CONFERENCE RECOMMENDATIONS

June 14 –17, 2017 | Atlanta, GA

Achieving Competency-Based, Time-Variable Health Professions Education

Recommendations from the Macy Foundation Conference

Health professions education requires radical transformation to ensure delivery of high-quality health care in the 21st century. High-quality care begins with the education of our health professionals, who must be optimally prepared to meet the public's health care needs.

Current approaches to health professions education are in evolution, as leaders of health professions education and healthcare delivery work to define the competencies needed to deliver care in our communities, implement new strategies for assessment, provide greater support for learner and practitioner well-being, and assure the public that the competence of their health care professionals remains superb across the continuum from formal education through decades of practice. Despite these efforts, however, health professions education is fragmented, time-bound, and too often disconnected from the practice of optimal pedagogies and existing health care challenges. To fulfill the social contract implicit in the provision of health care requires change that is more than evolutionary or incremental.

Now is the time for leaders of health professions education systems to partner closely with health systems executives, clinicians, researchers, accreditors, and our learners to revolutionize our educational approach, shifting it toward one of continuous learning, guided by the principles of competency-based, time-variable education.

Such a transformation will take time and will not be easy. Existing challenges in both health care delivery and health professions education are considerable. Despite almost two decades of concerns about the safety, quality, equity, accessibility, value, and patient-centeredness of health care in America, progress toward a system in which every patient receives the right care in the right place at the right time for the right cost has been slow. Challenges include the following:

- *Fragmented Care*. Patients with multiple and more complex chronic diseases are best served by health care that is continuous and integrated, but today's care remains too fragmented.
- *Slow Diffusion*. Advances in biomedical and behavioral science are potentially lifesaving, but their diffusion throughout the practice environment is slow and incomplete.
- *Disruptive Technology*. Electronic health records (EHRs) hold promise for improving the efficiency, safety, and precision of care, but their design clashes with existing systems of work, causing a tension that is contributing to a dangerous upswing in burnout among health professionals.
- *Ineffective Collaboration*. Health care professionals in many disciplines routinely earn advanced degrees and gain expertise in areas such as functional assessment, rehabilitation sciences, and therapeutic management equal to or surpassing physician

competencies, yet true interprofessional collaborative practice that takes full advantage of all the health professions remains an aspiration rather than a reality in most health care systems.

Health professions education also faces many challenges, such as:

- *Information Explosion*. Substantial expansion of content relevant to the practice of medicine, pharmacy, nursing, and other health professions has led to concerns about curricula that are too dense at every stage of formal education.

- *Discontinuity in Education*. Optimal workplace learning requires stable, longitudinal assignments that enable students, residents, faculty, and patients to build relationships over time, but challenges such as monthly block rotations, work hours restrictions, shortened lengths of stay, and a shift from inpatient to outpatient care without a concomitant shift in educational venues have led to fragmentation and lack of continuity for both caring and learning.

- *Student Debt Burden*. The debt burdens of our students and trainees continue to escalate, causing significant stress and impacting career choices.

- *Faculty Burnout*. Faculty members, under intense pressure to maximize clinical productivity, have less time to spend teaching and assessing learners. Inherent in this time-pressured environment is a risk that lowering time spent on observation, assessment, and coaching of learners may fail to identify those who need more instruction and guidance to achieve satisfactory performance and limit opportunities for achieving excellence among all learners.

- *Assessment Challenges*. High-stakes decisions about advancement, retention, and graduation are made with persistent emphasis on multiple-choice exams, while robust assessments of critical competencies—such as clinical skills, communication, professionalism, and ethics—are not as widely used. Criteria for health professional certification and licensing need to be aligned with educational goals.

- *Marginalization of Patients*. Despite the importance of patient-centeredness as a critical element of health care quality, patients rarely have the opportunity to contribute to assessment of health professions students.

- *Challenges to Workforce Diversity*. The health professions workforce should reflect the diversity of the population served. More individualized approaches to learning that build upon what each learner brings to the educational environment will be a necessary component to diversifying the health professions workforce.

- *Inadequate Preparation for Transitions*. In medicine, pharmacy, and nursing, residency programs accepting new graduates and employers hiring newly licensed clinicians have raised concerns about inadequate training and deficiencies in critical competencies.

- *Inadequate Faculty Development*. Faculty members are committed to

> the concepts of remaining current and teaching new subject areas and skills, but many do not feel well-supported by existing systems for continuing education, professional development, and maintaining certification—which generally are not integrated into daily practice and are assumed to take place outside of the regular work day.

In response to these challenges, some health professions educators are championing a shift away from the traditional time-based educational system, in which learners spend a pre-determined amount of time in each phase of their health professions education, toward a competency-based, time-variable system, in which learners advance only after they have mastered specific concepts and skills. In fact, health professions educators within and outside the U.S. have taken critical foundational steps toward a competency-based, time-variable education system. We are now at an important inflection point; our current, predominantly time-fixed health professions education system must accelerate the transition to a competency-based, time-variable system.

In the U.S., the Accreditation Council for Graduate Medical Education (ACGME) launched the competency-based "Outcome Project" by describing the set of competency domains needed for physicians to better meet the health care needs of today's patients. ACGME's subsequent "Milestones" initiative, imbedded in the Next Accreditation System, attempted to define the developmental sequence of competency attainment and required programs to measure and report the progress of their residents. The Liaison Committee on Medical Education mandates that medical schools articulate graduation competencies and attest that their learners have met these competencies. Further, countries such as the Netherlands and Denmark have tested systematic efforts in competency-based education, and the College of Family Physicians of Canada has transformed all its residency programs to a competency-based model. Currently, the Royal College of Physicians and Surgeons of Canada has outlined a pathway to transition all its graduate medical education (GME) programs to a competency-based, time-variable system.

