






# The power of interdependence: Linking health systems, communities, and health professions educational programs to better meet the needs of patients and populations

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## ABSTRACT

Promoting optimal health outcomes for diverse patients and populations requires the acknowledgement and strengthening of interdependent relationships between health professions education programs, health systems, and the communities they serve. Educational programs must recognize their role as integral components of a larger system. Educators must strive to break down silos and synergize efforts to foster a health care workforce positioned for collaborative, equitable, community-oriented practice. Sharing interprofessional and interinstitutional strategies can foster wide propagation of educational innovation while accommodating local contexts. This paper outlines how member schools of the American Medical Association Accelerating Change in Medical Education Consortium leveraged interdependence to accomplish transformative innovations catalyzed by systems thinking and a community of innovation.

## KEYWORDS

Community-based education; interprofessional education; value-added roles; team-based health care; systems thinking

## The need for interdependence and reform

The concept of interdependence in medical education and health care is multi-faceted, with multiple contextual variations. The Lancet Commission on Education of Health Professionals for the 21st Century (Frenk et al. 2010), argues that to better meet the needs of patients and populations, educational reform must be viewed from a systemic perspective:

The Commission adopted a global outlook, a multiprofessional perspective, and a systems approach. This comprehensive framework considers the connections between education and health systems....By interaction through the labour market, the provision of educational services generates the supply of an educated workforce to meet the demand for professionals to work in the health system. (Frenk et al. 2010)

They argue that transformative educational reform 'should be systems based' and will require that 'all health professionals... be educated to mobilise knowledge and to engage in critical reasoning and ethical conduct so that they are competent to participate in patient and population-centred health systems as members of locally responsive and globally connected teams' (Frenk et al. 2010).

The systemic, interprofessional focus of the proposed educational reforms aims to foster both interdependence and transformative learning via three fundamental shifts: 'from isolated to harmonised education and health systems;

## Practice points

- Embracing the interdependence of health professions educational programs with health systems and the communities they serve is necessary to advance needed transformations of medical education.
- Educational programs should collaborate with community leaders to identify and develop interprofessional educational initiatives that promote the development of critical competencies in learners while providing sustainable solutions to community needs.
- Educational programs should collaborate with health systems leaders to identify and develop novel roles for learners that add value to both the process of care delivery and to the learners' education.
- Educators should foster their own skills in systems thinking and apply these principles to generate creative solutions to challenges in health professions education.
- Collaboration among health professions education programs, with sharing of strategies and resources, can accelerate the propagation of needed transformation across the globe.

from stand-alone institutions to networks, alliances, and consortia; and from inward-looking institutional preoccupations to harnessing global flows of educational content, teaching resources, and innovations' (Frenk et al. 2010).

The implications of such systemic framing of medical education offers a tantalizing shift. Current reductionist approaches train individuals within disciplinary silos and assume that having each expert impart their narrow expertise somehow collectively leads to functional systems that produce high quality care. In contrast, a systemic, interprofessional approach has great potential to develop an interdependent workforce that engages in the work of education, health care, and service to communities in a more synthetic manner. This allows for a focus on the health of whole people, families, and communities, which is fundamentally necessary to achieve equity in community health. An educational system that fosters shared learning across multiple professions, in settings that include but transcend hospitals, can create an interdependent workforce able to foster community health and tackle complex problems such as health inequities, unsustainable waste of resources, and fragmentation of care that leads to great cost and poor outcomes.

To optimize outcomes, health professions education programs must foster interdependence and strengthen relationships with communities, with health systems and with other health professions education programs.

### **Fostering interdependence: The AMA Accelerating Change in Medical Education Consortium**

Achieving systemic transformation requires investing in relationships with communities, health systems and interprofessional colleagues to develop trust and a shared vision that enables necessary collaboration and reappropriation of resources. Those processes allow each organization to move from an isolated position toward the collective goal of creating a workforce readily prepared to address 21st century problems and to reimagine a health system grounded in equity.

In 2013, the American Medical Association (AMA) launched the Accelerating Change in Medical Education initiative to spur transformation in medical education (Skochelak and Stack 2017), awarding 5-year grants of \$1 million each to 11 medical schools answering the call to foster competency-based individualized educational pathways, trainee competency in health systems, and improvements in the learning environment. Recognizing the powerful role of interdependence in achieving transformation, the AMA gathered these schools into the Accelerating Change in Medical Education Consortium to share struggles and successes. The consortium was later expanded via more modest grants to include more schools and has incorporated graduate medical education programs. This paper reports activities of the 32 medical school members during in the initial five years of the initiative.

