does not have, but it could instead be a form of good habits that are developed over time as part of learning, as a part of interacting within learning environments.

Group 2: Social Components of Learning Environments

The second breakout group discussed the social components of the learning environment—by which we mean the interpersonal interactions that take place as part of learning, work, and relationships. The group's reporter first explained that the social component is often underestimated, as evidenced by the fact that we don't always appreciate how much work goes into developing a cohesive, high-functioning team. "People don't just come together naturally and suddenly there's trust and transparency between them," she said. "There is a lot of relationship building that must happen and an appreciation of diversity of thought and perspectives." The group also raised some of the barriers that hinder the social component, including power differentials and hierarchies, and the need to understand each others' roles and responsibilities and breakdown disciplinary silos and expand interprofessional education.

The group also discussed the need for patient engagement—the importance of not excluding patients from the team relationship and acknowledging them as people who bring their own experiences and perspectives. The group went beyond patient engagement to talk about public engagement and the importance of teams sharing the goal of caring for entire populations and communities. Finally, the group talked about the importance of measurement to assess the learning environment, but acknowledged the difficulty of measuring the social component. They discussed the importance of safety in learning environments so that learners are able to express concerns about discrimination, mistreatment, bad behaviors, and other conflicts.

In response, Dr. Thibault, acting as a commenter, reiterated the group's call for more interprofessional education (IPE). "I'm seeing some pushback on IPE around the nation, some people are concerned about it blurring the lines between professions and eroding professional identities," he said. "But I would argue that the opposite is true. Effective collaboration comes only from having the strongest people on the team, those who are clear and confident in their professional roles and able to hold their own. That is what gets you the diversity of professional opinions and perspectives necessary to provide excellent team care."

Dr. Thibault also suggested, based on experience with a past Macy conference, that conferees talk about "partnering with patients, families, and communities" rather than merely engaging patients. "A partnership is a more equal and respectful relationship with shared responsibilities. Words really do make a

difference," he said. The Foundation's Stephen Schoenbaum followed up on this comment, stating that "patient engagement" suggests a power differential that places health care professionals in the driver's seat. Dr. Irby countered, "I like 'engagement.' It doesn't suggest a power differential to me, or at least it didn't. It just goes to show you that we all have different experiences and frames of reference and that we are all always learning."

Another conferee picked up on the group's comments about the difficulty of measuring the social components in learning environments. He noted the usefulness of qualitative information to enhance a quantitative assessment, even though such information is not generalizable. "The numbers don't always tell a complete story," he said, and went on to recommend the book, *The Tyranny of Metrics,* by Jerry Muller. Finally, a conferee mentioned the giving and receiving of feedback as another social component of the learning environment that must be examined and improved.

Group 3: Organizational Components of Learning Environments

The third breakout group discussed the organizational components of learning environments, including leadership, culture, infrastructure, supports, and more. The group identified several themes, illustrating how an organization can be structured such that it maintains the status quo or promotes a vision for optimal learning environments. The first theme is that *accountability* must be present and enforced to ensure an exemplary learning environment. This means, for example, that resources are fairly and adequately allocated. Another theme is the need to use *accreditation standards* to drive improvements in learning environments.

The group also explored *organizational culture*, *leadership*, and *curriculum structure* as interrelated themes. Leadership should be active, not complacent, and should always be exploring ways to improve. Leadership also should ensure an organizational culture that supports optimal learning environments, including opportunities to align curriculum development with the clinical enterprise.

"We realized after talking about these various components and how they interact," the group's reporter said, "that we basically reconstructed in our conversation the Institute for Healthcare Improvement's (IHI's) 2017 model, the 'Framework for Safe, Reliable, and Effective Care.'" The reporter said the group looked at that model and asked, "what's missing?" in terms of exemplary learning environments?

Their answer: interprofessional education is an integral part of an optimal learning environment that is missing from the IHI model mentioned above.

The group also identified barriers to optimal learning environments, including volume-based care and productivity goals, as well as electronic health records. The group sought to formulate a value proposition, asking themselves which arguments might persuade C-suite leadership to ensure optimal learning environments? One argument might be to demonstrate how optimal learning environments—which ensure that people have time to learn, sharpen skills, help improve processes, etc.—could cut down on professional turnover, thereby improving the bottom line and helping to build a sustainable workforce.

Finally, the group's reporter read several of the most salient quotes that he took note of during the discussion, including the following: "There's a significant burden of moral distress in health care. The motive to generate profit cannot be underestimated. The productivity burden and the reliance on disease for revenue, both of these create an incredible moral burden that we all must fight against." Another example: "The organizational structures are so invested in preserving the current status quo; it has taken a long time to get all those structures in place at every level. It's time to take a fresh look and retool all of them in terms of meeting our vision. It won't just be simply changing a vision and mission statement and an organizational structure. We have to look from the top down in great detail."

In response to the group presentation, a conferee raised a concern about relying on accreditation standards to move the needle, "What if we continue to look to accreditors to push us in what they think is the right direction, but they end up being wrong? How do they know any better than we do what is right? We have to consider that and not abdicate our moral responsibilities to assess these things for ourselves." Another commenter followed up on this, saying that it is a very valid point, while another urged caution in painting those in health care with a broad brush or insinuating nefarious motivations. "Yes, the system is set up so there is a profit motive in health care, but we all go into this because we want to help people," he said. "I doubt there are any surgeons sitting around hoping that people get hurt so that the surgeons can do their jobs and get paid." This was supported by another commenter's observation that, while the system is much larger, more complex, and harder to shift now, it also has structures in place to help deal with disruptive situations, such as faculty exhibiting undesirable behaviors toward learners or patients.

Another commenter picked up on the group's discussion about learning environments and the development of a value proposition for the C-suite. "There is a persuasive storyline that can be developed between the characteristics of a highly reliable organization and an ideal learning environment," he said. "The two can be equated to align with what the C-suite needs to accomplish. Go down the laundry list of key characteristics of a highly reliable organization and what spills out of that, without ever raising the topic of profit, are improved operations, fixing the darn problems that frustrate the providers and administrators alike, and out of that, magically, profit occurs."

Group 4: Physical Components of Learning Environments

The fourth breakout group, which was charged with examining the use of physical space within learning environments, began by brainstorming and then broke into two smaller sub-groups to organize their ideas. The first sub-group decided to refer back to the vision paper and think about the physical learning environment in terms of complex adaptive systems and the authors' four simple rules. According to the group's reporter, the sub-group decided that the physical space must support those within it by possessing "characteristics such as being nurturing, reflective, and safe both physically and psychologically." The group also decided that the physical space should support the continuum of care as well as meaningful inclusivity across the clinical care team, including patients.

The other sub-group thought about physical space according to the framework proposed in the first commissioned paper—that the learning environment has multiple components: personal, social, organizational, and physical/virtual. Regarding the personal component, the sub-group said that physical learning spaces should be inviting, nurturing, and safe for individual learners, and should provide access to resources that help them maximize learning. In terms of the social component, physical learning spaces should promote meaningful inclusivity and provide shared spaces where teams or other groupings can work together.

For the organizational component, the sub-group said spaces for learners should have proximity to authentic clinical experiences, and technology should be readily accessible with increasingly wireless capabilities so that activities like charting and teaching can be proximate to the patients. The idea is to bring learners closer to the patients, with physical spaces designed to be flexible and serve multiple purposes over time, such as accommodating teleconferencing with families and patients outside the institution.

A conferee responded to the group presentation with accolades, expressing how important it is to consider the effects of physical space on the ways that people learn, work, interact, etc. She and another conferee shared several anecdotes from their own careers that demonstrated how changes in physical space affected the behaviors of faculty, staff, and learners in both positive and negative ways. The point of these anecdotes was that the tangible impacts the intangible, and not always in ways that are intended or predictable.

Another conferee mentioned a hospital's use of artwork as a good return on investment in terms of the well-being of patients, families, and those who work in the building. The same conferee also noted that there are a variety of architectural innovations in health care and caregiving that have tried to idealize space for those within it. Additional conferees seconded the use of art, one expanding the term to include the beneficial use of music in some physical spaces. Another explained how art communicates messages about who is welcome in the space and, therefore, should be diverse and inclusive of minorities, of marginalized groups, of people with disabilities, etc. Recently, one well-known health care organization was featured in the news because a decision was made to remove from public spaces the portraits of the many former leaders of the organization—all of whom were white men.

One conferee, who began by talking about art, also brought up the power dynamics of space. "I want to underscore that physical space is power in an organization. It is a symbolic representation of who matters and who gets investiture," she said. In other words, physical space is a limited resource and how it is used communicates information about what the organization values.

Group 5: Virtual Components of Learning Environments

The fifth and final group discussed the virtual components of optimal learning environments, including online learning, electronic health records, informatics, and data analytics. The group's reporter began by drawing a distinction between virtual technologies that relate to patient care, such as electronic health records, and virtual technologies related to learning, such as online classrooms and distance learning. "It was a challenge because our conversation jumped back and forth between the two quite a bit," she said. Another challenge: technology is changing rapidly, making it difficult for organizations and individuals to keep up. "But at the same time, it is exciting," the reporter said, "knowing we can do things we never could before, and that we will soon be able to do things that we can't do now."

The reporter noted several technologies that have made it possible for learners to have quicker and easier access to more information than ever before, and noted an important implication of this development. "Learners may have faster access to better information, but they also have to learn how to evaluate that information critically—what is useful and what is not," she said. "That will become an even more important skill." Also important during this time of rapid technological change is ensuring "that everyone who needs to be is at the table when designing new electronic health records systems," for example, or otherwise deciding how best to implement new technologies. The group also called for partnering between those who understand the technology needs of health care organizations and those who develop the technologies.

Along a similar vein, the group discussed the fact that there are disparities in access to technology that will continue, possibly even increase. Some people, for example, are much more digitally connected and have better access to health information and health-related technologies than others.

The group also discussed the need for better measurement and assessment related to the use of technology. "Sometimes, we've adopted new technologies without understanding what it is we want it to do for us," the reporter said. "We need to ensure alignment between goals and the technology being used. This requires us to have clarity about what we want and how to assess the technology's usefulness in achieving what we want." The group closed with a discussion about the need for faculty development around integrating new technologies into their teaching.

Following the group's presentation, a conferee provided an example of how things are changing as a result of technology. "I typed 'transverse colectomy' in YouTube and the very first thing that popped up was a video about transverse colectomy for residents by residents. And there were more than 30,000 views of the video. So the virtual community is happening. It's happening deep, and it's happening wide, right now. We're just not attached to it."

The same conferee told a similarly relevant story about an accomplished surgeon who talked about the differences between when she trained and today. Then, colectomy patients remained in the hospital for a month instead of two days, and surgeons were deeply involved in all aspects of a patient's care and healing, whereas today there are many people involved who the surgeon may never meet. The conferee said, "Talking to (that surgeon), I realized care teams may no longer

exist in proximity, but rather over distance and over time and in transitions. And that's a very different model. I am haunted by this wonderful surgeon who said she doesn't know how to teach this stuff anymore because the residents don't learn what she learned in the same way she learned it."

Another conferee pivoted to electronic health records (EHRs) and urged withholding judgment on them. "I know EHRs are the bane of everyone's existence right now, but they're in their infancy. The internet didn't used to be as easy to use as it is now," he said. "I think once EHRs are being used correctly and to their full potential, they will be indispensible to teams for both patient care and learning."

Bringing some counter-perspective to the discussion, a conferee mentioned that, when learners come back from international electives, having worked in remote places with little or no access to technology, they often talk about what a transformative learning experience it was. "I don't want us to lose sight of those powerful learning experiences that happen when only people are there," she said.

Following the last group presentation, Drs. Irby and Thibault wrapped up the first day of the conference by thanking the conferees and noting that the productive discussion had provided an excellent foundation for the next day's work.

DAY 2: TUESDAY, APRIL 17, 2018

Brief Recap of Day 1 and Charge to Breakout Groups

The second day of the conference began with Dr. Thibault reflecting on the primary themes from day one, and Dr. Irby providing a preview of day two. Dr. Thibault first summarized key messages from the commissioned papers and case studies, including the proposed frameworks/models for understanding learning environments. He went on to highlight some themes from the discussions, which he framed as a "working list" of possible characteristics for an ideal learning environment.

"From our rich discussion, I extracted 10 characteristics of the ideal learning environment that we want to be working toward," he said. "First, it is values driven, but we must articulate values in order to share them. Second, it is inclusive and it values all who participate and what they have to offer. Third, it recognizes

the importance of relationships, including those with patients, families, and communities. Fourth, it depends on organizational leadership, and the concept was introduced of the master adaptive leader. Fifth, it aligns with the goals of highly reliable systems and takes the long view of value."

"Sixth," he continued, "it recognizes the potential of unintended consequences and, therefore, it studies, prepares, and evaluates in order to continuously improve. Seventh, it recognizes that physical spaces and structures are expressions of the values of the organization. Eighth, it understands the importance of the virtual environment, with both its pluses and its minuses, and it works to accentuate the positive. Ninth, it has all stakeholders at the table in making decisions. And tenth, it nurtures the health and well-being of all its participants."

