

# A Constructive Reframing of Student Roles and Systems Learning in Medical Education Using a Communities of Practice Lens

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## Abstract

Health systems are in the midst of a transformation that is being driven by a variety of forces. This has important implications for medical educators because clinical practice environments play a key role in learning and professional development, and evolving health systems are beginning to demand that providers have “systems-ready” knowledge, attitudes, and skills. Such implications provide a clear mandate for medical schools to modify their goals and prepare physicians to practice flexibly within teams and effectively contribute to the improvement of health care delivery.

In this context, the concepts of value-added medical education, authentic student roles, and health systems science are emerging as increasingly important. In this Article, the authors use a lens informed by communities of practice theory to explore these three concepts, examining the implications that the communities of practice theory has in the constructive reframing of educational practices—particularly common student roles and experiences—and charting future directions for medical education that better align with the needs of the health care system. The authors apply

several key features of the communities of practice theory to current experiential roles for students, then propose a new approach to students’ clinical experiences—value-added clinical systems learning roles—that provides students with opportunities to make meaningful contributions to patient care while learning health systems science at the patient and population level. Finally, the authors discuss implications for professional role formation and anticipated challenges to the design and implementation of value-added clinical systems learning roles.

**H**ealth systems are in the midst of one of the biggest transformations since the explosion of technology in the 1960s. This transformation is being driven by a variety of forces focused on reducing costs, improving patients’ experience of care and safety, managing health of populations, and preventing burnout among health care clinicians.<sup>1–3</sup> This has important implications for medical educators because clinical practice environments play a key role in learning and professional development, and evolving health systems are beginning to demand that providers have “systems-ready” knowledge, skills, and attitudes.<sup>4</sup> Such implications provide a clear mandate for medical schools to modify their goals and prepare physicians to practice flexibly within teams and effectively contribute to the improvement

of health care delivery.<sup>5</sup> In this context, the concepts of value-added medical education, authentic student roles, and health systems science are emerging as increasingly important.<sup>6–9</sup> In this Article, we will use a lens informed by communities of practice theory to explore these three concepts, examining the implications that the communities of practice theory has in the constructive reframing of educational practices—particularly common student roles and experiences—and charting future directions for medical education that better align with the needs of the health care system.

## Communities of Practice Theory and Relevance to Medical Education

Recommendations for medical education reform have emphasized higher-order learning skills, including a long-overdue redesign of immersive experiences in health care settings.<sup>10</sup> These reform efforts are influenced by a range of education theories that address student roles, tasks, enculturation into the profession, and professional role identity.<sup>11</sup> We suggest that communities of practice theory, as originally described by Wenger<sup>12</sup> and Lave and Wenger,<sup>13</sup> is especially important in

the current health care environment as a way to understand student learning experiences.<sup>11</sup> Communities of practice theory draws from social learning theory and focuses on a shift from merely “getting a job done” to knowledge management within a community.<sup>12,13</sup> Communities of practice are formed by groups of people who share a common set of problems and related solutions and who, through ongoing interactions, deepen their knowledge and skills.<sup>12,14,15</sup>

Communities of practice theory includes four key features that need to be considered in any discussion of experiential roles for medical students.<sup>12</sup> These include the following: (1) Who constitutes a given community, (2) what is the context of the learning experience within the community, (3) what domain of knowledge is operationalized within the community, and (4) what opportunities exist for students to legitimately participate and contribute in the community?

### Who constitutes a given community?

Traditionally, a community of practice has been identified as practitioners who engage in joint activities and discussions, help each other, and share information to learn with and from each other.<sup>12</sup>

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Community members must interact and learn together, although they may not have the same job or title, or work together on a daily basis. So ... who is the community for novice physicians? Traditionally, most would suggest that the community consists of peers, near-peers, residents, and more senior practicing physicians.<sup>16</sup> We suggest, however, that health care transformation has effectively recreated and expanded that community to a diverse collaborative of interprofessional providers, patients, and populations. Learning experiences must now allow for student engagement in this new community. Unfortunately, many medical schools continue with the traditional communities, which may negatively impact professional development in two ways: (1) It attenuates the potential for contextual learning and preparation for future practice, and (2) it disables a promising opportunity for meaningful immersive experiences in medical education.