The AMA recognized the need to 'overcome the constraints of individual institutions and expand resources in knowledge, information, and solidarity for shared missions' (Frenk et al. 2010), and created the consortium as a synergistic collaborative space where a community of medical

education leaders share, learn together, and ideate on the future of medical education. Building cross-institutional trust and relationships and sharing raw stories of successes and challenges propelled efforts at consortium member institutions to improve the alignment of medical education with the needs of patients and communities. The degree of trust and transparency among consortium members and their willingness to engage institutions beyond the membership reflects a prioritization of interdependence and a value for systems-level change (Lomis et al. 2020).

### **Interdependencies addressed by the consortium**

Frenk et al. argue that reforms must occur at both the instructional and institutional levels. While addressing interdependence leads to instructional reform, it relies upon institutional reform as the primary driver. The work described in this article focuses on institutional strategies to promote alignment between education, the community, and the health system. Collaborative learning and practice among health professions is a critical enabler of transformation (Figure 1).

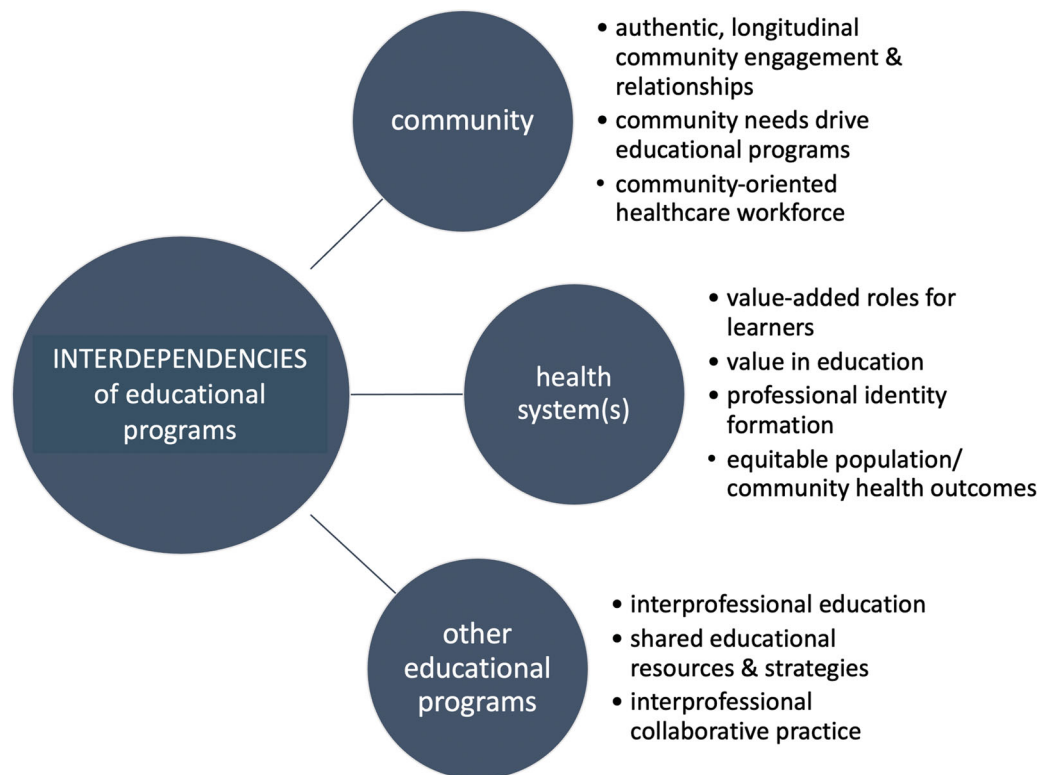
The following examples highlight community and systems grounded reforms at and among consortium member institutions as a starting point for envisioning even more systemic, interdependent, and interprofessional innovations. These reforms hinge on fundamental shifts in medical education that result in an equity-oriented health care workforce prepared to care for diverse populations and communities in addition to individual patients. Interdependence among the educational programs of the consortium fosters propagation of change beyond isolated programs.

### **Strengthening interdependence with communities**

Traditional U.S. medical education occurs predominantly within the confines of a university and hospital system(s). Equipping the workforce to promote equity, impact population health, and be agents of health systems transformation requires training in non-traditional medical education environments. Engaging the community, in which the vast majority of health-promoting activities occur, is necessary in the design of educational innovations (Gullett et al. 2022).