Dr. Thibault acknowledged that others in the room may have arrived at a different list of characteristics, and that the list could/should be refined during continuing discussions. He also mentioned that no organization has yet achieved the ideal learning environment as defined by these 10 traits. "But, today, going forward we take the optimistic view that it is possible to create such an environment because we've seen and known elements of it," he said. "The obstacles in place can be overcome and that's what we're going to work on today. We're going to identify the specific actions and recommendations that can overcome the obstacles one by one, rather than looking at this as an insurmountable task."

Following this discussion of themes, Dr. Irby introduced the topic areas for the breakout group discussions and entertained questions. Conferees then dispersed to their assigned groups to begin the process of developing recommendations. The five groups were focused on the following topic areas.

1. Organizational supports for learning, well-being, and resilience

2. Faculty/staff development to create an inclusive, welcoming, inquiring, and respectful learning environment that continuously improves

3. Creating spaces that foster learning, a sense of belonging, diversity, inclusion, and innovation

4. Governance and policies to support an optimal learning environment

5. Setting an agenda for research and development of assessment tools for the learning environment

Plenary Session Overview: Reports from Breakout Groups, Response to Group Reports, and Identification of Missing Themes and Recommendations

After spending the morning in their breakout groups, the conferees reassembled in a plenary session to hear summary reports from each group. For this session, the breakout groups reported back in reverse numerical order, starting with Group 5.

Group 5: Setting an agenda for research and development of assessment tools for the learning environment

The group's reporter began by summarizing an overarching recommendation for research and assessment related to learning environments. "The research agenda should be built on ways of improving, of getting to an increasingly excellent learning environment, " he said, and went on to describe several sub-recommendations that the group developed to support this broader goal, including the following:

- Research questions should be linked directly to the overall learning environment framework and take into account the complexity of learning environments.

- Research methodologies should be multi-modal, "and we would urge people to strongly consider randomized controlled trials (RCTs) and hypothesis-driven research" the reporter said. "We also see a need for descriptive case studies, for ethnographic studies. Ideally, the studies would be multi-institutional and try to give some degree of generalizability or context for what works in what kind of environment."

- Outcomes assessments should include personal outcomes/self-reports, as well as socio-cultural outcomes, learning outcomes, and patient outcomes.

- Accrediting bodies, which are requiring improvements in learning environments, should advocate for funding from the federal government to support this type of research.

A conferee responded to the group presentation with a recommendation that journal editors be encouraged to require authors submitting articles on this type

of research to provide a definition of "learning environment" and describe their specific learning environment(s). "We did that with interprofessional education," the conferee said. "We asked journal editors to start requiring authors to state which professions were involved, how many were involved, what the training goals were, instead of just saying, 'Here is another IPE activity.'"

Another conferee questioned the group's recommendation for randomized controlled trials. "They're expensive, cumbersome, and increasingly being recognized as unrealistic," she said. "And since one learning environment is likely not going to look like another learning environment, we have to think about that one carefully." Dr. Thibault responded, "I would urge us not to make a recommendation against doing randomized control trials. There are times when they are possible to do and still aren't being done, and that seems like a missed opportunity. We're not arguing that everything should be an RCT."

Another conferee expanded on the research recommendations, suggesting that the research methodologies also be multi-disciplinary and that evaluation be continuous. Another suggested a collaborative effort among health professions groups to identify a research agenda that spells out important research questions that need to be explored, while another suggested articulating and prioritizing some of the most important research questions—or at least identifying the research gaps—as part of the conference recommendations document.

In response, one member of the breakout group explained that the group did discuss some of the research questions. "We saw future learning environment research as detailing such questions as the following: what level are you focusing the research question on—is it micro-, meso-, or macro-? Is the location of the learning environment a classroom, a virtual space, or a clinical workplace? We also talked about cultural elements, such as language, routines, artifacts, and rituals, which are different across our professions. We thought about physical space considerations; sociocultural considerations; interprofessional elements; diversity considerations; instructional strategies; and organizational factors, such as resources, structures, leadership, and populations served."

Another conferee added, "I think it would be wonderful if the ACGME would share its data variables so that other disciplines could collect the same data, and then we could create a huge registry in which we could really learn what's working and what's not in terms of learning environments." The same conferee suggested

adding the funding of assessment tools and psychometric evaluations, and broadening the term "research" to "scholarship."

Group 5's discussion ended with a recommendation to develop a core set of common assessment tools for collaborative learning environments that can be used across the field.

Group 4: Governance and policies to support an optimal learning environment

The breakout group on governance and policies decided to discuss the two domains separately, with the group's reporter first describing four recommendations for the governance of learning environments.

- A learning environment's governing body should be able to articulate the value of the learning environment to the organization—including the value of diversity and inclusion.

- The governing body is accountable for ensuring resources are available and allocated so the organization can have a successful learning environment, including all learners.

- The governing body will regularly receive and analyze data on the culture of the learning environment. These data will include data specific to the diversity and inclusion of all learners in order to assess their influence and impact on the learning environment.

- The governing body will ensure that its core values are imparted and upheld. These core values are designed around both patients and professionals, and a core value should be diversity and inclusion.

Another reporter from the group then shared five recommendations regarding learning environment policies. "It is pretty clear," she said, "that clinical outcomes and academic outcomes are not always aligned. We come from different perspectives, different sets of standards, and we have to meet and work. We're not always on the same page, so some of these policy recommendations were chosen to try and help address that gap."

- Accrediting bodies should identify standards related to accountability for the learning environment's culture and outcomes that are aligned with its mission.

- The Health Resources and Services Administration (HRSA) should expand graduate education financial support to include all health professions (clinical training).

- Relevant national membership organizations should build educational programs and resources to enhance the ability of patients and community representatives to help shape the quality of learning environments.

- The U.S. Department of Health & Human Services (HHS) should establish and fund (through re-allocation) a new entity to accelerate excellence in our nation's learning environments through intramurally and extramurally funded programs and projects.

- Recognizing the current culture of competition across health professions education programs, there should be a mechanism enabling accrediting bodies to enhance their efforts to minimize conflict and maximize alignment of learning environment standards.

Following the presentation, a conferee suggested that health professions learning environments, because they often are part of complex organizations, may fall under conflicting or competing governance structures that must be aligned in order to optimally support the learning environment. This led to a brief conversation about the need to define "governance" and/or "governing body" in the recommendations document. Another conferee suggested not focusing the recommendation for clinical training funding solely on HRSA or even the government, because such funding is not secure. "There are some innovative funding proposals for health professions education out there that are worth looking into," the conferee said.

A conferee asked if this was an opportunity to consider academic practice partnerships in a governance model to minimize some fragmentation. She added, "I would like to see us go farther in terms of recommending the setting of clear expectations and responsibilities for governance to ensure the quality of the learning environment."

Group 3: Creating spaces that foster learning, a sense of belonging, diversity, inclusion, and innovation

"I want to begin by acknowledging the role of technology in changing our expectations around learning spaces," the reporter for Group 3 began. "It's been a disruptive innovator, not only in how we provide care, but also in how we teach." She also mentioned that, for this exercise, the group envisioned a resource-rich environment, but acknowledged that not all organizations have that luxury. Finally, she mentioned a recurring theme in the group's discussion: the power of physical space in an organization. She then articulated the group's overarching goal or recommendation: to create a space that fosters learning, a sense of belonging, diversity, inclusion, and innovation.

The group also identified some background context or assumptions that must be considered when thinking about this recommendation. One is that learning needs to dictate the space (classroom, clinical, simulation, online) that will best facilitate discovery, curiosity, connectedness, and innovation. Another is that environments are dynamic, requiring a matrix of learning spaces that support the growth and development of all learners. And a third recognizes the need for a comprehensive evaluation of different types of spaces that constitute the learning environment.

In terms of practical recommendations, the group offered the following:

- Develop criteria to evaluate the effectiveness of the learning environments, recognizing that the spaces and learning processes are dynamic and disruptive (e.g., role of faculty/learner, tools used, accountabilities).

- Assure that learning environments purposefully address these key elements: safety, engagement, belonging (connectedness), support (infrastructure), access, and aesthetics (milieu).

- In creating and evaluating learning environments, apply a diversity lens to assure that all roles and voices are visible.

- Structure learning environments to optimize: (1) the co-construction of learning between the learner and educator (e.g., faculty, peers), and (2) a culture of mutual respect.

Following several comments to clarify language the group used (e.g., "environment" versus "space"), a conferee suggested some concepts that might be missing from this group's recommendations. "There are two different pieces from yesterday's conversation that I thought we would have heard here," he said. "One is proximity to patient, and not just proximity in terms of space, but proximity in terms of inclusiveness of the patient in the activity. And the second is the team function and maybe making that more explicit within the space?" Another conferee said she too was "struck by the absence of not only patients, but also all the other players in the clinical workspace." She suggested adding these concepts to the group's fourth recommendation on structuring the learning environment.

"As I listen to these comments," one conferee said, "I am reminded that most of our health care learning environments are imperfect. I'm thinking about our emergency department on the South Side of Chicago overflowing at the seams, with patients literally in the hallways. The group might consider providing some guidance for how we work in imperfect environments. Are there some fundamental ways we might approach our patients and our work in these imperfect environments that would bring dignity to the humans in those processes and elevate the learning that might be taking place in a respectful and compassionate manner?"

In response, another conferee offered a cautionary note, "I think we would do better to argue that places need to create appropriate spaces than that we have to adapt to inappropriate spaces." Another followed up, "Can we instead articulate what it is that we're striving for, that there is an intention here to learn? Even in the most unnatural situations, a sacred space for learning is still possible."

Group 2: Faculty/staff development to create an inclusive, welcoming, inquiring, and respectful learning environment that continuously improves

This group worked hard, according to its reporter, to put framing around who is meant by "faculty" and whether or not faculty is the right word to use when working with the assumption that everyone, including patients, are both teachers and learners. The group decided that faculty refers to those who have formal responsibility for learning outcomes. The group also began with the assumption that learning is a co-production and that everyone is a steward of the learning environment. Given this context, the group drafted an overall goal and then developed recommendations for two groups: 1) everyone in the learning environment, and 2) faculty, or those with designated responsibility for learning outcomes.

The group's stated goal for faculty/staff development: develop everyone in the learning environment so that they are able to improve in order to accomplish health for all. The group noted that this goal requires leaders to develop a learning mindset in order to create the conditions necessary for the continuous development of everyone in the learning environment.

Recommendations that apply to everyone in the learning environment:

- Everyone is welcome to bring their full selves to the learning environment in a way that reinforces the learning environment's mission and values, supported by a set of enabling structures and policies.

- Everyone shares expectations for and is supported in the co-creation of processes and systems for improved health and learning.

- Everyone is able and prepared to exchange feedback to improve the learning environment.

Recommendations for those with designated responsibility for learning outcomes:

- Faculty charged with education will have the knowledge, skills, attitudes, and behaviors that lead to these outcomes.

- The development of faculty and staff charged with education will be mandatory and require dedicated time, support, recognition, and rewards.

- Faculty development will focus on purpose-driven learning and improvement and will be situated to account for formal and informal structures of learning, including interprofessional and interdisciplinary teams (e.g., effective co-production of health with patients and families, implicit bias, bystander training, self-awareness, leadership/structures, awareness of limitations, reflective practice, and team communication across professions).

- Faculty and staff will be assessed and programs evaluated on the following aspects of the learning environment: assessments of respect/discrimination, candid feedback on performance to promote improvement, and measures of culture/safety improvement.

The first conferee to offer feedback suggested that, along with the work done to define "faculty," the group should clarify the definition of "staff." Another conferee suggested that the group incorporate a reference to master adaptive learners in its recommendations, and another suggested an explicit recommendation regarding faculty development in interprofessional education. A conferee also raised the idea of linking faculty/staff development to the value proposition in terms of improving patient care.

A variety of other comments were made regarding the way this group broke its recommendations up for two target audiences and also regarding the number of this group's recommendations that overlap with those in other groups.

"I am wondering if there is an opportunity here for us to make an explicit statement about continuous professional development and lifelong learning?" said the final commenter, who was also a member of this group. "That would make it clear that this is not just for a few individuals, but for everyone who is in the educational role."

Group 1: Organizational supports for learning, well-being, and resilience

The reporter for Group 1 began by reading through the group's overarching recommendation and its six supporting recommendations, which follow below.

"Organizations responsible for education should develop specific strategies and a structure to unify culture, resources, and processes to cultivate a climate that supports an optimal learning environment across the continuum of health professions education."

- Create and sustain a just, inclusive, and civil culture in the learning environment.

- Adopt and sustain a culture that promotes quality and the science safety in the learning environment.

- Support the training of a diverse group of master adaptive learners (i.e., emotionally intelligent, situationally aware, mindful, reflective, learning-agile, and boundary-spanning individuals) across all levels and disciplines to enhance the learning environment.

- Provide coordinated resources (e.g., space, time, funds, experts, technology) for the learning environment consistent with the strategies developed.

- Foster respectful and reinforcing relationships in the learning environment (peer-to-peer, learners, patients, teachers, learners-staff, interprofessional colleagues) and across organizations that influence the learning environment.

- Ensure that the organizational values and practices regarding the learning environment are aligned and outcomes are continually evaluated and shared with the governing body.

The first few commenters offered suggestions for clarifying and refining the group's language. This included a suggestion to add the concept of "sustaining" an inclusive culture and not just "creating" one. Another conferee, acknowledging that his comment applies both to this group and to the governing/policy group, suggested a recommendation that would place interprofessional learners on an organization's governing board.