Further, since the early 1990s, the American Association of Colleges of Pharmacy through its Center for the Advancement of Pharmacy Education has developed and maintained educational outcomes for pharmacy students, the newest version of which has been incorporated by the Accreditation Council for Pharmacy Education into its PharmD program standards as expected competencies for new graduates. The key targets are that, based on reliable assessments, pharmacy graduates are both "practice-ready" and "team-ready."

To review the current state of competency-based, time-variable health professions education—and to explore its potential to accelerate solutions to the challenges outlined above—the Josiah Macy Jr. Foundation hosted a conference on *Achieving Competency-Based, Time-Variable Health Professions Education*. The conference brought together 39 health professions educators in medicine, nursing, and pharmacy as well as experts in educational theory and reform, medical residents (learners), and education and residency program accreditors. They gathered in Atlanta and participated in two-and-a-half days of discussions leading to consensus around the recommendations presented in this report for designing and implementing competency-based, time-variable health professions education. By the end of the conference, the attendees had agreed upon the following vision for transformation of the American health professions education system:

Consensus Vision Statement

With the achievement of competency-based, time-variable health professions education, we envision a health care system in which all learners and practitioners are actively engaged in their own education and continuing professional development to improve the health of the public. In this system, learners and faculty partner to co-produce learning, all practitioners are life long learners, and all health care environments place a high value on learning.

This report provides an overview of the Macy conference on competency-based, time-variable education, including commissioned papers, themes, and recommendations.

Conference Background

In a competency-based education system, learners progress by demonstrating the competencies they need to perform optimally as health professionals across the span of their careers—through the various stages of formal education, including transitions from one stage to the next, and into and throughout decades of practice. The desired competencies for optimal performance are based on what is needed to deliver health care of the highest quality and value to patients and their communities.

Competency-based education differs from traditional, time-based education in the way it views the continuum of learning and learner success, the nature of assessment, the roles and relationships of learners and faculty, and the design of educational experiences. Competency-based education approaches the entirety of a professional's career—from matriculation into health professions school to retirement—as part of the educational continuum. Learners are successful when they transition through different stages and different practice environments based not on their performance on an exam after spending a specific time in formal education, but on their ability to demonstrate measurable competence in the requisite set of behaviors needed to succeed at the next level or stage of performance.

When fully implemented, competency-based education provides assessment that is frequent (often daily), multi-modal, linked to explicitly defined performance goals, and based on observable behaviors. Learners in competency-based education systems are partners with faculty and patients in assessment; they know their competency targets and view assessment and feedback as welcome opportunities to receive critical coaching that allows them to progress toward their goals. In competency-based education, educational experiences are tailored to the assessed needs of the learner. In competency-based, time-variable training, time becomes a resource that learners use for their benefit. They have the freedom to dedicate additional time to work on mastery of a particularly challenging set of

competencies; to use free time to pursue enrichment activities once competencies have been achieved; or to accelerate their transition to the next stage of training.

Many in education fear the term "time variability," believing that it would result in every student charting a totally independent course through their formal education, causing chaos within our institutions. But in competency-based education, time becomes a resource rather than a constraint. Time variability recognizes that competency acquisition is individual; it is a rare learner who simultaneously masters every competency needed to transition to the next stage of their career.

Learners who master some required competencies in less time than the total duration of their educational programs can shift their attention to more challenging competencies; move on to more advanced work; have time to engage in scholarly activities, such as research; or dedicate more time to family building and other extracurricular activities. Some learners may indeed be able to accelerate their transition into the next phase of their career. Conversely, learners who need additional time to master all requisite competencies are still viewed as successful once they meet the required competencies—in contrast to the stigma currently attached to failing to finish on time.

An important objective of competency-based, time-variable education is entrusting learners to provide care without supervision in relation to the professional competencies they have acquired. Faculty supervisors may formally entrust learners when they have demonstrated certain abilities and there is confidence that the learners have the capacity to perform equally well in situations that are similar but not identical. Entrustment derives from the construct, used in both medicine and pharmacy, of entrustable professional activities (EPAs), which are essential units of observable work that, in the aggregate, define each of the health professions. They provide the context for the competencies that professions have identified, and interestingly, many of these competencies are shared across health professions.

Successful assessment strategies are foundational to the conduct of a competency-based educational system. Many have assumed there is a single strategy that must be adopted to advance competency-based education. In fact, a number of different paradigms for assessment are compatible with a competency-based educational system, including EPAs, milestones, and the University of Wisconsin "Flex Option" competency sets (described in one of the papers commissioned for this conference). They share critical elements: each is designed to reflect the work that optimal-practicing health professionals must carry out at different stages of their careers; each is described using behavioral criterion; and each assesses the learner's knowledge application, skills, and habits of mind using direct observation as well as analysis of different types of evidence (e.g., written notes or multi-source feedback) submitted by learners.

Unfortunately, educational innovations targeting the achievement of a fully competency-based, time-variable system are constrained not only by traditional views of education but also by existing structures and systems, such as university registrar systems, licensing requirements, board certification standards, and accreditation systems that rely on credit hours and fixed durations of training as evidence of sufficient academic achievement. As an example, in medical education, the once-a-year matching structure and "all in" rules of the National Residency Matching Program

prevent learners from moving on to residency when they are ready.