### **Exemplars in interdependence with communities**

The Florida International University Herbert Wertheim College of Medicine Green Family Foundation Neighborhood Health Education and Learning Program was conceived as a system-community-education model and relies upon ongoing guidance from the communities served. This program focuses on the social and behavioral determinants of health to provide a longitudinal and interprofessional service-learning experience. Interprofessional teams, including students of medicine, nursing, social work, physician assistant, education, and law, provide household-centered care. Mobile health centers enable the delivery of primary and behavioral health services, including screening mammograms, facilitating access to care for uninsured household individuals and decreasing emergency department visits for non-urgent issues. Through participation in



**Figure 1.** Interdependencies of educational programs addressed by the AMA Accelerating Change in Medical Education Consortium.

NeighborhoodHELP, students learn to identify, measure, track, and manage social determinants of health at the household level. The impact of interprofessional team activities on long-term health outcomes of community members is tracked for ongoing tailored interventions, process quality improvement, and institutional accountability (Greer et al. 2018).

The University of Texas Rio Grande Valley School of Medicine has a steadfast community commitment, including the advancement of the quality and accessibility of patient care by engaging with the surrounding community of the Rio Grande Valley. Early initiatives with community leaders and outreach efforts, particularly within these marginalized vulnerable groups, helped to build trusting partnerships with the academic institution. Students join interprofessional provider teams – including physicians, nurses, advanced practice clinicians, pharmacists, medical assistants, social workers, clinical psychiatrists, and community health workers – to support colonias, largely impoverished neighborhoods that fall outside of city limits and lack basic public services (Manusov et al. 2019). In particular, students are trained in novel uses of technology to support communication, ongoing information exchange, and empathetic interactions with individuals and diverse groups in multiple contexts for numerous health care delivery purposes, including disease prevention.

The A.T. Still University's School of Osteopathic Medicine in Arizona (ATSU-SOMA) has a public service mission to 'prepare individuals through high-quality, innovative, learning-centered undergraduate and graduate medical education programs to become compassionate osteopathic physicians and health care leaders who serve medically underserved populations with a focus on research and community-oriented primary care'. ATSU-SOMA exemplifies the importance of and value from intentional collaboration

and coordination between health systems, communities, and educational programs. In collaboration with the National Association of Community Health Centers, ATSU-SOMA students spend the last 3 years of medical school training at community partner sites. This contextual training model embeds students within a health care system to engage in the social, economic, and medical needs of patients and communities while becoming part of the communities served by the health centers. Additionally, the ATSU-SOMA hometown scholars program allows potential applicants from partner health center communities to be sponsored in medical school. This forward-thinking program, focused on students underrepresented in medicine, helps communities develop their next generation of health care clinicians to be community-minded healers.

### Strengthening interdependence with health systems

Frenk et al. call for an expansion from traditional academic centers to academic systems that immerse learners in the broader clinical context. Consortium members have collaborated to apply lessons from the health system to medical education. Health systems in the U.S have had an increasing focus on value: the relationship between the quality of care, the patient's experience of care, and cost. The Quadruple Aim expands the call for better care outcomes, better patient experience and lower costs by adding an emphasis on improving the experience of care providers to ensure sustainability (Bodenheimer and Sinsky 2014). Strengthening interdependence with health system partners is essential to create meaningful value-added roles for health professions students to contribute to the health system (Gonzalo et al. 2017), while imparting an experiential

understanding of upstream drivers of health inequities and enhancing the value of education itself.

## Exemplars in interdependence with health systems

### *Value-added roles for learners*

Both Penn State College of Medicine and Case Western Reserve University School of Medicine employ a medical student patient navigator program that has created value-added roles for learners on patient care teams. This longitudinal experiential learning is integrated with core health systems science curricular content. Penn State College of Medicine launched this approach in August 2014 with its Systems Navigation Curriculum (SyNC) which combines a course in the science of health systems with an immersive experience as a patient navigator. The curriculum integrates core systems sciences such as health policy, high-value care, and population and public health with two threads related to evidence-based medicine, along with teamwork and leadership training throughout seven modules.

The Case Western Reserve University School of Medicine patient navigator program partners first-year medical students with either a veteran or newly arrived refugee family in patient-centered medical homes (Gullett 2021). Student placements occur immediately following the first block of medical school which serves as the foundational health systems science course covering population health, determinants of health, health systems, epidemiology, quality improvement, bioethics, and patient-centered care (Singh et al. 2021). Student navigators serve in the role for a year, partnering with patients to navigate the health system and address social determinants of health in pragmatic ways. This program is made possible through long-standing relationships with Neighborhood Family Practice, a federally qualified community health center, and the Cleveland Veterans Affairs Medical Center.