That comment prompted a question from another conferee. "Who are these organizations we're talking about?" he asked. "Are they larger academic medical centers or federally qualified health centers? Are they individual institutions that may just have one element of this? Are we talking about organizations that are totally integrated under one umbrella or a university that contracts out its hospital? The types of organizations we're talking to or about will determine how they implement these recommendations."

At the close of day two, the five breakout groups reconvened until dinner time to collectively refine their draft recommendations based on the plenary discussion. The writing committee then took those drafts and further refined them while Drs. Thibault and Irby worked with Macy staff to draft the introductory and background sections of the document. Finally, Macy staff combined the various pieces into one complete first draft and distributed it to the conferees for review.

DAY 3: WEDNESDAY, APRIL 18, 2018

On the final morning of the conference, participants shared feedback on the draft recommendations that had been distributed overnight.

Conference Conclusions and Recommendations

In opening the discussion, Dr. Thibault asked conferees to refrain from wordsmithing the draft document and focus their feedback on larger issues such as content, organization, and tone. He pointed out that the writing committee, for example, had ended up creating six sets of recommendations from the five topic areas that the five breakout groups had considered. "Did we do the right thing by separating policy and governance into two recommendations?" he asked. "And do we have the six recommendations presented in the right order? Are we missing anything important? Is there anything we focused on that we should not have? These are the important questions for this session."

Conferees generously praised the first draft of the recommendations document and also shared many substantive comments intended to improve it. Several reviewers, for example, suggested that, in the early pages, the definitions of "learners" and "learning environment" as well as the draft vision statement for what an optimal learning environment looks like needed to be refined. It was decided that the writing committee would refer back to the commissioned papers as well as to their notes from the conference to revise these items before circulation of the next full draft for review.

Some conferees also felt that the opening paragraphs were too lackluster to draw in readers; one conferee said that "more evocative and powerful language" was required. This dovetailed with a discussion around the need to provide more context in the opening regarding the rapid changes occurring in America's health care system. Overall, the conferees felt strongly that the introduction should communicate a sense of urgency around optimizing health professions learning environments.

Constructive criticism about the opening paragraphs led to important discussions about whether or not two topics that permeated the conference were adequately captured in the draft. The first topic was the centrality of patients and patient care to health professions learning environments—had the writing committee done a

good job of communicating to readers that patients and their care are what drives the entire health care enterprise? The second topic was diversity and inclusion—had the writing committee done all it could to ensure that optimal learning environments require an unswerving commitment to diversity and inclusion? Specific suggestions were made for improving the treatment of both topics in the draft.

Similarly, some conferees expressed or agreed that the draft focused too heavily on medicine and the clinical learning environment and did not do enough to include other health professions learners as well as learners focused on research instead of direct patient care and staff who are not faculty. Dr. Thibault agreed that the conferees should be thinking about all learning environments across a continuum of lifelong learning. He said he was comfortable with the balance struck in the draft, but that the suggestions would be kept in mind during the revision process, especially suggestions to be more inclusive of interprofessional education, as well as all types of learners and staff.

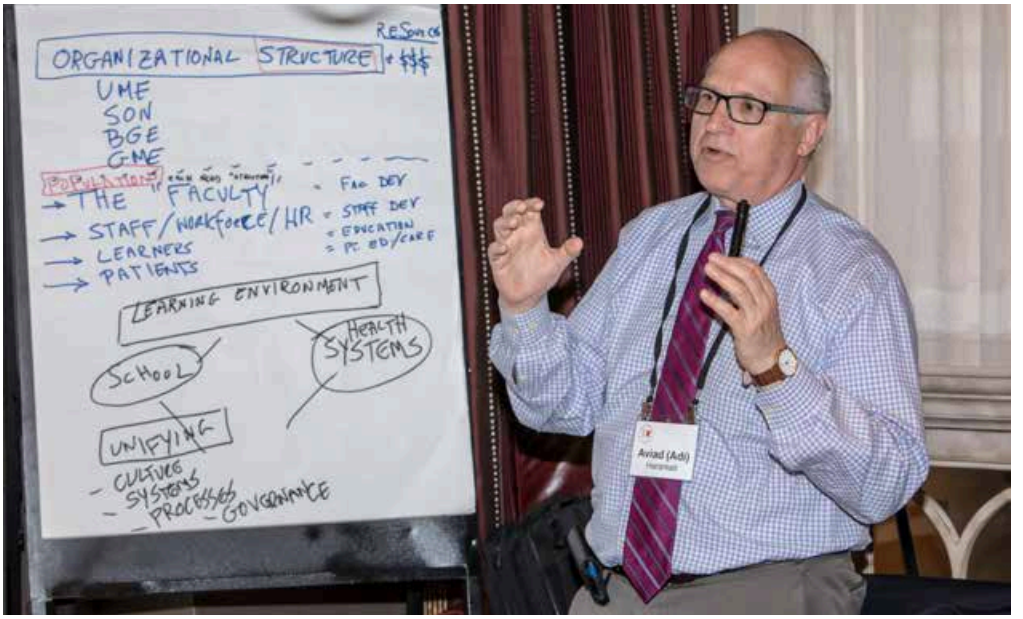
The conversation continued throughout the morning, moving from overarching comments about tone and organization to more granular suggestions regarding specific recommendations and sections that required additional work. During this part of the discussion, the conferees wrestled with identifying and eliminating redundancies and called for more consistency in the language used as well as clearer definitions of certain concepts, the insertion of examples to support important points, and more. It was during this part of the conversation that some conferees identified important points that made their first appearances in the recommendations sections, but actually needed to be mentioned and explained earlier in the draft.

Upon conclusion of the discussion, the writing committee was charged with revising the draft recommendations document based on the feedback provided by the conferees. In the weeks following the conference, the committee revised and reviewed several versions of the draft via email and phone meetings. A semi-final draft was distributed to all conferees for review and comment. The final, consensus document appears in this monograph.

Around lunchtime on Wednesday, Drs. Thibault and Irby shared their concluding thoughts. Dr. Thibault, who had previously announced his forthcoming retirement, in June 2018, as President of the Foundation said, "This was the perfect conference

on which to end my tenure as president. The discussion was rich and engaging and the resulting recommendations are thoughtful and substantive. I am honored to have spent these past few days with you all, creating a product that we can be proud of and that I believe will help move the needle toward more optimal learning environments in the health professions. Thank you."

In response, Dr. Irby expressed the gratitude of the group, as well as of the larger health professions education and health care community, for Dr. Thibault's significant and sustained leadership in improving both. With standing applause for Dr. Thibault, Dr. Irby brought the meeting to a close.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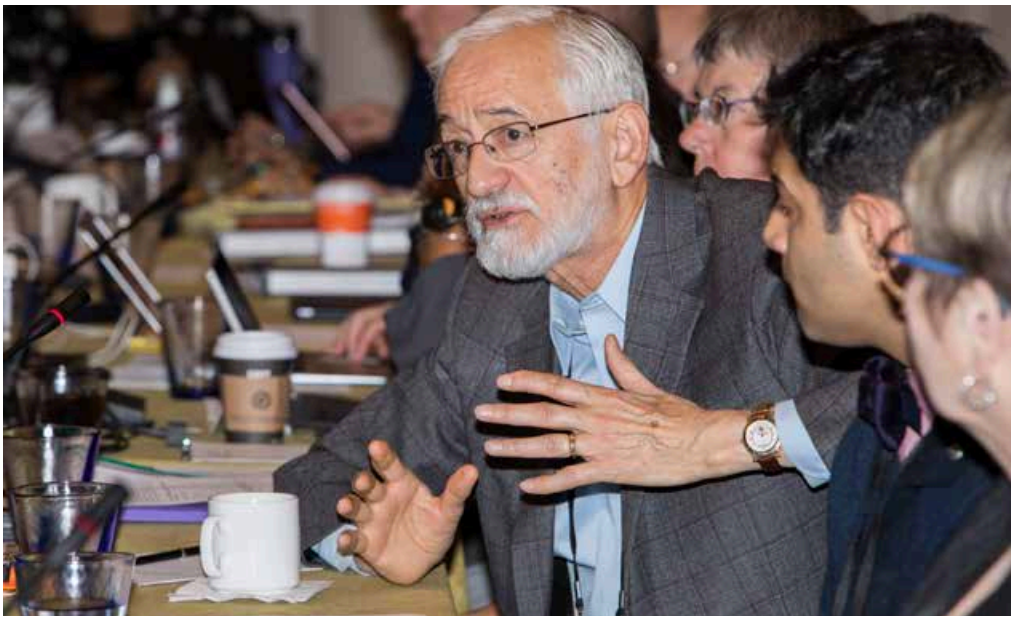


Michelle
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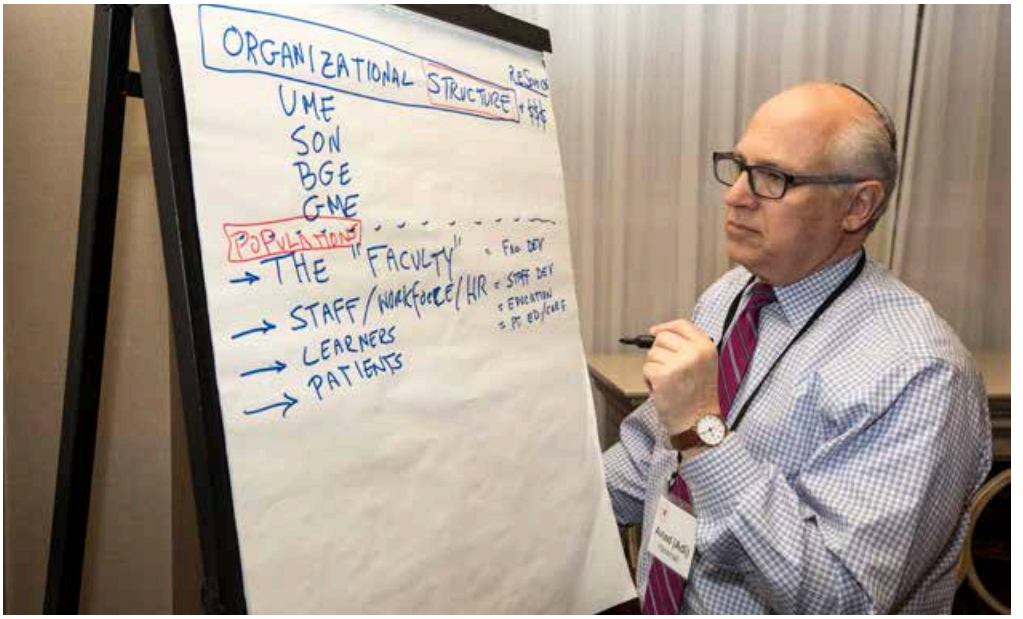
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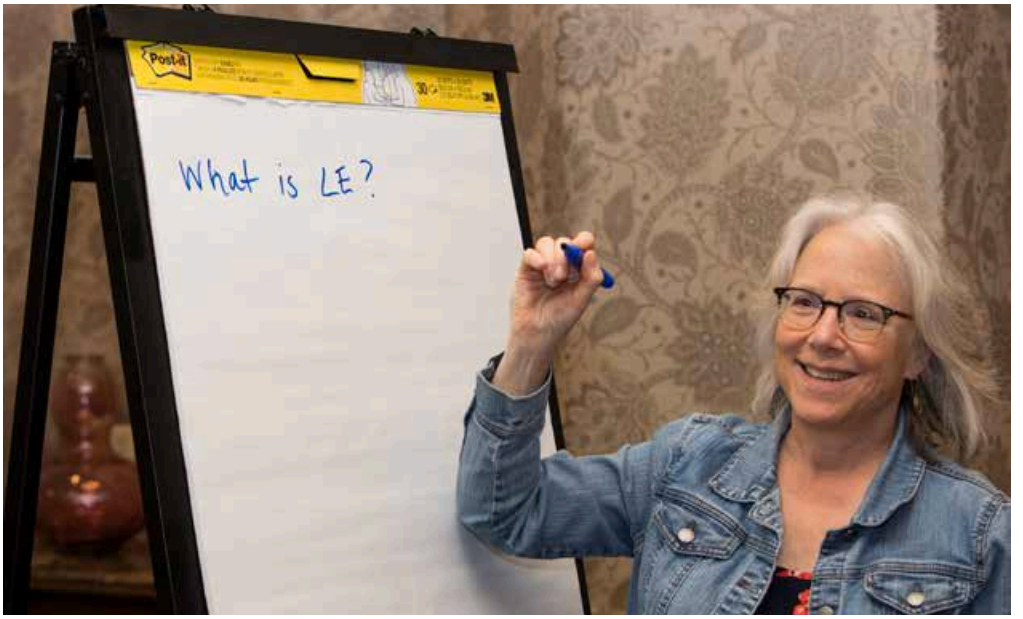
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BIOGRAPHIES OF PARTICIPANTS

Selasi Attipoe, MA, is a second-year doctoral student in Health Services Management and Policy at The Ohio State University. She received her Bachelor's and Master's degrees in Kinesiological Science from the University of Maryland, College Park. She then served in various research, supervisory, and leadership positions at the Consortium for Health and Military Performance (CHAMP), a Defense Center of Excellence, at the Uniformed Services University of Health Sciences (USU), Bethesda, Maryland. At CHAMP, she worked with scientists, researchers, physicians, and other health care professionals on projects to help improve the health, performance, resilience, and well-being of military service members and their families across all human dimensions. Through her doctoral studies, she seeks to expand her education and research training to include health management. She is particularly interested in health information technology, leadership in organizations, and how organizations influence policy.