Removing these and other barriers and facilitating the full implementation of competency-based, time-variable health professions education has the potential to result in the following benefits to society, educational institutions, and individual learners.

- Societal needs for high-quality care will be better met when health professionals' competencies are assessed and verified as they enter their profession, and are continuously assessed throughout their careers. This will advance our professions' abilities to fulfill our social contract.

- Learners' needs for rigorous, safe, and supportive educational environments will be better served by educational programs that encourage partnering with faculty in learning and assessment strategies while striving to achieve specific competencies, rather than competing with peers to outperform each other. Learning environments such as these have the potential to decrease toxic stress and burnout.

- Learners whose personal circumstances, abilities, and life goals allow or require them to master competencies at a different rate than their peers can do so without the fear of failing. Some learners may have the opportunity to advance earlier to the next stage of training, with potential economic and lifestyle benefits. At the same time, learners who otherwise might not consider entering the health professions (because of their non-typical learning styles, lack of educational opportunities, etc.) may find themselves drawn to competency-based, time-variable health professions education, which would permit the tailoring of the educational trajectory to their needs.

- Practicing health professionals, having been exposed to the benefits of assessment-driven learning during their formative educational/training years, will become skilled, lifelong learners who enthusiastically seek out specific assessment and learning experiences to continuously improve their competency throughout their careers.

- Interprofessional collaborative care will benefit from the establishment of explicit competencies and performance expectations relevant to all professions—such as the Interprofessional Education Collaborative's (IPEC) core competencies for interprofessional practice. This important work has the potential to increase the ability and opportunities of learners to work together to improve their performance and for faculty from all professions to supervise and coach learners from all professions.

- Educational institutions may find that participation in competency-based, time-variable educational programs creates more satisfaction for faculty as they see the benefits of assuming a role focused on the longitudinal support and coaching of young health professionals, rather than an episodic responsibility for judging students.

Conference Papers

Prior to the conference, participants read two commissioned papers and three case studies[1] to ground them in the topic and prepare them for the work of the meeting.

The first paper, *Time-Variable Training in Medicine: Insights Derived from the Literature and Examples in Practice*, provided a thorough overview of time-variable medical training. The authors, Olle ten Cate, professor of medical education at University Medical Center in The Netherlands, and his colleagues Eugene Custers, Larry Gruppen, Lorelei Lingard, Pim Teunissen, and Jennifer Kogan, referred to such training as "related to the introduction of competency-based medical education" and "a shift from 'fixed time, variable outcomes' to 'fixed outcomes, variable time' as a desirable target for the future of medical training." They describe time in medical education as "already variable" because it differs around the world, with much more time flexibility built into the medical education models found in other countries. They also explain that there appears to be no research evidence to justify specific training lengths, and go on to describe reasons why time variability is now of interest to medical educators who are interested in better controlling the outcomes of training. The paper cites specific examples of successful programs employing this paradigm and describes several conceptual, theoretical, and practical aspects of time-variable training.

The second paper, *Great Expectations: Competency-Based Education from Reality to Vision*, was authored by Damon Dagnone, associate professor of emergency medicine and faculty lead on competency-based postgraduate medical education, and his colleagues Denise Stockley, Leslie Flynn, and Richard Reznick at Canada's Queen's University. Based on the authors' experiences with converting the university's 29 residency programs to a competency-based, time-variable approach, it provided conferees with a blue-sky vision for the future of health professions training. It also explained the movement toward competency-based education taking place in medical education programs around the world, describing it as a response to more traditional educational models that assume learner competence based on the amount of time spent on task.

Each of the three case studies focused on efforts to design and implement a competency-based, time-variable education program. One case study outlined The University of Wisconsin (UW) Flexible Option for BSN Completion offered through UW-Milwaukee. Another described the journey and lessons learned during the implementation of a competency-based and time-independent undergraduate medical education curriculum at Oregon Health & Science University School of Medicine. A third detailed the competency-based, time-variable Education in Pediatrics Across the Continuum (EPAC) program, which is supported by the Association of American Medical Colleges and the Macy Foundation in four medical schools that have established pilot programs for competency-based, time-variable advancement in undergraduate and graduate education in pediatrics.

1 The commissioned papers and case studies will be included in a comprehensive conference monograph, which the Foundation will publish later in 2017.

Conference Themes

During conference discussions, several important themes surfaced repeatedly as conferees processed insights and lessons gleaned from the papers and case studies and began honing in on recommendations.

1. Health professions education systems, the clinical practice system in which learning occurs, and the educators and learners who participate in the system all have a responsibility to patients to continuously improve and evolve. A learning continuum that views time as a resource to be optimized rather than as a constraint, and that ensures mastery of well-defined competencies, supports this goal. Further, when health professions education is learner-centered and outcomes-oriented in this way, it becomes a more supportive environment for teaching interprofessional, patient-centered care.

2. Principles of competency-based, time-variable education must be applied across all the health professions and across the whole continuum of education throughout the careers of health professionals. Viewing learning as a continuous process that spans different settings and phases reduces the pressure to master everything in any individual phase. It also has the potential to facilitate earlier differentiation for learners who know their preferred career trajectory and who wish to tailor their educational experience to optimize preparation for that career. Learning at every stage can build on learning from the previous stage, ensuring that the learner masters the competencies necessary to be successful.