Student navigators experience the health system in a way that was otherwise not included in medical training. This perspective enlightens their subsequent clinical interactions and contributions to health systems and enhances the educational experience by strengthening students' sense of purpose (Gonzalo et al. 2018; Starr et al. 2019).

### *The value of education*

The University of Utah School of Medicine has extended this value conversation to examine the value of educational programs. Frenk et al. noted that the U.S. investment in medical education made up < 2% of total annual health care spending. Additionally, the U.S. has seen rising rates of indebtedness for medical school graduates, with the average indebtedness in 2016 estimated at \$190,000 (Youngclaus et al. 2017). Recognizing these factors as a call to critically appraise value in education, the team adapted a data-aggregation tool to create an education model that emphasizes cost reduction and connects education to patient-related outcomes. The goal is to increase the value of training medical students while reducing related costs. The initial focus was to understand the cost of medical education, then to explore the desired learning outcomes

(i.e., quality) as perceived by various stakeholders. Ongoing work aims to integrate the cost and quality components to propose relevant measures of value for medical education. As an example, this effort has led the institution to reform undergraduate medical education funds flow, consolidating the delivery of the educational program to a core group of expert educators.

## Strengthening interdependence among educational programs

Frenk et al. called for the bold transformation of medical education through cross-sector linkages and encouraged institutions to abandon acting in isolation in favor of creating 'flows of educational content, teaching resources, and innovations' (Frenk et al. 2010). To accomplish needed innovations regarding interdependence with communities and with health systems, interdependence among educational programs emerges as a powerful enabler.

Interprofessional education and collaborative practice are critical interdependencies. It should be noted that the community and health systems interventions described previously in this manuscript rely upon interprofessional approaches to optimize education and value. Several consortium institutions strengthened a sense of shared ownership across health professions educational programs and secured additional funding to extend interprofessional training efforts within their own institutions.

## Exemplars in interdependence among educational programs

The additional exemplars described here leverage novel technological platforms in support of interprofessional training and competencies.

The University of North Dakota School of Medicine and Health Sciences recognized that geographic isolation remains a key challenge for rural education, both from professional and personal perspectives. Remote vulnerable communities in the state suffer limitations in health care access, including challenges with health system resources and specialty care. Information technology (IT), such as telehealth, can play an important role in ameliorating the effects of distance and strengthening interdependence. Noting the potential for 'deploying the power of IT to ease professional isolation' (Frenk et al. 2010), the University of North Dakota developed the Remotely Operated Biomedical Telepresence Simulations (ROBOTS) program to prepare its students to address these concerns. The program is comprised of three interconnected longitudinal simulations demonstrating interprofessional care of chronic disease via telemedicine to provide continuity for patients in rural settings. In the first simulation, medical and nursing students assist remotely in the treatment of a patient with a myocardial infarction in a rural emergency department. In the second simulation, the patient has been discharged to her hometown and medical, physical therapy, occupational therapy, and nursing students conduct a remote home health assessment conference with the patient and her husband. In the third scenario, after the patient has moved to a long-term care facility and her health has deteriorated, those professions are joined by social work

students who engage remotely in an interprofessional discussion with the patient's daughter regarding advanced directives. Leveraging such technological advances to enhance interdependency across sites and professions requires training in new communication techniques to maintain patient-centeredness and to foster best practices (e.g. situational awareness, workload/resource management) when working remotely.

Indiana University School of Medicine collaborated with its partner, the Regenstrief Institute, to create a teaching electronic health record (EHR) using de-identified and mis-identified real data on more than 10,000 patients collected from a system used throughout the state. Students in medicine, nursing, pharmacy, and dentistry are using this teaching EHR, the Regenstrief EHR Clinical Learning Platform, to learn how to navigate records and practice key EHR functions. They access the system to participate in case-based learning using authentic clinical scenarios. The Regenstrief Institute elected to share the platform, seeking input of users across professions and across schools to enhance its development, demonstrating interdependence of educational programs across institutions. The Regenstrief EHR Clinical Learning Platform has been successfully adopted at 12 health professional, public health, and health information technology schools, with over 11,800 unique student users (Takesue et al. 2021).

Eastern Virginia Medical School and the University of Connecticut School of Medicine recognized the potential of this system to embed authentic social determinants of health into cases. The schools collaboratively designed programming around virtual families that highlight patient- and family-centered, cost-conscious care for the unique needs of the elderly and those with multiple chronic conditions, as well as a host of structural and social determinants of health. The collection of virtual families is designed to be diverse with regard to age, gender, sexual orientation, ethnicity, race, culture, belief system, literacy level, socioeconomic status, and geography. Variables introduced include Veteran Affairs, family dynamics, financial turbulence, health equity, roles within a care delivery team, access to community resources, interactions of organizations, and complexities of care in specific patient populations.