Amy J. Barton, PhD, RN, FAAN, Professor and Daniel and Janet Mordecai Endowed Chair in Rural Health Nursing, earned a BSN from the University of Toledo, an MSN from the Medical College of Ohio, and a PhD from the University of Florida. As Associate Dean for Clinical and Community Affairs at the University of Colorado, College of Nursing, she is responsible for faculty practice and development of community partnerships. As a national leader in nurse-led care, she provided the vision and strategic initiative to create Sheridan Health Services, a nurse-managed federally qualified community health center, serving low-income residents in an urban area southwest of Denver, Colorado. She was also instrumental in the development of i-LEAD, an online master's option in nursing and health care systems leadership.

Her publications focus on faculty practice, interprofessional education, patient outcomes, quality and safety, and informatics. She has successfully competed for more than $8.5 million in grants to support research, practice, and education. Her work in national quality and safety initiatives includes the Quality and Safety

Education for Nurses initiative and the Institute for Healthcare Improvement/ Josiah Macy Jr. Foundation initiative on "Retooling for Quality and Safety." Her most recent grants awarded by the Health Resources and Services Administration concern the development of interprofessional teams to enhance patient outcomes and the integration of behavioral health services in primary care. Dr. Barton is a member of the 2005 cohort of the Robert Wood Johnson Executive Nurse Fellows. She is a Distinguished Practitioner in the National Academies of Practice and is a Fellow in the Western Academy of Nursing and the American Academy of Nursing. She received the University of Colorado Denver Chancellor's Recognition for Promoting and Supporting Diversity, as well as alumni awards from the University of Toledo and the University of Florida.

Kenya V. Beard, EdD, AGACNP-BC, NP-C, CNE, ANEF, FAAN, is a 2012 Josiah Macy Jr. Faculty Scholar. She recently joined the faculty of City University of New York, The School of Professional Studies, to assist with the inaugural Master's degree in Nursing Education and Organizational Leadership programs. During her tenure at Hunter College School of Nursing, she founded the Center for Multicultural Education and Health Disparities and disseminated research and best practices to move the needle on diversity, inclusion, and health equity. Dr. Beard is a Faculty Scholar for the Harvard Macy Institute Program for Educators in the Health Professions and teaches a session to strengthen the capacity of faculty to facilitate race-related dialogues. As a Senior Fellow at the Center for Health Policy and Media Engagement at George Washington University School of Nursing, she writes about health equity issues and policy implications. She has also co-produced HealthCetera segments for WBAI-FM.

Dr. Beard is a national leader who is passionate about providing meaningful ways to safely address difference and improve the quality of health care. Her research, publications, radio segments, and webinars speak to the complexities of diversity and emphasize best practices that support inclusive environments, promote health equity, and foster academic excellence among diverse learners. She helped shape the National League for Nursing's (NLN) 2016 Diversity Vision Statement, is currently assisting the NLN with their vision statement for faculty civility, and facilitates the NLN annual Diversity and Inclusion workshop for nurse educators. As Chair of the New York State Action Coalition Committee for Diversity, she led the team in producing the 2014 Workforce Diversity Toolkit for New York. Dr. Beard currently serves on the editorial board of the *American Journal of Nursing* and serves on the New York State Board for Nursing.

Bobbie Berkowitz, PhD, RN, NEA-BC, FAAN, is the Dean and Mary O'Neil Mundinger Professor of Nursing at Columbia University School of Nursing and Senior Vice President of the Columbia University Medical Center. She is Professor Emerita at the University of Washington School of Nursing, where she served on faculty for 14 years.

Prior to her appointment as Dean at Columbia she was the Alumni Endowed Professor of Nursing and Chair of the Department of Psychosocial and Community Health and Adjunct Professor in the School of Public Health and Community Medicine. Her primary research relates to public health systems, health disparities, and health equity. Her major grant funding includes the NIH Center for the Advancement of Health Disparities Research (PI) and PI and Director of the National Program Office for Robert Wood Johnson Foundation's Turning Point Initiative (1996 through 2006). Previous appointments include Deputy Secretary for the Washington State Department of Health and Chief of Nursing Services for the Seattle-King County Department of Public Health.

Dr. Berkowitz has served on a number of boards, including Hanford Environmental Health Foundation, Washington State Board of Health, Washington Health Care Commission, Washington State Academy of Science, National Academy of Medicine Board on Population Health and Public Health Practice, Public Health Foundation, and chair of the Board of Trustees of Group Health Cooperative. She is the immediate past President of the American Academy of Nursing and currently serves as a member of the Board of Trustees for the New York Academy of Medicine and the Report Review Committee of the National Academies of Sciences, Engineering, and Medicine. She holds a PhD in Nursing Science from Case Western Reserve University and Master of Nursing and Bachelor of Science in Nursing from the University of Washington.

Judith L. Bowen, MD, FACP, is Professor of Medicine, Schools of Medicine and Nursing, and Director of the Education Scholars Program for Oregon Health and Science University (OHSU), Portland, Oregon. A graduate of Williams College and Dartmouth Medical School, and general internist by training, Dr. Bowen has advanced training in health care ethics (1991) and medical education (1996), both from the University of Washington.

Dr. Bowen's leadership roles in medical education have included internal medicine program directorships (Virginia Mason Hospital, 1991–1996; associate director,

OHSU 1998–2009) and leadership responsibilities for the Association of Program Directors in Internal Medicine (APDIM) (1996–1999, education committee chair; director of pre-courses,1996–2003; Council member, 1996–1999; and representative to the national faculty development program for teaching in ambulatory settings, 1996–2000). She was elected member (2001–2005) and chair (2004–2005) of the Association of American Medical Colleges Research in Medical Education (RIME) conference committee. She has served as education director for the national Academic Chronic Care Collaborative (ACCC) (2005) and the California ACCC (2007) and advisory panel member for the Carnegie Institute for the Advancement of Teaching and Learning 'Preparation of Physicians' Professions project (2006). She served as national education consultant for the Office of Academic Affiliations, Veterans Health Administration Centers of Excellence in Primary Care Education (2010–2017). Dr. Bowen received the national Society of General Internal Medicine (SGIM) award for Scholarship in Medical Education (2006) and the Dema C. Daley Founder's Award from the Association of Program Directors in Internal Medicine (2009). Dr. Bowen is currently a doctoral candidate in the UCSF-University of Utrecht PhD program in Health Professions Education, studying the impact of patient care transitions on the clinical reasoning process.

Barbara F. Brandt, PhD, is renowned for her work in health professional education, and specifically, interprofessional education and continuing education. Dr. Brandt serves as the director of the National Center for Interprofessional Practice and Education (National Center), a public-private partnership charged by its founders to provide the leadership, evidence, and resources needed to guide the nation on the use of interprofessional education and collaborative practice as a way to enhance the experience of health care, improve population health, and reduce the overall cost of care. The National Center received initial funding from the United States Department of Health and Human Services, Health Resources and Services Administration, as well as the Josiah Macy Jr. Foundation, the Gordon and Betty Moore Foundation, the Robert Wood Johnson Foundation, and the University of Minnesota.

Dr. Brandt has served as an associate vice president at the University of Minnesota for more than 15 years. Under her leadership, the Academic Health Center Office of Education was formed. In the Office of Education, the University's 1Health initiative was established to build the interprofessional practice skills of students and faculty in a broad range of health professions. In 2017, Dr. Brandt decided to focus her energies further on the national work and stepped down from the Office

of Education. Still an Associate Vice President in the Academic Health Center, Dr. Brandt provides leadership in interprofessional models of education and practice integration across both the state of Minnesota and the nation.

In her leadership roles, Dr. Brandt has served as a consultant, advisor, and speaker for a wide variety of organizations such as the Institute of Medicine—now the National Academy of Medicine—the National Quality Forum, the Academy of Healthcare Improvement, the Josiah Macy Jr. Foundation, the Association of Schools of Allied Health Professions, the American Nurses Association, the American Speech-Language-Hearing Association, and the American Medical Association, among many other professional and academic associations and groups.

Dr. Brandt holds a Bachelor of Arts in the teaching of history from the University of Illinois at Chicago and a Master of Education and Doctor of Philosophy in continuing education (specializing in continuing professional education for the health professions) from the University of Illinois at Urbana-Champaign. In 2013, she was recognized as a University of Illinois Distinguished Alumna. She completed a postdoctoral fellowship sponsored by the W.K. Kellogg Foundation for faculty in adult and continuing education at the University of Wisconsin-Madison.

Laurinda Calongne, EdD, received her MSW degree from Tulane University and her Master of Education degree from University of Southern California. She completed a one-year fellowship in Medical Education at USC Keck School of Medicine. She earned her Doctorate of Education with a specialization in leadership and management from Capella University.

In 2001 she was appointed by President George W. Bush as Advisor to the President for the Council on Graduate Medical Education (COGME) and served in that role for four years. During her tenure on COGME, the council published four congressional reports, including two landmark reports: "Minorities in Medicine: An Ethnic and Cultural Challenge for Physician Training" and "Women in Medicine." Both these congressional reports served as foundation for federal policy and grants encouraging medical schools to increase the enrollment of women and minorities.

Currently, Dr. Calongne is the Chief Academic Officer and Designated Institutional Officer for Our Lady of the Lake Regional Medical Center. She holds academic appointments at both Louisiana State University and Tulane University. During her

leadership tenure, the hospital has transitioned from a community-based hospital to a major academic medical center, has seen a 400% growth in medical residents rotating on campus, developed the research enterprise to support residents and faculty, won the Alliance of Independent Academic Medical Centers (AIAMC) Innovation Award, and has been selected as one of eight institutions by the Accreditation Council for Graduate Medical Education (ACGME) to participate in their Pursuing Excellence Initiative.

Regina Cunningham, PhD, RN, NEA-BC, FAAN, is an accomplished nurse executive, scientist, and educator who has made impactful contributions to advancing nursing practice and clinical care. Cunningham was recently named Chief Executive Officer at the Hospital of the University of Pennsylvania and currently serves as Adjunct Professor and Assistant Dean for Clinical Practice at the University of Pennsylvania, School of Nursing. She previously served as Chief Nursing Executive and Senior Vice President of the University of Pennsylvania Health System and Chief Nursing Executive & Associate Executive Director at the Hospital of the University of Pennsylvania. She has extensive experience in the organization and delivery of nursing service across the care continuum, with particular expertise in the utilization of nursing resources in care delivery systems. In her capacity as Chief Nursing Executive, she had responsibility for a broad array of strategic and operational functions, including the development of professional practice standards, oversight of quality, and strengthening the integration of scholarship within the practice of nursing for the Health System. Her research interests include the effect of nursing on outcomes, clinical trials, and innovative models of care delivery. She has been funded on numerous research initiatives and currently serves as Principal Investigator on a $1.7 million award from the National Cancer Institute focused on developing strategies to improve accrual to clinical trials. Dr. Cunningham received a baccalaureate degree from The College of Mount St. Vincent, a Master of Arts in the Delivery of Nursing Service from New York University, a Doctor of Philosophy from the University of Pennsylvania, and then completed a postdoctoral fellowship at Yale University. She was selected as a Robert Wood Johnson Executive Nurse Fellow in 2006 and was inducted as a Fellow of the American Academy of Nursing in 2014.

Joanne Disch, PhD, RN, FAAN, is Professor ad Honorem at the University of Minnesota School of Nursing. She received her BS from the University of Wisconsin, Madison; her MSN in Cardiovascular Nursing from the University of Alabama in Birmingham; and her PhD in Nursing from the University of Michigan.

Starting her career as a staff nurse in cardiovascular intensive care, Dr. Disch has served as a chief nurse executive in two major medical centers, as interim dean at the University of Minnesota School of Nursing, and as president of the American Association of Critical-Care Nurses, the American Academy of Nursing, and board member and chair of the national board of AARP. Currently she is chair of the Board of Directors of Aurora Health Care in Milwaukee, WI, and chair of the Board of Trustees of Chamberlain University.

Her research has centered on nurse/physician relationships and quality and safety within health care organizations. In 2014, she and two colleagues co-authored the award-winning text *Person and Family Centered Care*. She has received many awards for her work, including two from Sigma Theta Tau International—one for excellence in fostering professional standards and one for excellence in leadership—the President's Award from the American Academy of Nursing; the Marguerite Rodgers Kinney Award for a Distinguished Career from the American Association of Critical-Care Nurses; the Polly Bednash Lectureship Award from the American Association of Colleges of Nursing; and the Distinguished Alumna Award from the University of Wisconsin.