#### **What is the context of the learning experience within the community?**

Effective experiential learning in health care is critically dependent on situating learning within the actual community or practice environment in a way that aligns a learner's goals with an ability to make legitimate contributions. Currently, early clinical experiences for students are limited, with a small number of hours dedicated to out-of-classroom experiences. When present, these experiences generally occur in clinical practice environments or community-based programs and services, including food pantries, health fairs, and homeless shelters. These community-based programs do not represent the clinical learning environments in which students will eventually practice as physicians. Because most physicians will be practicing in hospitals and primary-care and specialty-based clinics, we suggest that students' learning experiences should allow for an immersive engagement within these clinically based contexts.

#### **What domain of knowledge is operationalized within the community?**

A domain of knowledge includes formal and informal shared competencies and practice resources (tools, experiences, stories, methods for addressing recurring problems) that define a community of practice. This collective knowledge is

built over time. Previously, most would have agreed that for physicians, this domain was overwhelmingly focused on basic and clinical science knowledge and skills.<sup>17</sup> However, transformations in the practice of medicine, along with the rapid evolution of concepts and insights that do not fit tidily into the traditional biomedical perspective, are now demanding a reconceptualization of this domain of knowledge to include health systems science.<sup>6,18,19</sup> For example, the Association of American Medical Colleges' Core Entrustable Professional Activities for Entering Residency include the identification of system failures and contributing to a culture of safety and improvement, and the Accreditation Council for Graduate Medical Education includes systems-based practice as a core competency domain.<sup>20,21</sup> Educators, policy makers, and employers are all beginning to recognize that physicians need the knowledge and skills necessary to implement present and future health care transformations.<sup>6,20-23</sup> Just as education in clinical science requires complementary clinical experiences, education in health systems science requires meaningful workplace experiences.<sup>24,25</sup> Although efforts are under way to advance systems education, there remains a significant paucity of experiential roles to catalyze learning in this area.<sup>26-28</sup>

#### **What opportunities exist for students to legitimately participate and contribute in the community?**

Novices typically enter a community of practice through what Wenger<sup>12</sup> and Lave and Wenger<sup>13</sup> first termed legitimate peripheral participation.<sup>11</sup> The objective of legitimate peripheral participation is to allow access to the community and its culture, language, and values through small tasks that allow novices to legitimately move from peripheral to full participation. This gradually increasing participation allows for a learner's socialization into the medical profession. During World War II, acting internships were created to allow medical students to fill gaps in care left by men and women serving overseas.<sup>29</sup> Until the 1990s, routine tasks on hospital-based wards, such as dressing changes, blood draws, note writing, and other activities were performed by medical students.<sup>30</sup> Such peripheral participatory roles added value to the health system and provided students with authentic

roles in patients' care processes. Over the past several decades, however, there has been a steady decline in legitimate peripheral participation due to many factors, including increased regulation of services and changes in supervision and reimbursement.<sup>16,29,31</sup> Gone are the days when students could contribute through documentation, routine procedures, and decision making.<sup>19,21-23</sup> For example, despite specific recommendations for students to develop skills with the electronic health record and documentation, in recent years the Centers for Medicare & Medicaid Services have increased the restrictions placed on students' ability to contribute to clinical documentation, widening the divide between students' contributions and meaningful contributions to clinical care.<sup>32-35</sup> Today, students in both preclerkship and clerkship curricula enter clinical sites largely as outsiders linked with attending physicians and/or residents to learn doctoring skills (e.g., history taking, physical examination), professionalism, and key aspects of the doctor-patient relationship.<sup>29,36</sup> Students do still make contributions, but those contributions are typically ill defined or are often described vaguely as the student being a "great team player." Further, educating students in doctoring skills requires time by the educator—time that is frequently cited by practicing physicians as a burden that has a negative impact on clinical efficiency and productivity.<sup>37-41</sup> In this context, students often describe themselves as "fifth wheels."

#### **Current Experiential Roles for Medical Students**

Current student roles should be examined for their alignment with the key features of communities of practice theory, including the identification of who constitutes the community of practice, the context of the learning experience, the operationalized domain of knowledge, and opportunities for legitimate participation and value-added contributions. Using these key features, we have examined several common contemporary medical student roles (see Table 1 and below).