3. A learner-engaged, robust assessment strategy must underpin the competency-based, time-variable approach to health professions education. The learner in this transformed educational system must be an active and engaged partner in ongoing and frequent assessment experiences rather than a passive recipient of a grade at the end of a rotation. The assessment strategy must target all relevant competencies using multiple modalities (including direct observation and input from patients and other team members).

4. Required competencies must be broad and developmentally based. They must encompass the requisite knowledge, skills, behaviors, and attitudes expected of health professionals at each stage of their development within their specific profession and discipline. It was noted that even with the most comprehensive competency framework, some aspects of professional development are challenging to measure, particularly professional identity formation. Conferees acknowledged that maturation time in a supportive educational environment—beyond what is needed to master competencies—may be required for learners to fully internalize their identities as professionals.

5. Full implementation of a competency-based, time-variable educational strategy will require health professions schools and training sites to develop a strategy to manage such a major change. All stakeholders (learners, faculty, administrators, staff, regulators, and communities served) must be included in the process. Much attention must be paid to faculty who will need to take on new roles and acquire new skills. Throughout this process, attention must be paid to the concerns of learners and faculty about possible adverse or unintended consequences of these changes.

6. Conferees agreed that the educational paradigm shift should be interprofessional and should include interprofessional competencies, such as those developed by IPEC. It is important for the development of all health professionals that both teaching and assessment are interprofessional. Currently, interprofessional, competency-based, time-variable education is uncharted territory. Developing it requires building relationships and mastering team-focused attributes, such as trust, communication, and collaboration.

When advocating for a major paradigm shift in complex systems, however, it also is necessary to consider scale. While one of the papers prepared for the conference describes the ambitious effort at Canada's Queen's University to introduce competency-based education simultaneously into the medical school's 29 residency programs, the other papers described efforts with a more limited scope. The conferees, while firmly supportive of competency-based, time-variable education as a goal, recognize that it will take different forms at different institutions and so encourage experimentation and customization. In fact, there is an immediate and ongoing need for research related to all facets of the concept, from design and implementation to learner assessment and program evaluation. Such research will better help us understand both the strengths and limitations of the concept.

Measures for Success

Although pilot programs in competency-based, time-variable education have confirmed the potential of this approach, moving forward requires institutions capable of implementing and studying its impact, describing the conditions under which it is both successful and unsuccessful, and contributing to the success of other institutions. The Macy conferees identified several conditions for success that will need to be met by institutions undertaking this paradigm shift. These include:

- Committed institutional leadership and an explicit plan for organizational change management,
- Agreed upon program outcomes and measures of success for each profession,
- A program of assessment tied to these outcomes,
- A well-thought-out implementation strategy,
- A willingness to break down barriers across the professions and across the continuum of education, and
- A willingness to work with regulators to remove barriers.

Certainly, some institutions engaged in educating the health care workforce are primed and eager to implement competency-based, time-variable health professions education. Other institutions, however, are not likely to be early adopters of this educational model. Our hope is that regardless of whether an institution adopts the model, all institutions will benefit from the research and implementation science work that their peer institutions do in pursuit of understanding how competency-based, time-variable training can contribute to optimal lifelong knowledge, skills, and habits of mind among health professionals.

Based on the commissioned papers and case studies, the rich plenary and breakout group discussions, and the experience of the conferees, consensus was reached around the following recommendations. The conferees felt all the recommendations were equally important and needed to be enacted together, not sequentially. They also felt an urgency to undertake this paradigm shift immediately so as not to further delay societal benefits.

CONFERENCE RECOMMENDATIONS

Recommendation I: System Redesign

Curricula, learning environments, and faculty development require systematic redesign to achieve a successful competency-based, time-variable health professions education system.

Recommendation II: Creating a Continuum of Education, Training, and Practice

Institutions responsible for health professions education and health care delivery as well as those who lead, learn, and work within them should embrace the view of health professions education as a learning continuum that spans formal education, clinical training, and professional practice.

Recommendation III: Implement a Robust Program of Assessment

Leaders in health professions schools and their health care system partners should champion, develop, and implement a program of assessment that supports competency-based, time-variable training and explicitly links educational programs to improved health care outcomes.

Recommendation IV: Enabling Technologies

Health professions education and health care delivery institutions should develop and use enabling technologies in the implementation of competency-based, time-variable education throughout the professional education continuum of the practitioner.

Recommendation V: Outcomes Evaluation

Competency-based, time-variable health professions education programs should be designed, implemented, and evaluated in relation to preparing their graduates to advance important societal goals, including improved patient care and improved practitioner performance and satisfaction.

Recommendation I: System Redesign

Curricula, learning environments, and faculty development require systematic redesign to achieve a successful competency-based, time-variable health professions education system.

Competency-based assessment must be adopted as the strategy by which all health professionals navigate their formal education, transition into advanced training and then into practice, and demonstrate their continued effectiveness across the lifespan of their careers. Realization of the potential of competency-based, time-variable education requires integration of the work of the numerous distinct organizations currently charged with the conduct and oversight of multiple stages of health care professionals' education and assessment and will require significant system redesign. Leaders, accreditors, and licensors of organizations that provide health professions education and health care must immediately develop the necessary infrastructures to facilitate adoption of and to support the success of competency-based, time-variable education for learners across the continuum of health care careers, from students through practicing professionals.