Mary A. Dolansky, PhD, RN, FAAN, is Associate Professor and Director of the Quality and Safety Education for Nurses (QSEN) Institute at the Frances Payne Bolton School of Nursing, Case Western Reserve University (CWRU). At the Louis Stokes Cleveland VA, she is Senior Faculty in the Veterans Administration Quality Scholars program and Director of Interprofessional Education and Integration for the Center of Excellence in Primary Care. Dr. Dolansky has a long history of quality improvement and evidence-based guideline implementation education expertise. She co-published two books on quality improvement education, co-authored several book chapters and articles, and was guest editor on a special quality improvement education issue in the *Journal of Quality Management in Health Care*. She led an interprofessional team that developed and implemented a massive open online course "Take the Lead on Healthcare Quality" that has reached over 15,000 learners across the country and is available for free and available at any time. She serves on several interprofessional national committees including the Association of American Medical Colleges (AAMC) Teaching for Quality (Te4Q) national initiative, the advisory board for the SQUIRE Education guidelines, and the advisory board for the Building the Bridge for Quality, an international community to advance progress in integrating quality improvement and safety in health care professions education worldwide. Dr. Dolansky has many projects in interprofessional education that

include implementation and evaluation of a longitudinal interdisciplinary curriculum for health care professions students in primary care and is an active faculty member for the CWRU-Macy interprofessional education project for pre-licensure students. She has presented at the Interprofessional Education Collaborative (IPEC) meeting and serves as a reviewer for *Academy Health*.

John F. Duval, MBA, FACHE, is the former Chief Executive Officer of Virginia Commonwealth University Hospitals and Clinics in Richmond, Virginia, and Vice President for Clinical Services for Virginia Commonwealth University. As former CEO of this three-hospital, 1,126-bed system, including more than 700 faculty and 705 resident physicians, his responsibilities included hospital and clinics strategic planning, patient experience, quality and safety, performance management and improvement, financial management, workforce development, and community outreach.

Mr. Duval currently serves as Senior Scholar for the Accreditation Council for Graduate Medical Education (ACGME). He also serves on the National Academic Affiliation Council of the Veteran's Administration.

Mr. Duval earned his BS in Biological Sciences from the University of California, Irvine, in 1976 and earned his Master's degree in Business Administration from the same institution in 1981. Prior to joining Virginia Commonwealth University Health System, he served as Chief Operating Officer of University Medical Center in Tucson, Arizona. Prior to joining University Medical Center, he served in executive leadership roles at the University of Colorado Health Sciences Center and the University of California, Irvine Medical Center.

Mr. Duval served on the board of the ACGME as chair, and was a member of the Richmond Industry Roundtable of the Federal Reserve Bank of Richmond. He is a Fellow in the American College of Healthcare Executives. Mr. Duval also served on the Board of the Virginia Hospital and Healthcare Association and is a former member of the Vizient Academic Medical Center Network Board of Managers. He has also served on the Boards of the American Red Cross for the Capital Region, the Valentine Richmond History Center, and the Boys and Girls Clubs of Metro Richmond.

Mr. Duval has published numerous articles, monographs, and book chapters.

Richard M. Frankel, PhD, is Professor of Medicine and Geriatrics at the Indiana University School of Medicine and is the Director of the Applied Scholarship Program for Internists in Research and Education (ASPIRE) Fellowship in General Internal Medicine. He is also a Senior Researcher in the Center for Healthcare Information and Communication at the Richard L. Roudebush VA and a Senior Investigator at the Regenstrief Institute.

Dr. Frankel is trained as a qualitative social scientist whose interests include face-to-face communication and the role of technology and its effects on the quality, safety, and outcomes of care. In addition to his health services research interests, he has been a medical educator for the past 35 years. For a decade he was co-director of the internal medicine residency program at Highland Hospital/University of Rochester and also served as co-director of the Program and Fellowship in Advanced Biopsychosocial Medicine. From 2003–2013, he was the statewide director of Indiana University School of Medicine's professionalism competency and was responsible for both curriculum and remediation in this arena. To date, he has published more than 250 scientific papers and edited seven books.

Dr. Frankel completed his undergraduate studies at Colgate University and obtained a PhD in sociology at the Graduate School and University Center of the City University of New York. Prior to receiving his degree, he was a pre-doctoral visiting scholar at UCLA and UC Irvine. He completed postdoctoral training at Boston University in qualitative approaches to mental health research and was a Fulbright Research Fellow in Uppsala, Sweden. He is a founding Fellow of the American Academy on Communication in Healthcare and has been honored both as the recipient of the George Engel Award for research contributions to the field of physician-patient communication and as a co-recipient of the Lynn Payer Award for contributions to the literature and teaching of communication skills. His work has been featured on the CBS Evening News, *The New York Times*, and the *Wall Street Journal,* among other media outlets.

Rosemary Gibson, MSc, is Senior Advisor at The Hastings Center and founding editor for Less is More Perspectives in *JAMA Internal Medicine*.

At Robert Wood Johnson Foundation, Rosemary was chief architect of its $250 million, decade-long national strategy to establish inpatient palliative care programs that now number 1,600, an increase from about 10 in the 1990s. She received the Lifetime Achievement Award from the American Academy of Hospice and

Palliative Medicine and worked with Bill Moyers on the PBS documentary, "On Our Own Terms." While at the Foundation, Rosemary led national quality and patient safety initiatives in partnership with the Institute for Health Care Improvement: Pursuing Perfection, Transforming Care at the Bedside, and Rapid Response System Implementation. She is the recipient of the Lewis Blackman Patient Safety Award from the South Carolina Hospital Association.

She is the 2014 recipient of the highest honor from the American Medical Writers Association for her contributions to the field of medical communication. Her writing gives voice to the public's interest in critical health care issues of the day. She is author of *Medicare Meltdown* (2013), *Battle Over Health Care* (2012), *Treatment Trap* (2010), and *Wall of Silence* (2003).

Rosemary is chair of the board of the Altarum Institute, a non-profit health systems research organization headquartered in Ann Arbor, Michigan. She is a board member of the Accreditation Council for Graduate Medical Education (ACGME) and serves on the ACGME CLER Evaluation Committee, which aims to engage resident physicians in improving quality and patient safety.

Rosemary has given presentations and grand rounds on patient safety at hundreds of hospitals; keynoted meetings of the National Quality Forum, The Joint Commission, National Board of Medical Examiners, American Academy of Otolaryngology, AONE, National Council of State Boards of Nursing, Federation of State Medical Boards, National Summit on Overuse held by The Joint Commission and AMA, Society of Critical Care Medicine, among others. She has been faculty for the Dartmouth Summer Symposium on Quality Improvement and was its 2013 "wizard."

Her books have been reviewed in *Publishers Weekly*, *Washington Post*, *JAMA*, *Health Affairs*; referenced in proceedings of the US Senate; mentioned in Congressional testimony; noted in the *Wall Street Journal*, *The New York Times*, *USA Today*, *Consumer Reports*, the *Boston Globe*, *O Magazine*, *Reader's Digest*, and *US News and World Report*. *Wall of Silence* was translated into Japanese; the Chinese translation of *Treatment Trap* won the prestigious Open Book Award from *China Times*. Rosemary has appeared on Chicago Tonight, WBGH's Greater Boston, Fox News, The Doctors, and C-Span Book TV.

Rosemary graduated summa cum laude from Georgetown University and has a Master's degree from the London School of Economics.

Larry D. Gruppen, PhD, is Professor in the Department of Learning Health Sciences at the University of Michigan Medical School, where he directs the competency-based Master in Health Professions Education program. His research interests center around the development of expertise, knowledge and performance assessment, self-regulated learning, and educational leadership development. He has held the offices of president of the Society of Directors of Research in Medical Education and chair of the Association of American Medical College's (AAMC) Central Group on Educational Affairs. He was also the founding chair of the AAMC's Medical Education Research Certificate (MERC) program. He was recognized for career productivity by the AAMC's Central Group for Educational Affairs' Medical Education Laureate Award, the 2015 John P. Hubbard Award from the National Board of Medical Examiners, and the Merrel Flair Award from the AAMC Group on Educational Affairs.

Aviad "Adi" Haramati, PhD, is Professor of Integrative Physiology in the Departments of Biochemistry, Molecular & Cellular Biology, and Medicine (Nephrology); Director of the Center for Innovation and Leadership in Education (CENTILE); and co-director of the CAM Graduate Program at Georgetown University Medical Center (GUMC). He received a PhD in Physiology from the University of Cincinnati and came to Georgetown after five years at Mayo Clinic. His research interests addressed renal and electrolyte homeostasis, but now he focuses his work on medical education and rethinking how health professionals are trained.

Dr. Haramati has taught physiology for over 35 years and has been recognized with multiple awards, including the Arthur C. Guyton Teacher of the Year award by the American Physiological Society, the Alpha Omega Alpha Robert J. Glaser Distinguished Teaching Award from the Association of American Medical Colleges, the Master Scholar Award from the International Association of Medical Science Educators (IAMSE), and named Distinguished Educator by the GUMC Teaching Academy for Health Sciences.

Dr. Haramati seeks to improve medical education across the globe, especially with regard to the intersection of science, mind-body medicine, and professionalism. He has chaired a number of international conferences, including the recent 2017 CENTILE Conference on Strategies to Promote Resilience, Empathy and Well-being in the Health Professions: An Inter-professional Forum, held in Washington, DC, October 22–25, 2017. Dr. Haramati has been a visiting professor at over 90 medical schools worldwide.

Helen Haskell, MA, is president of the non-profit patient organizations Mothers Against Medical Error and Consumers Advancing Patient Safety. Since the medical error death of her young son Lewis in 2000, Helen has devoted herself to health care safety and quality advocacy in areas including professional education, diagnostic error reduction, rapid response, and adverse event disclosure, among others. She serves on national and international boards and committees, including the boards of directors of the Institute for Healthcare Improvement and the Accreditation Council for Graduate Medical Education, and the board of advisors of the International Society for Rapid Response Systems. She is co-chair of the World Health Organization's patient advisory group for patient safety and of the Patients and the Public Workgroup for the WHO Global Patient Safety Challenge in medication safety. Helen is author and co-author of numerous articles, book chapters, and patient educational materials, including a recent co-edited textbook of case studies in patient safety from the patient perspective. Her son Lewis's story has been featured in numerous educational programs and videos, including Transparent Health's Lewis Blackman Story, shown in medical and nursing schools across the country. Helen holds a bachelor's degree in Classical Studies from Duke University and a master's in Anthropology from Rice University.

Linda A. Headrick, MD, MS, FACP, is Professor Emerita of Medicine at the School of Medicine, University of Missouri in Columbia, Missouri (MU SOM). Dr. Headrick's initial faculty appointment was at Case Western Reserve University and MetroHealth Medical Center, where she was one of the first to introduce continuous quality improvement into medical education. From 2002 to 2016, Dr. Headrick served as MU SOM's Senior Associate Dean for Education, leading a team that supported all aspects of medical education from pre-admissions through continuing medical education. Together they enhanced the medical school's internationally recognized curriculum by emphasizing quality improvement and interprofessional teamwork. In 2013, the Association of American Medical Colleges (AAMC) recognized those efforts with a Learning Health System Challenge Award. Dr. Headrick is a member of the Accreditation Council for Graduate Medical Education Clinical Learning Environment Review (CLER) Evaluation Committee and a past chair of the AAMC's Integrating Quality Steering Committee. In addition to numerous peer-reviewed publications, Dr. Headrick has co-authored three books, including *Enhancing the Professional Culture of Academic Health Science Centers: Educators' Stories of Creating Enduring Change* (2013) and *Fundamentals of Health Care Improvement: A Guide to Improving Your Patients' Care, Third Edition* (2018).

Cheryl L. Hoying, PhD, RN, NEA-BC, FACHE, FAAN, is a seasoned practice administrator. Her experience includes leadership roles in academic and community settings; independent hospitals and healthcare systems; adult and pediatric; ranging in size from 230 to 927 beds. On March 5, 2018, she started as the Chief Nursing Executive/Executive Vice President, Customer Relations, for The Joint Commission. Immediately prior to that, from 2005–2018 she served as the Senior Vice President, Patient Services, at Cincinnati Children's Hospital Medical Center. In that role, she fiscally managed a revenue budget of $2.2 billion; an expense budget of $556 million; and 7,000 employees including nurses and allied health professionals. She led Cincinnati Children's to Magnet designation in 2009 and re-designation in 2013.

Dr. Hoying is a proponent of Shared Governance and is team-focused. She enjoys mentoring staff and challenging them to be the best they can be. Under Dr. Hoying's leadership, the Cincinnati Children's Patient Services Division developed an Interprofessional Practice Model, which aligns the clinical application of the mission, vision, and values to team-based care delivery.

Dr. Hoying is an experienced educator. She served as Interim Dean for the University of Cincinnati College of Nursing in 2011, taught at Wright State University for seven years, and served a faculty appointment at The Ohio State University.

Dr. Hoying is actively involved on a national level. She is a Fellow of the American Academy of Nursing and member of the National League for Nursing's Strategic Steering Committee. She has served as president of the American Organization of Nurse Executives (AONE), of which she has been a member since 1989.

Dr. Hoying has lectured internationally in Australia, China, Saudi Arabia, Italy, Croatia, and Malta. Her work has been published in *Nurse Leader*, *Journal of Nursing Administration*, *AONE Voice of Nursing Leadership*, *Journal of Pediatric Oncology, Nursing Administration Quarterly*, *Modern Healthcare*, and *Healthcare Executive*, among others.

Holly J. Humphrey, MD, MACP, is the Ralph W. Gerard Professor in Medicine and Dean for Medical Education at the University of Chicago. In this role, she oversees undergraduate, graduate, and continuing medical education. An honors graduate of the University of Chicago's Pritzker School of Medicine, Dr. Humphrey completed her internal medicine residency, pulmonary and critical care fellowship, and Chief

Residency all in the department of medicine at the University of Chicago. Her 14-year tenure as Director of the Internal Medicine Residency Program created the foundation for her medical education career.