#### **Clinical preceptorships**

Currently, the most common experiential role in medical school is the

Table 1

**Characteristics of Current and New Experiential Learning Roles for Medical Students Based on the Key Features of Communities of Practice Theory**

Learning roles	Key features of communities of practice theory			
	Who constitutes the community?	What is the context of the learning experience?	What is the operationalized domain of knowledge?	What are the opportunities for legitimate participation and value-added contributions?
<b>Current</b>				
Clinical preceptorships <sup>42,43</sup>	Primarily physicians, also nurses, pharmacists, therapists, and patients	Clinical settings, including hospitals and primary-care- and specialty-based clinics	Patient care, knowledge for practice	<ul style="list-style-type: none"> <li>• Observing supervisors</li> <li>• Practicing history-taking, physical examination, and communication skills</li> <li>• Perceived value added to health system by trainee and educational presence</li> </ul>
Service learning experiences <sup>45-49</sup>	Community leaders, and potentially families and patients	Community-based settings, including food pantries, homeless shelters, and health fairs	Professionalism	<ul style="list-style-type: none"> <li>• Completing community-based projects</li> <li>• Value added to community and society by learner work</li> </ul>
Student-run free clinics <sup>50-52,71,72</sup>	Primarily physicians, also nurses and patients	Independent clinic commonly affiliated with a not-for-profit organization	Patient care, knowledge for practice, systems-based practice	<ul style="list-style-type: none"> <li>• Performing diagnostic and therapeutic tasks with supervision</li> <li>• Value added to underserved patients by learner work</li> </ul>
<b>New</b>				
Value-added clinical systems learning roles <sup>19,28,55,56</sup>	Care coordinators, social workers, nurses, physicians, therapists, pharmacists, patients, etc.	Clinical settings, including hospitals and primary-care- and specialty-based clinics	Systems-based practice, patient care, knowledge for practice	<ul style="list-style-type: none"> <li>• Performing systems- and team-based tasks (i.e., less diagnostics or therapeutics)</li> <li>• Value added to health care setting by learner work (e.g., identifying patient barriers, linking patients to community resources, providing education, enhancing communication between providers)</li> </ul>

clinical preceptorship. In most medical schools, early experiences in clinical skills courses and preceptorships expose students to history-taking, physical examination, and communication skills. Extending into traditional clinical years, clerkships provide the main method for students to develop knowledge and skills in various specialty areas. With increasing experience, students are offered more opportunities for decision making and autonomy, under appropriate supervision by attending physicians.

While these experiences may create opportunities to learn essential clinical skills, they provide limited value to the health system.<sup>42,43</sup> The value they reportedly provide includes improved clinician recruitment and retention and higher-quality patient care. In addition, another purported benefit is the fulfillment of a professional fiduciary duty to educate the next generation of providers.<sup>42,43</sup> While at times upper-level students make valuable contributions to care in today's clinical environment, our experience and prior studies suggest this is uncommon.<sup>16</sup> Even in early residency

training, opportunities for students to make a difference beyond reporting and documenting have become increasingly rare.