Actionable Recommendations

1. National consortia representing health professions educators, health care delivery systems, academic health centers, community-based health systems and practices, practicing health professionals, learners, and patients must continuously identify critical population health and health care delivery goals and establish or update health professional competencies that ensure the health professions workforce is capable of successfully addressing contemporary health issues.

2. Each profession and its regulatory bodies must define readiness for learner transitions across the educational continuum and into practice by describing the comprehensive set of demonstrable competencies that indicate a learner is ready to advance, rather than by dictating the time the learner must spend in a given educational stage. Institutions must be held accountable for the decisions they make to allow learners to advance from highly structured and tightly supervised environments (such as medical, pharmacy, and nursing schools) to more flexible environments in which supervision is less direct (such as residency training programs) to fully autonomous practice.

3. Leaders of health professions education programs should evaluate and redesign, where necessary, curricula, programs, and methods of assessment to prepare their learners to demonstrate the competencies they need to contribute to the workforce that achieves the established health care goals. Learning activities and assessment strategies should be sequenced by the desired outcomes at each phase of education, training, and practice. Milestones of competency acquisition should be delineated to allow learners and faculty to understand the developmental trajectory expected of learners as they work to be entrusted with progressively more challenging work with less intensive supervision. This will require change management strategies involving all stakeholders in the educational process.

4. Health professions education programs must invest in expertise to support competency-based, time-variable curricula. Experts in curriculum and assessment

must engage teams to manage the design, implementation, evaluation, and continuous improvement of new learning and assessment strategies. These teams must involve or seek ongoing input from multiple stakeholders, such as patients, learners, and faculty as well as from experts in interprofessional collaborative care, data science, technology, and organizational change. Experts in faculty development must be charged with supporting faculty as they master new roles (such as coaching) and use new tools (such as performance dashboards) to support their learners. Experts in instructional design, technology-enhanced education and library sciences should collaborate on strategies and systems for optimizing learning throughout the entire continuum. They should be charged with developing and curating learning objects (videos, patient cases, teaching tools, simulation models, etc.) so that students, residents, and practicing professionals can access learning tools when they are ready to learn rather than wait until a formal course is offered. Technology systems for collecting longitudinal data about student performance and competency attainment across the continuum, such as electronic portfolios (e-portfolios), will be needed (see Recommendation IV).

5. Academic institutions should redesign promotion and tenure systems as well as faculty compensation models that recognize and reward faculty whose scholarly work focuses on the design, implementation, and continuous improvement of competency-based, time-variable education. Faculty compensation models and work schedules for health care professionals who supervise learners in the clinical environment should reflect the time needed to observe, coach, assess, and support learners in the competency-based, time-variable model.

6. Health care institutions should design health care environments to support workplace learning and assessment by all members of the team as part of the normal workflow. These environments should include interprofessional practitioners and learners within an aligned competency-based framework through all stages of learning, including continuing professional development. Time must be built into the workflow to enable multi-directional, interprofessional assessment feedback to learners and practicing professionals.

Recommendation II: Creating a Continuum of Education, Training, and Practice

Institutions responsible for health professions education and health care delivery as well as those who lead, learn, and work within them should embrace the view of health professions education as a learning continuum that spans formal education, clinical training, and professional practice.

To maximize the effectiveness and the efficiency of competency-based education, learners must be able to move from one phase of learning to the next, building on and reinforcing what came before as well as laying the foundation for what comes next. It is incumbent upon the systems in which health professionals learn, train, and practice to ensure that the transitions between phases and throughout a career are as seamless as possible. Continuity of learning experiences not only leads to optimized learning but also provides the opportunity to align educational outcomes with the health needs of the populations served. The benefits of competency-based education can only be realized when transitions between phases are based on attainment of competencies rather than time.

Actionable Recommendations

1. Accreditors, regulators, certifiers, and educators in each health profession should examine and revise time-based policies governing transition points between phases of education. The internal programmatic logistics of time variability, in which a learner progresses from one phase to the next phase of structured training at an individual pace, may be daunting. This is especially true when education and service are inextricably linked. Other barriers that must be mitigated include inflexible financial models that are time bound (e.g. financial aid, tuition, stipends, etc.) and current National Resident Matching Program rules for physicians, which require a fixed time and process for transition from undergraduate to graduate medical education and from residency to fellowship.

   Experiments with an alternative "transition-to-practice phase" are underway at Queen's University in Ontario and may allow a more logistically manageable model of time variability. In this environment, learners who have been entrusted to perform the required activities of their profession enter a transition phase, which ends at the previously scheduled training completion date. During the transition phase, certification or licensing examinations are held. Learners are allowed to become certified and credentialed, increasing their clinical responsibilities as well as their supervisory and teaching roles. Patients and junior learners benefit from their experiences, the institution realizes greater reimbursements, and those in the transition-to-practice phase benefit from remote supervision in a supportive environment before facing autonomous practice.

2. Learners should be active navigators of the education, training, and practice continuum, with institutional support to develop the skill sets needed to follow their individual career roadmap. In a competency-based, time-variable educational environment, learners are expected and empowered to own their learning and assessment and to be actively involved and invested in working to ensure that faculty in current and subsequent learning experiences or environments are aware of and invested in helping them to build on strengths and fill identified gaps. Alignment along the continuum provides the opportunity to use many of the same assessment tools and strategies throughout all phases, providing each learner with a trajectory of performance over time.