Serving as dean since 2003, Dr. Humphrey has launched numerous programs, including the Roadmap to Professionalism initiative to support and enhance the highest professional standards in the learning environment. She also led a major curriculum reform effort entitled The Pritzker Initiative: A Curriculum for the 21st Century. She is the editor of *Mentoring in Academic Medicine* (2010) and is the author of numerous peer-reviewed publications on issues related to medical education. Her vision for medical education as a discipline worthy of scholarship led to creating the MERITS fellowship program in medical education, open to residents, nurses, and faculty, and she is currently supporting two institution-wide initiatives in interprofessional learning.

Dr. Humphrey is the co-founder of the Bowman Society, which explores issues of health care disparities and provides mentoring for minority students, residents, and faculty. She led the development of new pipeline programs for underrepresented minority students interested in careers in medicine. Most recently, she founded the school's Identity and Inclusion Initiative (i2i), a collaborative faculty/student committee that promotes an inclusive learning environment with diverse patients and colleagues around issues of identity.

Dr. Humphrey is a national leader in medical education and serves as chair of the Board of Directors for the Kaiser Permanente School of Medicine. She is Chair Emeritus of the American Board of Internal Medicine, immediate past chair of the American Board of Internal Medicine Foundation, and a past President of the Association of Program Directors in Internal Medicine (APDIM). She serves on the Boards of Directors for both Alpha Omega Alpha and the Bucksbaum Institute for Clinical Excellence and is a member of the Gold Foundation's Research Institute. Awards and honors are many, and include the Dema C. Daley Founders Award from APDIM and selection as a Master by the American College of Physicians. Crain's Chicago Business featured her as one of their "Women to Watch" and the YWCA of Metropolitan Chicago honored her with their Outstanding Leader Award in the Professions. Her teaching honors and awards include her selection by graduating students 25 times as a favorite faculty teacher.

David M. Irby, PhD, is an emeritus professor of medicine and an educational researcher in the Center for Faculty Educators at University of California, San Francisco.

His current research is on workplace learning in the health professions; examining the learning environment, knowledge construction in interprofessional teams, and experiential learning in the workplace. Additional areas of research include faculty development, clinical teaching, and leading organizational change.

From 1997–2011, he served as Vice Dean for Education and Director of the Office of Medical Education in the UCSF School of Medicine. From 2006–2010, he was also a Senior Scholar at The Carnegie Foundation for the Advancement of Teaching, where he co-directed a national study on the professional preparation of physicians. From 1972–1997, he was a Professor of Medical Education at the University of Washington.

For his research and leadership in academic medicine, he has received awards from the Association of American Medical Colleges, the American Educational Research Association, the National Board of Medical Examiners, the Karolinska Institutet in Stockholm, Harvard Medical School, and Vanderbilt School of Medicine among others. He earned a Masters of Divinity from Union Theological Seminary in 1970, a doctorate in education from the University of Washington in 1977, and completed a postdoctoral fellowship in academic administration at Harvard Medical School in 1983.

Lee A. Learman, MD, PhD, is Professor and Senior Associate Dean for Graduate Medical Education and Academic Affairs, at the Florida Atlantic University Charles E. Schmidt College of Medicine. He was recruited in October 2015 to steward the growth of the new medical school's residency and fellowship training programs and faculty development strategy.

Dr. Learman attended Harvard Medical School where he received his MD degree as well as a PhD in Social Psychology. After completing his OBGYN residency at UCLA, Dr. Learman spent 14 years on the faculty at the UCSF, where he became Professor of Obstetrics, Gynecology & Reproductive Sciences; Professor of Epidemiology and Biostatistics; OBGYN Residency Program Director; Director of Curricular Affairs for the Office of Graduate Medical Education; and Chair of the Scholarship Committee for the UCSF Academy of Medical Educators. In 2007 he received the Established

Investigator Award from the American Educational Research Association Division I (Education in the Professions) for "Resident Physicians' Ability to Reflect" and with colleagues later published a psychometric analysis on measurement of residents' reflective ability (PMID: 18395041) as well as a Reflective Ability Rubric and User Guide in the AAMC MedEdPORTAL (www.mededportal.org/publication/8133). In 2008 Dr. Learman moved to Indianapolis, where he served for seven years as the Clarence E. Ehrlich Professor and Chair of the Department of OBGYN at the Indiana University School of Medicine. There he worked with colleagues to change the learning and working environment in the department to better support professionalism and professional identity formation (see chapter in Creuss R, Creuss S, Steinert Y, eds. *Teaching Medical Professionalism: Supporting the Development of a Professional Identity*. Cambridge University Press, 2016).

Dr. Learman is president of the Society for Academic Specialists in General Obstetrics and Gynecology. His other national roles have included service to the American Board of Obstetrics and Gynecology, ACGME Residency Review Committee for Obstetrics and Gynecology, and USMLE Management Committee. He is the past chair of the Council on Resident Education in Obstetrics and Gynecology and co-leads a national faculty development program for educators, the APGO Academic Scholars and Leaders Program. He has co-authored more than 80 peer-reviewed publications on clinical and educational topics, provides ad hoc peer review service to 15 journals including *Academic Medicine*, has served on the editorial board of *Obstetrics & Gynecology*, and is Editor-in-Chief (Gynecology) of the *Obstetrical & Gynecological Survey*.

Patrick Lee, MD, is Chair of Medicine at North Shore Medical Center in Salem, MA, and Assistant Professor of Medicine at Harvard Medical School. He has dedicated his career to building communities that change culture and transform the lives of people who suffer health injustice. He believes "the secret of quality is love" and tries to deepen his understanding of, and align his daily actions to, this essential lesson. Dr. Lee's current focus is creating optimal conditions for the people at North Shore Medical Center to thrive and, in turn, astonish their patients with the dignity and excellence of their care.

In previous roles, Dr. Lee has helped build clinical programs in Rwanda; Liberia; Uganda; Cambridge, MA; and Lynn, MA, as well as novel educational programs at the Massachusetts General Hospital and Harvard Medical School in Boston. He earned a BA in English from Princeton University and his MD from the University

of California, San Francisco School of Medicine. Dr. Lee completed his residency training in internal medicine and primary care at Massachusetts General Hospital, his fellowship in medical education at Harvard Medical School, and holds an advanced diploma in tropical medicine from the London School of Hygiene and Tropical Medicine.

Monica Lypson, MD, MHPE, is the Director of Medical and Dental Education for the Department of Veterans Affairs, where she provides leadership, oversight, and coordination for VA's graduate and undergraduate medical and dental education program. Dr. Lypson is a board-certified general internist with significant leadership experience in clinical, educational, and administrative arenas. She has served as the Associate and Acting Chief of Staff at the Ann Arbor VA Healthcare System; Assistant Dean for Graduate Medical Education, Standardized Patient Program and Communication Skills Faculty Director, and the Interim Associate Dean for Diversity and Career Development at the University of Michigan Medical School. She is a clinician educator and has published over 70 peer-reviewed publications in top-tier medical education journals in the areas of resident assessment, communication skills, cultural competency education, and faculty development. Dr. Lypson has held many national roles focused on health professions education, including with the Accreditation Council of Graduate Medical Education, the Association of American Medical Colleges, the National Board of Medical Examiners, and the Society of General Internal Medicine. As a medical education leader in administrative, organizational, and professional matters and as an executive coach, she has mentored faculty and staff as well as peers in various specialties and administrative areas.

Dr. Lypson graduated from Brown University and received her medical degree from Case Western Reserve University School of Medicine. She completed her graduate medical training at the Brigham and Women's Hospital in Internal Medicine–Primary Care. Subsequently, Dr. Lypson completed a Robert Wood Johnson Clinical Scholars program at the University of Chicago and a master's degree in Health Professions Education at the University of Illinois at Chicago.

As a strategic, visionary thinker, Dr. Lypson inspires all people, at all levels, to meet their goals and optimize their full potential. Dr. Lypson continues to strive for wellness and work-life balance. She has written on the topic of physician marriages especially in academic medicine and is the wife of Dr. Andrew D. Campbell, a pediatric hematologist oncologist, and a mother of two young children.

Valerie Montgomery Rice, MD, FACOG, provides a valuable combination of experience at the highest levels of patient care and medical research, as well as organizational management and public health policy. Marrying her management skills and strategic thinking to tackle challenging problems, she has a track record of redesigning management infrastructures of complex organizations to reflect the needs of evolving strategic environments and position the organization for success.

The sixth president of Morehouse School of Medicine (MSM) and the first woman to lead the freestanding medical institution, Dr. Montgomery Rice serves as both the president and dean. A renowned infertility specialist and researcher, she most recently served as dean and executive vice president of MSM, where she has served since 2011.

Prior to joining MSM, Dr. Montgomery Rice held faculty positions and leadership roles at various health centers, including academic health centers. Most notably, she was the founding director of the Center for Women's Health Research at Meharry Medical College, one of the nation's first research centers devoted to studying diseases that disproportionately impact women of color.

Dedicated to the creation and advancement of health equity, Dr. Montgomery Rice lends her vast experience and talents to programs that enhance pipeline opportunities for academically diverse students, diversifies the physician and scientific workforce, and fosters equity in health care access and health outcomes. To this end, she holds membership in many organizations and boards such as the National Academy of Medicine (2016–), the National Center for Advancing Translational Sciences (2016–), the Board of Directors for Kaiser Permanente School of Medicine (2016–), the Board of Directors for The Nemours Foundation (2016–), the Josiah Macy Jr. Foundation (2017–), and the Association of American Medical Colleges Council of Deans.

Dr. Montgomery Rice has received numerous accolades and honors. She was named to the Horatio Alger Association of Distinguished Americans and was a recipient of the 2017 Horatio Alger Award. For two consecutive years (2016, 2017) *Georgia Trend* magazine selected Dr. Montgomery Rice as one of the 100 Most Influential Georgians. Other honors include the Trumpet Vanguard Award (2015); The Dorothy Heights Crystal Stair Award (2014); the National Coalition of 100 Black Women – Women of Impact (2014); YWCA – Women of Achievement (Atlanta-2014 and Nashville-2007); American Medical Women's Association Elizabeth Blackwell

Medal (2011); and Working Mother Media Multicultural Women's Legacy Award (2011).

A Georgia native, Dr. Montgomery Rice holds a bachelor's degree in chemistry from the Georgia Institute of Technology and a medical degree from Harvard Medical School. She completed her residency in obstetrics and gynecology at Emory University School of Medicine and her fellowship in reproductive endocrinology and infertility at Hutzel Hospital in Detroit, MI.

Dr. Montgomery Rice has been married to her fellow Georgia Institute of Technology alumnus, Melvin Rice, Jr., for 25 years. They have two children, Jayne, a medical student at Harvard Medical School, and Melvin, a recent graduate from Ringling College of Art and Design.

Michelle Morse, MD, MPH, is Founding Co-Director of EqualHealth and Assistant Program Director for the Internal Medicine Residency at Brigham and Women's Hospital. Dr. Morse co-founded EqualHealth (www.equalhealth.org), an organization that aims to inspire and support the development of Haiti's next generation of health care leaders through transforming medical and nursing education and creating opportunities for Haitian health professionals to thrive. She works to strengthen medical education globally, expand the teaching of social medicine in the US and abroad, and support strengthening health systems through EqualHealth. In 2015 Dr. Morse worked with several partners to found the Social Medicine Consortium, a global coalition of over 450 people representing over 50 universities and organizations in twelve countries, which seeks to use activism and disruptive pedagogy rooted in the practice and teaching of social medicine to address the miseducation of health professionals on the root causes of illness.

Dr. Morse is an internal medicine hospitalist at Brigham and Women's Hospital (BWH) through the Division of Global Health Equity, an instructor on the faculty at Harvard Medical School, and an affiliate of the Department of Global Health and Social Medicine. She served as Deputy Chief Medical Officer for Partners in Health (PIH) from 2013 to 2016. She also served as an advisor to the Medical Director of Mirebalais Hospital, a newly built public academic medical center established through a partnership between the government of Haiti and PIH. Previously, she served as Director of Medical Education at Mirebalais Hospital, where she started the hospital's first three residency programs.

As a Howard Hiatt Global Health Equity resident in Internal Medicine at BWH, Dr. Morse worked in Haiti, Rwanda, and Botswana. She focused her international work in Haiti where she helped coordinate PIH's earthquake relief efforts, was a first-responder for the cholera epidemic, and worked on women's health and quality improvement projects.

Dr. Morse earned her BS in French in 2003 from the University of Virginia, her MD from the University of Pennsylvania School of Medicine in 2008, and her MPH from the Harvard School of Public Health in May 2012.

Bridget O'Brien, PhD, is Associate Professor in the Department of Medicine and education researcher in the Center for Faculty Educators. She teaches and mentors faculty and learners in several programs, including the UCSF-University of Utrecht doctoral program in Health Professions Education, the Health Professions Education Pathway and the Teaching Scholars Program. At the San Francisco VA, she directs scholarship and evaluation for the Center of Excellence in Primary Care Education and a Fellowship in Health Professions Education Evaluation and Research. With Molly Cooke and David Irby, she co-authored the book *Educating Physicians: A Call for Reform of Medical School and Residency,* which summarizes the findings of a landmark study into the state of medical education in the United States 100 years after the Flexner report. Her work has brought workplace learning to the forefront of educational innovation and reform.