These technological platforms demonstrate to students the interdependence between communities, health systems, and health professions education.

## Catalyzing conditions to optimize interdependence

### Systems thinking

The Accelerating Change in Medical Education initiative was designed to tackle challenges in medical education using a systems approach. Members of the consortium collectively gained expertise in systems thinking through concomitant work on enhancing physician training in health systems science – how health care is delivered, how health care professionals work together to deliver that care, and how the health system can improve patient care and health care delivery (Skochelak et al. 2020). As members collaborated to develop ways of teaching concepts of systems thinking to prepare learners for complex systems of

health care, they came to recognize parallels to medical education as a component of that complex system.

Traditionally, medical education often fails to conceptualize itself as part of a dynamic system. It can suffer from siloed disciplines and isolated institutional strategies. Although many medical curricula have revised the presentation of foundational content to a systems-based presentation, ironically, many educational programs have yet to fully embrace the complex, dynamic interrelationships of medical education and the health care system writ large. Many educational organizations acknowledge the importance of innovations like those described in this manuscript but may become overwhelmed by the logistical issues required to implement them with fidelity.

One model of training in systems thinking that has been applied by members of the consortium derives from the Waters Center for Systems Thinking. Their habits of systems thinking are useful for teaching students and are also highly relevant to educators creating and sustaining interdependent innovations: (1) seek to understand the big picture, (2) observe how elements within systems change over time generating patterns and trends, (3) recognize that a system's structure generates behavior, (4) identify the circular nature of complex cause and effect relationships (feedback loops), (5) consider accumulations and their related rates of change, (6) make meaningful connections within and between systems, (7) consider how mental models affect behavior, and (8) employ system structure to identify leverage points and solutions (Waters 2021). We advocate that educators leverage systems thinking to design and deliver optimal educational programming within and across institutions (Gonzalo et al. 2019).

### An interdependent community of innovation

The consortium was intentionally designed to promote interdependence by fostering a community of innovation. The investment of resources was certainly important, given that there are relatively few large grant programs focused on innovation and research in medical education (Gottlieb et al. 2019). Yet members cite the greatest strength of the consortium rested in a sense of collective problem-solving that was actively promoted via the transparent exchange of stories of success and failure and the sharing of educational resources among schools. Through a carefully designed infrastructure and culture, the consortium has provided a space for each member school to innovate in the quest to radically change medical education to meet the needs of diverse communities where personal and population health can flourish. Frenk et al. called for medical education institutions to be part of:

...regional and global consortia...as a part of institutional design in the 21<sup>st</sup> century, taking advantage of information and communication technologies. The aim is to overcome the constraints of individual institutions and expand resources in knowledge, information, and solidarity for shared missions. (Frenk et al. 2010)

Perhaps most significantly, the interdependent orientation of the consortium has enabled change well beyond its membership. Consortium members reported engagement in more than 600 consultations involving over 250 unique institutions, providing guidance for how other institutions can accomplish

educational transformations (Lomis et al. 2020). Although the consortium targeted schools in the United States, there has been increasing connectedness on a global scale, with sharing of resources and strategies across continents.

## Conclusion and future directions

Interdependence is a critical consideration to advance needed transformation of medical education. Strengthening the relationships among health systems, communities, and health professions educational programs is necessary to better meet the needs of patients and populations.

Ongoing work is needed to fully achieve the transformations needed to support health equity. The shared goals of creating an equitable health system and guiding the health professionals who serve in it to act as systems thinkers and change agents can only be realized through an acceptance of deep interdependence within the context of a complex, currently fragmented system. This is more than a mental model – it requires a fundamental shift in how health professionals and educators view their roles within the health care system. There has rarely been a time in history that calls for more immediate action in fostering equity than now. Educational institutions must publicly identify equity as a shared value with cross-sector partners, forging sustainable, long-term relationships grounded in trust and mutual respect with communities, health systems, and interprofessional educational programs. This, in turn, requires significant shifts in curricular design and assessment to reflect these outcomes. Leveraging technology will accelerate collaboration in training across the medical education continuum.

Until the great mass of the people shall be filled with the sense of responsibility for each other's welfare, social justice can never be attained. That is why networking between like-minded socially-committed individuals and groups have been key drivers for social equity through reform of professional education. (Frenk et al. 2010)

The consortium's value for and deliberate strengthening of interdependence serves as a catalyst for scalable interventions across a variety of health professions that have the potential to foster equity for the next generation.

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