3. Health professions education programs and the clinical institutions in which learners train should prioritize continuity between faculty and learners within each educational phase as a guiding principle critical to professional formation. Longitudinal assignment of students to faculty and clinical sites provides the time learners need to practice and fosters the trust in their supervisors that learners need to seek and accept assessment and coaching. The longitudinal, integrated clerkship (LIC) for medical students is one example of such an experience. LICs engage learners in prolonged clinical learning experiences organized around the principle of continuity with patients as well as faculty. Nursing and pharmacy students who participate in immersive clinical experiences over a period of time are likely to see similar advantages with assessment and coaching. Longitudinal coaching relationships may provide an alternative strategy for continuity. The coaching role is one in which faculty work frequently

with a group of students across their formal educational program to provide ongoing observation, formative assessment, and advice to learners to support their competency development. Coaches may collect and incorporate data about their learners from other health professionals (e.g., supervisors of the student during a clerkship) to support accurate assessments.

4. Leaders of health professions education and their accrediting agencies should develop and implement an ethical and transparent governance system for sharing learner performance data that supports the development of learners and the safety of patients. Data sharing on individual performance promotes seamless educational transitions to help learners optimize their learning and supports appropriate decisions about supervision to safeguard the quality of patient care. To earn and maintain the public trust, the education and health care systems must be transparent with regards to the data they collect on the performance of their learners, the level of evidence used by faculty and program leaders to determine learner progression, the information provided to future employers about health professions students and trainees, and the clinical outcomes associated with learners when they are engaged in clinical practice. There should be a priori agreement between the learner and the oversight body on the core nature of the information that will be transmitted.

5. Licensing bodies should collaborate with certification boards to streamline processes for initial licensing, re-entry, and re-training, and facilitate the continuous and meaningful assessment of ongoing learning and improvement over a health professional's career. Practice is a time for informal transitions, career evolution, and continuous professional development. Strengths and gaps from the prior phase should set the initial agenda for this phase. Maintenance of needed knowledge and skills as well as acquisition and application of new knowledge and skills will need to be addressed throughout the span of a professional career. Standardizing licensure processes and repurposing learning activities and their documentation will streamline the burden for learners, educators, and accreditors.

6. Federal and philanthropic dollars should be allocated to support the design and conduct of implementation studies that track a cohort of learners from various health disciplines through phases of education and training into practice to determine the effects of transmitting core information about the learner from one phase to the next. Such studies may take a qualitative approach that examine 1) the impact on a learner's performance trajectory and self-efficacy; 2) how a program responds to the information received to benefit the learner; and 3) any unintended consequences.

Recommendation III: Implement a Robust Program of Assessment

Leaders in health professions schools and their health care system partners should champion, develop, and implement a program of assessment that supports competency-based, time-variable training and explicitly links educational programs to improved health care outcomes.

The assessment of students, trainees, and clinicians in practice should occur in a reliable, transparent manner and the tools and processes used to determine learner competence should be sound. Moreover, the program of assessment should be feasible, valid, reliable, dynamic, and acceptable to all stakeholders. Continuous improvement of the program of assessment requires analysis of data obtained during assessment activities across the career of health care professionals in relation to care that they deliver and health care outcomes of the systems in which they work.

Actionable Recommendations

1. Students, trainees, and clinicians in practice should embrace a systematic approach to assessment that aligns with desired outcomes from both the educational system and the clinical delivery system. Opportunities for learning should align with these desired outcomes so that the health care system is a partner in the educational mission. The program of assessment should incorporate rigorous methods along with valid and reliable tools that provide longitudinal, quantitative, and qualitative data related to learners' development and progression. Whenever possible, metadata from learning management systems and EHRs should be incorporated. For example, demographic data about patient mix, different diagnoses encountered, preventive services offered, and average patient length of stay on different rotations could be used to guide curricular changes, help determine whether a set number of encounters are needed to determine competence, and demonstrate the value that learners contribute in the health care delivery system.

2. Leaders in health professions education should ensure that assessment is optimally supported. This should entail fostering the development of a subset of faculty with specialized knowledge and skills related to competency-based, time-variable learning and assessment. Faculty expertise will be required in multiple roles, such as academic coaching and direct observation, together with the provision of meaningful, daily feedback in clinical settings. Faculty with skills in new areas, such as interpreting performance dashboards containing information from multiple sources and determining readiness for entrustment, will also be needed. These dashboards should contain longitudinal data about a learner's progression toward pre-determined educational outcomes.

3. Leaders in health professions education must ensure that multi-modal, longitudinal performance data are collected and tracked to monitor trends as learners progress along performance trajectories through a variety of classroom, simulation, and practice settings. The focus of assessment must shift toward frequent formative assessments for learning that support learners as they prepare for more formal summative assessments of learning. Performance dashboards and learning outcomes should be accessible to students, trainees, clinicians in practice, coaches, and instructors to help

customize learning. The need for additional time for a given learner to master a set of competencies should be viewed as a normal part of the process rather than an indication of failure. Learner assessment should always be competency-driven and criterion-based. Traditional grading scales should be eliminated as they may foster among learners the appearance rather than the achievement of competence, as well as unhealthy competition, and may contribute to stress and burnout among learners at all levels.