Dr. O'Brien received her bachelor's degree from Cornell University and, at the University of California, Berkeley, received her master's degree from the Haas School of Business and PhD from the Graduate School of Education. In 2015 she was selected as one of five national Macy Faculty Scholars, supported by the Josiah Macy Jr. Foundation.

Sarah E. Peyre, EdD, is the Associate Dean for Innovative Education and an Associate Professor of Surgery, Nursing, Medical Humanities, and Bioethics at the University of Rochester Medical Center (URMC). In addition to her faculty appointments, Dr. Peyre's primary role is as Executive Director of the Institute for Innovative Education (IIE), where she leads advances in health professions education through simulation, adaptive technology, team science, and novel approaches to information and education delivery. The IIE is a centralized matrix of services that includes the Miner Library and the Center for Experiential Learning, and is supported by IT and educational specialists with expertise in instructional

design, simulation and program development. The IIE supports the educational mission of the School of Medicine and Dentistry, School of Nursing, Eastman Institute of Oral Health, Strong Hospital, and the Faculty Practice Group.

Working extensively in the field of simulation, Dr. Peyre's career has evolved to focus on high-performing health care teams and the educational innovations that support collaborative care models. Her work in interprofessional education includes curriculum development on disparities in health care, leadership and technology. Her Macy Faculty Scholars project was focused on identifying and teaching best practices in the patient- and family-centered use of the electronic health record (EHR). Building on the traditions of the University of Rochester, she is interested in nourishing humanism alongside technology as educational programs are created that promote effective communication within high-performing teams. Before joining the URMC faculty in 2011, Dr. Peyre directed Education and Research for the STRATUS Center for Medical Simulation at the Brigham and Women's Hospital and was Assistant Professor of Surgery at Harvard Medical School. She earned her Bachelor of Arts in Sociology from the University of California, Berkeley, and her master's degree in Science of Medical Education and Doctorate in Educational Psychology from the Rossier School of Education at the University of Southern California.

Joan Y. Reede, MD, MPH, MS, MBA, is the Dean for Diversity and Community Partnership and Professor of Medicine at Harvard Medical School (HMS). Dr. Reede also holds appointments as Professor in the Department of Social and Behavioral Sciences at the Harvard T.H. Chan School of Public Health and as an Assistant in Health Policy at Massachusetts General Hospital. Dr. Reede is responsible for the development and management of a comprehensive program that provides leadership, guidance, and support to promote the increased recruitment, retention, and advancement of women and underrepresented minorities as well as members of the LGBT community and people living with disabilities at HMS. Her duties include oversight of all diversity activities as they relate to faculty, trainees, students, and staff. Dr. Reede also serves as the director of the Minority Faculty Development Program, Faculty Director of Community Outreach Programs, and Program Director of Faculty Diversity Inclusion of the Harvard Catalyst/The Harvard Clinical and Translational Science Center.

Dr. Reede has served on several boards and committees, including the Secretary's Advisory Committee to the Director of the NIH; the Sullivan Commission on

Diversity in the Healthcare Workforce; as co-chair of the Bias Review Committee of the Advisory Committee to the NIH Director's Working Group on Diversity; as chair of the AAMC Group on Diversity and Inclusion (GDI); and as chair of the National Academy of Medicine's Interest Group (IG) 08. Dr. Reede is acknowledged as an authority in the area of workforce development and diversity. She has been recognized with multiple awards, including the AAMC Herbert W. Nickens Award.

Susan A. Reeves, EdD, RN, assumed the role of Chief Nursing Executive for the Dartmouth-Hitchcock Health system in June 2017 and in February 2018, was also named Executive Vice President for Research and Education at the Dartmouth-Hitchcock Medical Center in Lebanon, New Hampshire. She continues to serve in a part-time role as the Dean for the School of Nursing and Health Professions at Colby-Sawyer College in New London, NH.

Susan received her Diploma in Nursing from Mary Hitchcock Memorial Hospital in 1980. She earned her Bachelor of Science with a major in Nursing in 1988 from Colby-Sawyer College. She attended the University of New Hampshire, where she earned her master's degree in Nursing Administration in 1991, and earned her Doctorate in Educational Leadership and Policy Studies from the University of Vermont in 2010.

Susan's scholarship interests lie in the field of health care quality and patient safety and she actively participates in numerous local, regional, and national programs with this focus. Locally, she is a trustee and Vice Chair on the board of New London Hospital. She is also a Director for the Crotched Mountain Foundation and serves on the Foundation's Quality Committee. At Colby-Sawyer, Susan worked closely with faculty of the Geisel School of Medicine at Dartmouth to offer interprofessional education sessions to nursing and medical students as well as electives in the medical humanities.

Susan and her husband David live in New London. They have two sons and two grandchildren.

Sheila M. Riggs, DDS, DMSc, is recognized as an academic and policy leader with an established record in developing and implementing innovative results through a balanced portfolio of peer-reviewed research and hands-on community engagement. She has navigated a uniquely influential career as a dentist, epidemiologist, academic, corporate executive, and policy advocate.

Dr. Riggs current serves as Chair, Department of Primary Dental Care at the University of Minnesota's School of Dentistry, where she provides leadership to the pre-doctoral dental program, the Dental Hygiene, and the innovative Dental Therapy program. Dr. Riggs also serves on the Community Engagement team for the University's Clinical and Translational Science Institute pursuing a wide range of critically important research interests related to the overall health status of communities and populations.

While pursuing her Doctorate in Medical Sciences from Harvard in the late 1980s, she was convinced that expanding access by influencing insurance carriers and legislative leaders would have a much greater impact than providing care one patient at a time. She began her career serving as an Assistant Professor in the Harvard School of Dental Medicine's Department of Oral Epidemiology and Health Policy, and then President of the Iowa Health Research Institute. She joined the executive ranks of Wellmark Blue Cross and Blue Shield of Iowa and South Dakota to launch and lead their analytics division, later adding the role of Executive Director of The Wellmark Foundation to her responsibilities.

In 1999, Dr. Riggs was recruited to the Board of Directors of Delta Dental of Minnesota to launch an innovative analytics strategy. The success of that strategy led to her appointment as CEO of Delta Dental in 2005 where she served until the firm's operations were acquired in 2008.

Dr. Riggs is Chair of the Board of Directors of Hennepin Health System, a $1 billion America's Essential Hospital system in Minneapolis. She also serves on the board of Benco Dental, Inc., chairing the Growth and Diversification Committee as well as the Minnesota Hospital Association and The Wellmark Foundation.

Richard M. Schwartzstein, MD, is the Ellen and Melvin Gordon Professor of Medicine and Medical Education at Harvard Medical School (HMS) and Associate Chief of the Division of Pulmonary and Critical Care Medicine at Beth Israel Deaconess Medical Center (BIDMC). He is a graduate of Princeton University and Harvard Medical School.

Dr. Schwartzstein has been an active pulmonary and critical care physician as well as clinical educator and researcher since he came to the HMS faculty over 30 years ago; he has authored over 130 research articles, reviews, and book chapters on educational and clinical topics. A graduate of the Rabkin Fellowship in Medical Education, for which he was named the Kay Senior Fellow, he has served as course

director for pre-clerkship courses for the past 23 years and developed the Principal Clinical Experience program at BIDMC for third-year students. Between 2011 and 2015, Dr. Schwartzstein chaired the Steering Committee on the Pre-Clerkship Curriculum, which redesigned the Harvard Medical School curriculum to put greater emphasis on interactive learning and critical thinking. He has co-authored an award-winning textbook on physiology and serves as editor for a physiology series published by Lippincott Williams & Wilkins.

Dr. Schwartzstein has been the Executive Director of the Shapiro Institute for Education and Research and Vice President for Education at Beth Israel Deaconess Medical Center since 2004. In this role, he has chaired seven national Millennium Conferences on a range of key education topics. Between 2009 and 2017, Dr. Schwartzstein served as Director of the HMS Academy for Teaching Excellence and Educational Innovation, and he is now the inaugural Director of Education Scholarship. His work in the Academy focused on the development of pedagogical approaches to enhance analytical reasoning, techniques to maximize the benefits of small group teaching, and assessment of the role of simulation in medical education. Dr. Schwartzstein has received multiple teaching awards at Harvard as well as regional and national awards bestowed by the Massachusetts Medical Society, the American Thoracic Society, and the Association of American Medical Colleges, including the Alpha Omega Alpha Robert J. Glaser Distinguished Teaching Award.

Stephen C. Schoenbaum, MD, MPH, is Special Advisor to the President of the Josiah Macy Jr. Foundation. He has extensive experience as a clinician, epidemiologist, and manager. From 2000–2010, he was Executive Vice President for Programs at The Commonwealth Fund and Executive Director of its Commission on High Performance Health Systems. Prior to that, he was Medical Director and then President of Harvard Pilgrim Health Care of New England, a mixed-model HMO delivery system in Providence, RI.

He is an adjunct professor of healthcare leadership at Brown University; a founder of what is now the Department of Population Medicine at Harvard Medical School, formerly the Department of Ambulatory Care and Prevention; author of over 175 professional publications; associate editor of the *Israel Journal of Health Policy Research*; a longstanding member and former chair of the International Academic Review Committee of the Joyce and Irving Goldman Medical School, Ben Gurion

University, Beer Sheva, Israel; and an honorary fellow of the Royal College of Physicians.

Linda D. Scott, PhD, RN, NEA-BC, FAAN, is the Dean of the University of Wisconsin-Madison School of Nursing. She was appointed the eighth dean of the School in July 2016. She previously served the University of Illinois at Chicago as the College of Nursing's Associate Dean for Academic Affairs, with additional responsibilities as the Director of Graduate Studies, PhD Studies, and Urban Health. From 2009–2012, she served as Associate Dean for Graduate Programs at Grand Valley State Kirkhof College of Nursing.

Dr. Scott earned her PhD in nursing from the University of Michigan in Ann Arbor, her master's degree from Grand Valley State University in Allendale, Michigan, and her undergraduate degree from Michigan State University in East Lansing. She was honored with Grand Valley State's Distinguished Alumni Award in 2013.

As Dean of the UW-Madison School of Nursing, she provides direction and leadership in educating nurses for the future of care, strengthening the school's research enterprise, and forging partnerships to improve health outcomes.

Her program of research focuses on the impact of fatigue and sleep deprivation on both nurses and their patients. Dr. Scott has also developed and implemented programs focused on economically disadvantaged students, including racial and ethnic minorities. She has also led diversity efforts across academic degrees, curricula, and universities, including the implementation of holistic review for admissions.

Deborah "Deb" Simpson, PhD, is Medical Education Programs Director for Aurora Health Care, a non-profit health care system whose physicians provide education to medical students, residents, fellows, and other health professions. She is an adjunct clinical professor in family medicine at the University of Wisconsin School of Medicine and Public Health (UWSMPH) and at the Medical College of Wisconsin (MCW). She is a Deputy Editor for the *Journal of Graduate Medical Education*, a member of the Alliance of Independent Academic Medical Centers' Board of Directors, a public member of the Psychiatry Residency Review Committee-ACGME, and a member of ACGME Task Force on Well-Being. Her more than 700 invited/peer reviewed presentations and 185 publications in medical education reflect her interrelated interests in (1) designing medical education based on future

job roles; (2) faculty development and vitality of clinical educators (developing, recognizing, and valuing faculty as teachers and educators); (3) workplace learning across the continuum of physician education: aligning education with clinical care markers for quality and patient experience to support the highest quality of education and patient care; and (4) the convergence between what is known about strong learning environments and emerging findings about physician well-being.

Prior to joining Aurora Health Care, Dr. Simpson served as Director of the Office of Educational Services and Associate Dean for Educational Support and Evaluation at the Medical College of Wisconsin. She was honored to be a member of MCW's Society of Teaching Scholars, the first holder of the Elsa B. and Roger D. Cohen, MDs, CHW/MCW Professorship in Medical Education, and the first female to receive the college's Distinguished Service Award. Nationally, Dr. Simpson served as Chair of the AAMC's Group on Educational Affairs (GEA), chaired the AAMC-GEA Consensus Conference on Educational Scholarship, and served as a member of the GEA's Educator Evaluation Task Force. Deb has been recognized nationally for her work in medical education as recipient of the Excellence in Education award from the Society of Teachers of Family Medicine for her work in faculty development; a McCann Faculty Scholar for her work in mentoring; and a recipient of the AAMC-GEA's Merrill Flair Award. She is a native of San Francisco, a graduate of the University of California at Santa Barbara (BS in American History and Cultural Anthropology), The Ohio State University (MA in Student Personnel Work in Higher Education), and the University of Minnesota (PhD in Educational Psychology).

Kelley M. Skeff, MD, PhD, MACP, is the George DeForest Barnett Professor in the Department of Internal Medicine at Stanford University, and Co-Director of the Stanford Faculty Development Center (SFDC). Dr. Skeff was the internal medicine residency program director at Stanford for two decades. He received his MD from the University of Colorado and his PhD from the Stanford School of Education. Dr. Skeff's academic career has focused on methods to assist faculty and residents internationally to improve their teaching effectiveness, resulting in the development of the Stanford Faculty Development Center (SFDC). The SFDC uses a dissemination approach that trains faculty from institutions internationally to train their own faculty colleagues and housestaff to become more effective teachers. Since 1986, the SFDC has trained 389 faculty trainers from 156 institutions in 19 countries to become local, regional, and national resources for the improvement of medical education. These faculty have, in turn, assisted over 15,000 faculty and residents to improve their teaching effectiveness. Recently, his research interests

have focused on physician distress and professionalism, using qualitative research methods to identify and address the multiple triggers for physician distress related to the electronic health record (EHR). He has been a Regent and is a Master of the American College of Physicians and serves on the Macy Faculty Scholars National Advisory Committee.