4. Students, trainees, and health care professionals should take active rather than passive roles in their own learning (i.e., co-produce). Engaged learners willingly take on their professional responsibility to seek assessment that will improve their competence in delivering care in a compassionate and competent manner. Learners across the health professions and along the continuum should actively seek opportunities for guided reflection (e.g., with a mentor) to assess their own performance dashboards, obtain feedback, participate in deliberate practice, and co-produce plans to learn. Learners must accept that a commitment to high-quality patient care means that advancement can only occur once they demonstrate sufficient competency, regardless of the time they have spent on an activity. Conversely, once a learning outcome, competency set, or entrustment is achieved, learners must be allowed to use acquired skills to consolidate learning and further develop their abilities.

5. Leaders in health professions education and faculty should commit to program evaluation using strategies based in implementation science and continuous quality improvement to monitor the effectiveness of the program of assessment, including the quality of learners' performance data. Transparent and defensible data about individuals, interprofessional teams, and the program of assessment itself should be used to inform decisions about curricular architecture, individualized learning plans, and learner progression.

6. Leaders in health professions education should study the effectiveness and outcomes of programs of assessment and disseminate their findings to the broader health professions community. Specific areas of research related to assessment of learners in competency-based, time-variable health professions education should include the following: identifying important characteristics (of individual learners, of interprofessional teams and cohorts, of faculty and coaching approaches, etc.) that affect learner progression; examining how educational program design (flexibility, time variability, interprofessional collaboration, support mechanisms, assessment models, etc.) affects learner and patient outcomes; and clarifying the costs associated with implementing a robust program of assessment.

Recommendation IV: Enabling Technologies

Health professions education and health care delivery institutions should develop and use enabling technologies in the implementation of competency-based, time-variable education throughout the professional education continuum of the practitioner.

To successfully implement a competency-based, time-variable health professions education or training initiative, it will be essential to use existing and create new technological systems, platforms, and tools geared toward a different kind of learner-educator relationship and an environment of continuous, frequent, longitudinal assessment. New technologies will need to interface with EHR systems to facilitate both learning and assessment. These technologies must address new approaches toward rapid, mobile, seamless tools that support administrative processes (e.g., student matriculation, tracking student assessment, predictive analytics, and communities of learning) and instructional needs (e.g., digital information and knowledge acquisition, enriched experiential augmentation through holographic manikin simulation and virtual reality, and telemedicine technologies). In addition, the development of transportable e-portfolios to support lifelong, competency-based learning will be necessary as learners assume active responsibility for their own learning.

Actionable Recommendations

1. Competency-based, time-variable health professions learning environments will require new and enhanced technologies and systems, both administrative and instructional. Administrative technologies will be needed to facilitate the management and tracking of a more complex student-learning experience that includes admission, registration, graduation, and transition tracking throughout the learner's professional career. These technologies must be capable of supporting documentation of academic progress for learners who will not be matriculating through a traditional semester-based academic structure. Institutions will need to move toward a more flexible accounting system that will recognize the diminished role of the credit hour and normative grading for tracking student progression. New transcript models will need to be developed to document competency acquisition rather than course hours and grades. Creating technologies and software solutions that will support student learners and educators throughout their transitions will be essential, particularly to support real-time student and resident development and assessment.

2. The creation and implementation of new instructional technologies will become increasingly important to support the learner in a competency-based, time-variable curriculum. Educational technologies should make curriculum and learning assets continuously available to learners to facilitate flexible pacing toward mastery. Tools that support continuous learning and just-in-time assessment and feedback will need to be more flexible, accessible, and easier to navigate if they are to enable student learning in a new, more complex environment. These technologies will be needed to support a wide range of instructional objectives including, but not limited to, the following:

    a. creation and implementation of mobile software to support and

enrich foundational knowledge acquisition;

b. development of holographic manikin simulation and high-fidelity virtual reality technology to accelerate experiential learning; and

c. incorporation of distance education and telehealth strategies to facilitate didactic and experiential learning by professionals enrolled in formal educational programs and engaged in practice-based learning, regardless of their location.

3. Health professions educational institutions should develop strategic partnerships and collaborations in the form of consortia that will facilitate the creation and sharing of novel and interoperable platforms and tools to aggregate relevant performance data from multiple sources on individuals, groups of individuals, and programs. There is a paucity of commercially available solutions to support competency-based, time-variable curricula. Strong commitment from institutional leadership is essential to create demand at scale to generate commitment from vendors and others to develop flexible, responsive technology that supports competency-based, time-variable education. These tools need to be developed in a manner to amplify interprofessional activities of learners and educators while maintaining the highest level of data stewardship. Current challenges to data stewardship include compatibility and interoperability between solutions and data, the limitations of privacy laws, ethical concerns around data sharing, and discoverability of data. Data stewardship must include flexible means for stakeholders to opt-in and opt-out of data sharing, such as longitudinal tracking of learners, faculty, and patient records.

4. Consortia of health professions educators and institutions, technology experts, and data scientists should create, develop, and deploy rapid, real-time assessment tools using hand-held and mobile technologies. Mobile technologies can provide learners with immediate assessment feedback and educators with rapid and efficient mechanisms to track and evaluate learner progress throughout the learning continuum. These tools must be integrated with data analytic systems that will enable a continuous assessment of learners as they progress through the various transitions of clinical learning and practice environments within urban and rural settings. Further, these robust tools must enable learners to connect continuously, including within interprofessional practice environments.

5. Academic institutions will need to encourage and support educational scholars and data scientists to investigate the use of data analytics to assist in planning educational trajectories for different students. It is essential to capture critical information and data from students and educators to support learners and educators throughout the learning process. From the point of admission, learners' data can be used to anticipate opportunities to enhance learning and mitigate challenges to optimize performance. These analytics will be necessary to individualize the educational experiences of our learners.

6. Digital learning communities should be developed to support learners and educators. These digital homes will facilitate the sharing of best practices associated with learners and educators within and among the health professions to

accelerate learning within the didactic and experiential settings. The creation and sharing of learning platforms, including e-portfolios to support longitudinal training throughout the learner's lifetime, will facilitate integrated, interprofessional training.

Recommendation V: Outcomes Evaluation

Competency-based, time-variable health professions education programs should be designed, implemented, and evaluated in relation to preparing their graduates to advance important societal goals, including improved patient care and improved practitioner performance and satisfaction.

Competency-based, time-variable health professions education is a transformational approach to both education and health care. With a relentless focus on achieving desired care outcomes, each stage of a health care professional's education, training, and career is linked by a set of competencies aligned across the continuum. The continuity of focus catalyzes the development of a cycle of continuous improvement, where educational outcomes are linked to and influenced by societal goals for health care outcomes. Achieving this will require all to commit to a guiding principle of transparency, establishing patient registries for learners as well as practitioners, and multi-directional exchange of outcomes data to ensure accountability of the system in meeting both educational and health care outcome goals. Learners should be able to review their performance on all types of assessment instruments. Faculty should be able to review feedback on their instructional effectiveness as well as on how learners they assessed performed at the next level of training and/or in practice. Leaders in health professions education should provide accurate information to those who work with learners following a transition, such as from graduation to residency. Employers should provide data back to the educational programs that participated in the training of their employees.

Actionable Recommendations

1. Leaders in competency-based, time-variable health professions education programs should employ rigorous program evaluation models that track individual and aggregate competency development trajectories and outcomes. These models must include data on learner performance before and after critical transitions between institutions and phases of education and career to measure the effectiveness of a program's system of learning and assessment.

2. Health professions education programs should track educational metrics and associated outcomes of individual learners that reflect the essential competencies needed to meet societal needs for high-quality health care. This tracking includes standard outcomes measures such as licensing, board certification, and maintenance of certification. Achieving this recommendation will also require development of new strategies to measure important but difficult to assess competencies related to the following professional commitments:

    a. To support the well-being of patients and populations;

    b. To partner with patients and with colleagues from other professions to optimize health and health care;

c. To remain ethical and professional in work habits and relationships, and

d. To engage in continuous learning throughout one's career using reliable external assessments of personal performance to inform learning plans and continuing education.

3. Health care institutions that sponsor health professions education should track outcomes relevant to a high-performing health care system to ensure that the competency-based, time-variable educational programs are addressing critical societal needs. Specific outcomes that should be measured include the following:

    a. Patient outcomes that can be correlated with a health professional's educational preparation (known as educationally sensitive patient outcomes), such as health literacy and active participation in care;

    b. Health system outcomes related to the Quadruple Aim, including quality-of-care standards, patient experience measurements, population health costs of care, and measures of health professional well-being; and

    c. Health professions workforce outcomes such as diversity and inclusivity of the health professions workforce and distribution of health professionals to optimize access to all people.

4. Accreditors of health professions educational institutions and organizations should develop organizational standards that support effective competency-based education. Critical standards should focus on the following:

    a. Ensuring the adequacy of resources to support faculty development and faculty time spent in assessment and learning responsibilities.

    b. Demonstrating that faculty success is assessed using promotion and tenure processes that equally value and recognize excellence and impact in education, research, and clinical care.

5. Public and private partnerships should chart the course of and fund a national research agenda on competency-based, time-variable health professions education. Quantitative and qualitative methods should be used to conduct research in two general areas: 1) process studies at both individual and program levels; and 2) defining outcomes that are both proximal and distal to the learning experiences. Examples of areas in need of further study include the following:

    a. The entrustment decision-making process and the impact of entrustment on learning and care at the individual and program levels;

    b. Barriers to the implementation of competency-based, time-variable education, including issues related to feasibility, fidelity, and acceptability;

    c. Economic issues relevant to the conduct of competency-based educational programs; and

d. Relationships between program inputs (such as human resources and technology), processes (such as organizational policies and curricula), and outcomes at individual and programmatic levels (individual outcomes should include a comparison of learners in competency-based, time-variable programs vs. traditional educational programs).

Conclusion

Improving health and health care will take more than redesigning the health care delivery system. It also requires changing the way those who work in that system are educated and trained. The Macy conferees strongly believe that this will require adopting a competency-based, time-variable educational model for health professionals across the continuum of their careers. In this model—which benefits learners, educators, practitioners, and patients—time becomes a resource rather than a restriction. Implementing such a model will take leadership at all levels, the development of a robust program of assessment, a commitment to research and innovation, a shifting of culture toward co-producing education, and resources devoted to education and educational research. In the end, we believe health professionals will be better prepared to meet patients' needs and more satisfied in their chosen careers. Health care will be more efficient and of higher quality, and society will be healthier.

The conclusions and recommendations from a Macy conference represent a consensus of the group and do not imply unanimity on every point. All conference members participated in the process, reviewed the final product, and provided input before publication. Participants are invited for their individual perspectives and broad experience and not to represent the views of any organization.

The Josiah Macy Jr. Foundation is dedicated to improving the health of the public by advancing the education and training of health professionals.

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CONFERENCE RECOMMENDATIONS

JUNE 14–17, 2017 | ATLANTA, GA

Achieving Competency-Based, Time-Variable Health Professions Education

Recommendations from the Macy Foundation Conference