Lakshmana Swamy, MD, is a Pulmonary and Critical Care Medicine Fellow at Boston Medical Center and is interested in teaching and evaluating the safety and delivery of care. Last year, he served as Chief Resident in Quality and Safety at VA Boston, and he has worked closely with the Institute for Healthcare Improvement (IHI) and the IHI Open School. He is currently a resident representative on the Accreditation Council for Graduate Medical Education Clinical Learning Environment Review (ACGME CLER) Evaluation Committee. He has spoken and debated on the importance of frontline-driven quality improvement as a strategy to improve patient safety while reducing burnout and bringing joy back to medicine.

Christine "Chris" Tanner, PhD, RN, ANEF, is Professor Emerita at the Oregon Health & Science University School of Nursing and national leader in nursing education innovation and scholarship. Dr. Tanner served as Editor-In-Chief for the *Journal of Nursing Education* from 1991–2012. Her program of research has focused on the development of expertise in clinical judgment and the impact of different education models on the development of skill in clinical judgment.

For the last decade, Dr. Tanner was involved in creating educational solutions to the nursing shortage, including ways to increase enrollment and advance academic progression through multi-institutional, multi-disciplinary collaboration. She and colleagues led the development, implementation, and evaluation of The Oregon Consortium for Nursing Education (OCNE), which was launched in 2003 as a partnership among OHSU and several community colleges. Among OCNE innovations were a new competency-based baccalaureate curriculum offered on all 14 campuses of the consortium and the development and testing of a new model of clinical education well-suited to a competency-based program.

Dr. Tanner received her PhD in Psychology from the University of Colorado and did postdoctoral study at University of California, San Francisco. She holds an MS in Medical-Surgical Nursing from the University of San Francisco and a BSN from the University of Colorado. Dr. Tanner is the recipient of numerous honors including the AJN Book of the Year Award for *Expertise in Nursing Practice: Caring, Clinical Judgment and Ethics*; the Graduate Faculty Award from OHSU School of Nursing;

the National League for Nursing Award for Excellence in Nursing Education Research; and the Oregon Medical Research Foundation Mentor Award.

Mark B. Taubman, MD, is CEO of the Medical Center, Dean of the School of Medicine and Dentistry, and Senior Vice President for Health Sciences at the University of Rochester. He received his MD degree from New York University and completed his training in medicine and cardiology at the Brigham and Women's Hospital and Harvard Medical School. He has served on the faculties of Mt. Sinai School of Medicine in New York, Children's Hospital Medical Center and Harvard Medical School in Boston, Massachusetts. Dr. Taubman was previously the Charles E. Dewey Professor and Chairman of Medicine (2007–2010) and Chief of the Cardiology Division (2003–2009) at the University of Rochester. In addition, he was Director of the Aab Cardiovascular Research Institute (2005–2007) and Director of the Center for Cellular and Molecular Cardiology (2003–2005). Dr. Taubman is a member of the American Heart Association, the American Society of Hypertension, the Association of University Cardiologists, and the Association of American Medical Colleges. He is a Fellow, American College of Cardiology and Fellow, American College of Physicians. He is the former Editor-in-Chief, *Arteriosclerosis, Thrombosis, and Vascular Biology*.

Dr. Taubman is an international authority in vascular biology with research interests in tissue factor biology and chemokines. He has published widely—more than 120 articles, chapters, and books.

George E. Thibault, MD, became the seventh president of the Josiah Macy Jr. Foundation in January 2008. Immediately prior to that, he served as Vice President of Clinical Affairs at Partners Healthcare System in Boston and Director of the Academy at Harvard Medical School (HMS). He was the first Daniel D. Federman Professor of Medicine and Medical Education at HMS and is now the Federman Professor, Emeritus.

Dr. Thibault previously served as Chief Medical Officer at Brigham and Women's Hospital and as Chief of Medicine at the Harvard-affiliated Brockton/West Roxbury VA Hospital. He was Associate Chief of Medicine and Director of the Internal Medical Residency Program at the Massachusetts General Hospital (MGH). At the MGH, he also served as Director of the Medical ICU and the Founding Director of the Medical Practice Evaluation Unit.

For nearly four decades at HMS, Dr. Thibault played leadership roles in many aspects of undergraduate and graduate medical education. He played a central role in the New Pathway Curriculum reform and was a leader in the new Integrated Curriculum reform at HMS. He was the Founding Director of the Academy at HMS, which was created to recognize outstanding teachers and to promote innovations in medical education. Throughout his career, he has been recognized for his roles in teaching and mentoring medical students, residents, fellows, and junior faculty. In addition to his teaching, his research has focused on the evaluation of practices and outcomes of medical intensive care and variations in the use of cardiac technologies.

Dr. Thibault is Chairman of the Board of the MGH Institute of Health Professions, Chairman of the Board of the New York Academy of Medicine, and he serves on the Boards of the Institute on Medicine as a Profession and the Arnold P. Gold Foundation. He served on the President's White House Fellows Commission during the Obama Administration and for 12 years he chaired the Special Medical Advisory Group for the Department of Veterans Affairs. He is past President of the Harvard Medical Alumni Association and past Chair of Alumni Relations at HMS. He is a member of the National Academy of Medicine.

Dr. Thibault graduated summa cum laude from Georgetown University in 1965 and magna cum laude from Harvard Medical School in 1969. He completed his internship and residency in Medicine and fellowship in Cardiology at MGH. He also trained in Cardiology at the National Heart and Lung Institute in Bethesda and at Guys Hospital in London, and served as Chief Resident in Medicine at MGH.

Dr. Thibault has been the recipient of numerous awards and honors from Georgetown (Ryan Prize in Philosophy, Alumni Prize, and Cohongaroton Speaker) and Harvard (Alpha Omega Alpha, Henry Asbury Christian Award, and Society of Fellows). He has been a visiting Scholar both at the Institute of Medicine and Harvard's Kennedy School of Government and a Visiting Professor of Medicine at numerous medical schools in the US and abroad. In 2017, he was the recipient of the Abraham Flexner Award for Distinguished Service to Medical Education from the Association of American Medical Colleges, and he was made an honorary Fellow of the American Academy of Nursing. He has received honorary doctoral degrees from Georgetown University, Wake Forest University, and The Commonwealth Medical College.

Barbara A. Todd, DNP, ACNP-BC, FAANP, FAAN, is the Director of the CMS Graduate Nurse Education (GNE) Demonstration Project at the Hospital University of Pennsylvania; Senior Fellow, Center for Health Outcomes & Policy; and Adjunct Assistant Professor of Nursing, University of Pennsylvania. She was recently appointed Director of the DNP Program at University of Pennsylvania.

She has practiced as a nurse practitioner (NP) in the Philadelphia region for the past 32 years. She is an experienced clinician and administrator for advanced practice providers. She has been instrumental in developing NP models of care in several large academic medical centers. Her clinical interest has been in cardiovascular health, with a focus on valvular heart disease and role transition for nurse practitioners. She has published extensively and presented nationally on advanced practice clinical and administrative topics. She is certified in both family practice and acute care. She has served on the planning committee for the American Association of Nurse Practitioners (AANP) international conference and is a member of the AANP nominations committee. She is a fellow in the AANP and American Academy of Nursing. At the American Academy of Nursing, she served on the Primary Care Expert Panel. Through her work during the GNE Demonstration Project, she has developed a keen interest in studies to evaluate clinical preceptorship models.

Sandrijn van Schaik, MD, PhD, is Professor of Pediatrics with a clinical appointment in the Division of Pediatric Critical Care Medicine. She earned her medical degree at the University of Amsterdam, the Netherlands. She then spent several years studying the pathogenesis of Respiratory Syncytial Virus infection at Children's Hospital of Buffalo, New York, and the University of Utrecht, the Netherlands, resulting in a PhD from the latter university. She completed her pediatric residency at the Floating Hospital, Tufts University, in Boston followed by Pediatric Critical Care Fellowship training at University of California, San Francisco (UCSF). After fellowship, she started to devote her career to education. She completed the Teaching Scholar Program at UCSF, and subsequently a two-year Medical Education Research Fellowship. In 2012, she was selected for the Josiah Macy Jr. Foundation Faculty Scholars Program. She currently serves as the Education Director for the UCSF Kanbar Center for Simulation and Clinical Skills, as the Director of Faculty Development for the new UCSF School of Medicine Bridges Curriculum, and as the Fellowship Director for Pediatric Critical Care Medicine. She is the founding chair of the University of California Simulation Consortium and the founding director of the UCSF Simulation Fellowship. She continues to maintain an active research career

with a focus on interprofessional teamwork and simulation and has published her work in high-impact journals in the field. She has received multiple awards and recognitions, including the inaugural Baum Family Presidential Chair for Experiential Learning.

Robin Wagner, RN, MHSA, is Vice President of the Clinical Learning Environment Review (CLER) Program. The CLER program is designed to provide formative feedback that presents GME leaders and the executive leaders of clinical learning environments with information on six areas of focus: 1) patient safety, 2) health care quality (including disparities), 3) transitions in care, 4) supervision, 5) well-being, and 6) professionalism.

Ms. Wagner is a registered nurse with over 25 years of experience in the health care environment. Prior to joining the Accreditation Council for Graduate Medical Education (ACGME), she was Program Director, Research and Evaluation at the American Board of Medical Specialties (ABMS). In that role she was responsible for providing leadership and management in the design, conduct, and dissemination of various efforts in physician performance measurement, resource use measurement, and meaningful use as well as facilitating and supporting the ABMS Committee on Research and Evaluation Procedures. Prior to joining ABMS, Ms. Wagner served as Administrator for the Institute for Healthcare Studies and the Division of General Internal Medicine at Northwestern University. While at Northwestern, she played a key role in the design and launch of their master's degree program in Patient Safety and Healthcare Quality. Ms. Wagner holds a Bachelor of Science in Nursing from the University of Maryland and a Master of Health Services Administration from the George Washington University.

Kevin B. Weiss, MD, MPH, has devoted his medical career to issues of health care quality, equity, and access to care, and training physicians and other health care providers in health care improvement.

As the Accreditation Council for Graduate Medical Education's (ACGME's) Senior Vice President for Institutional Accreditation, he is responsible for the new Clinical Learning Environment Review (CLER) Program. He also co-Chairs the CLER Evaluation Committee and oversees the ACGME's Institutional Review Committee's accreditation activities.

Prior to coming to the ACGME, Dr. Weiss served as President and Chief Executive Officer of the American Board of Medical Specialties (ABMS) from 2007 to 2012. While at ABMS he broadened public involvement in the Board's activities; implemented both its Ethics and Professionalism and Health and Public Policy Programs; established alignment with Maintenance of Licensure; and, as part of the Affordable Care Act, aligned Maintenance of Certification with the Medicare Physician Quality Reporting Initiative, and established ABMS-International.

He has served various roles on committees for the National Quality Forum, the National Committee for Quality Assurance, and the AMA's Physician Consortium for Performance Improvement. He has served as a member of the American College of Physicians' (ACP) Board of Regents and chaired its committees for clinical guidelines and for performance measurement. Dr. Weiss currently serves on the Board of Directors for the Educational Commission for Foreign Medical Graduates and has served on committees for the Institute of Medicine, including those that developed the reports "Crossing the Quality Chasm" and "Identifying Priority Areas for Quality Improvement."

Over the years, Dr. Weiss has conducted federally-funded US and international epidemiological and health services research projects related to guideline implementation, chronic care management, outcomes measurement, quality improvement, and health care equity, and has published over 200 articles, reviews, books, book chapters, and monographs. In 2005, Dr. Weiss established the first U.S. graduate-level Master's and PhD degree programs in Patient Safety and Healthcare Quality at Northwestern University.

Dr. Weiss is board-certified in Internal Medicine. He also maintains a role as Professor of Medicine in the Division of General Medicine and in the Center for Healthcare Studies in the Feinberg School of Medicine at Northwestern University, Chicago, Illinois.

Brenda K. Zierler, PhD, RN, FAAN, explores the relationships between the delivery of health care and outcomes—at both the patient and system level—through her research. Her primary appointment is in the School of Nursing at the University of Washington (UW), but she holds three adjunct appointments: two in the School of Medicine and one in the School of Public Health. Currently, Dr. Zierler is Co-PI on a Josiah Macy Jr. Foundation-funded grant with Dr. Les Hall, to develop a national Train-the-Trainer (T3) faculty development program for interprofessional

education and collaborative practice. She also leads two Health Resources and Services Administration (HRSA) training grants—one focused on interprofessional collaborative practice for advanced heart failure patients and the second focused on an education-practice partnership to improve advanced heart failure training and outcomes for rural and underserved populations in an accountable care organization. Dr. Zierler is the Co-Director for the UW Center for Health Sciences Interprofessional Education, Practice, and Research. She is a past Chair of the American Interprofessional Health Collaborative and a member of the Institute of Medicine's Global Forum on Innovation in Health Professions Education.

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