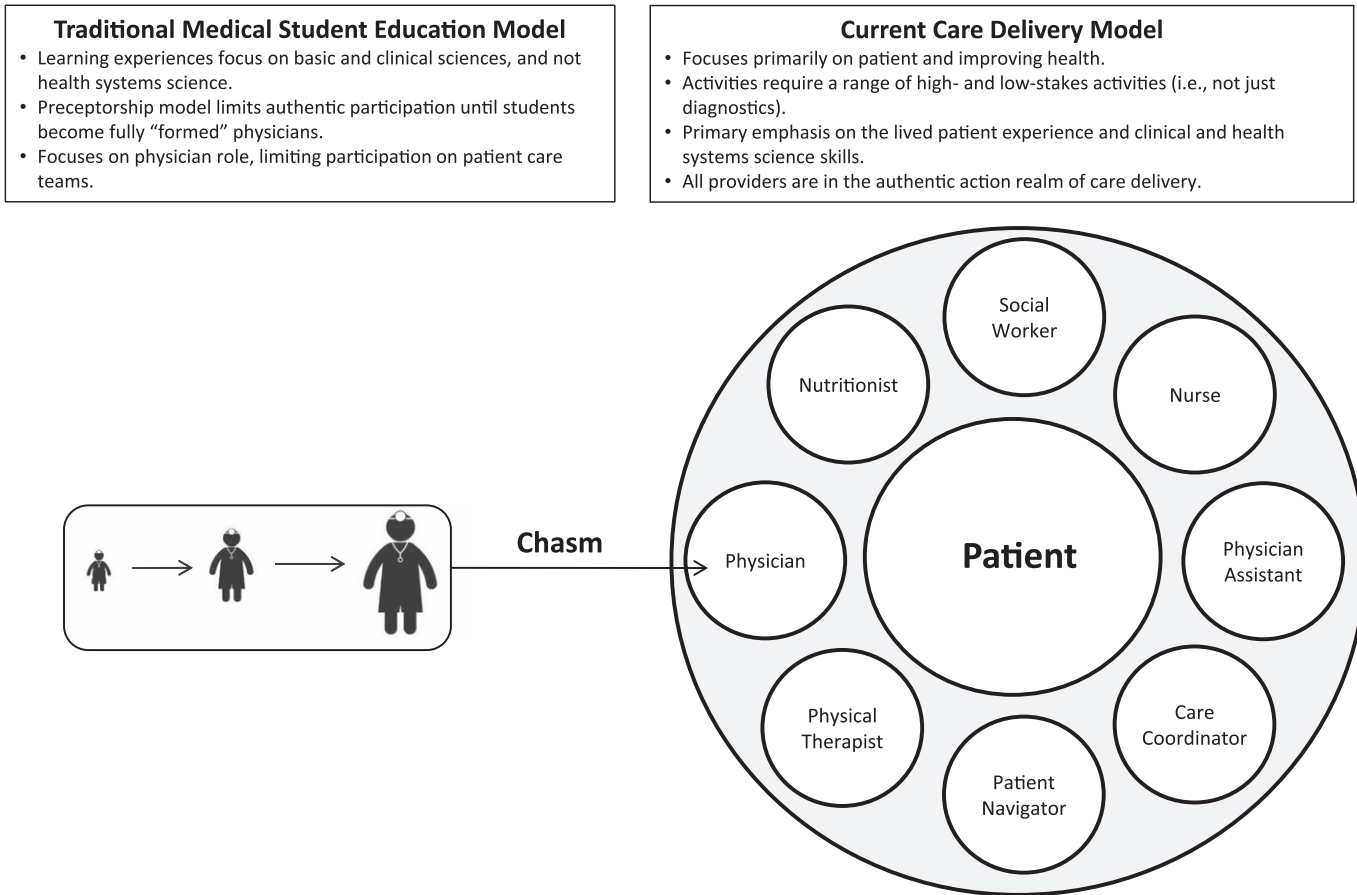
Looking at traditional clinical preceptorships through the lens of communities of practice theory, students begin on the outskirts of health care teams, slowly becoming active contributors over the course of their medical school experiences and into residency training. To become part of the team, students must undergo a lengthy developmental phase, taking years to break into the circle of team functioning. This development is also limited by the frequent rotations from one service or clerkship to another, compromising longitudinal relationships with teams and/or mentors as well as continuity with patients.<sup>44</sup>

Figure 1 demonstrates a conceptual schematic of the experiential roles, such as clinical preceptorships, in the traditional medical student education model and the current care delivery model, as well as the resulting chasm between matriculation and substantive

contribution to health care teams. We believe this chasm maintains students' positions on the fringe of health care teams, limits the value they could add to the health system until they are fully "formed," and contributes to the mindset of the "siloe" physician who functions independently of others.

### Service learning experiences

Service learning has been used in medical education for decades to link students with community-based sites and provide needed services to those local settings.<sup>45-47</sup> These roles may include volunteering in food pantries, homeless shelters, health fairs, or other community-based programs, and are primarily designed to foster a sense of civic responsibility or social justice.<sup>46</sup> Few reports have described the benefit of such experiences to patients, but one example is an interdisciplinary family health course designed to enhance student learning in community-based health while also providing services to families.<sup>48,49</sup> Although these experiences have the potential for benefit, they are typically not embedded within the



**Figure 1** Conceptual schematic of the current chasm between the traditional physician-centric medical student education model and the current care delivery model. Modified with permission from Skochelak SE, Hawkins RE; AMA Education Consortium. Health Systems Science. St. Louis, MO: Elsevier; 2017.

health care community of practice and practice environment. Notably, these experiences often begin with linking students with “the best learning experience,” rather than focusing on the patients most in need, which limits impact on patient outcomes.<sup>48</sup> Although service learning plays an important role in fostering altruism and professional values and potentially can add value to patient care, these experiences typically do not occur in the setting of collaborative clinical practice, are not designed for learning health systems science, and may not include clinical science learning.

**Student-run free clinics**

Studies suggest that student-run free clinics are ideal for developing professional identity and improving patient care skills. Most student-run free clinics provide needed medical care to patients who are underserved or underinsured, improve patient care skills, and help students form their

own physician-centric professional identity.<sup>44–50</sup> Although free clinics can provide rich opportunities for learning health systems science, in actual practice, the focus of these experiences is primarily clinical skills development.<sup>51,52</sup> Often, these clinics are not well integrated into current-day health systems, limiting full student immersion in the health system and with interprofessional providers. More important, these experiences may not be scalable to large numbers of students, as evidenced by less than 50% of medical schools having a student-run free clinic and the impracticality of schools with a clinic accommodating all students in longitudinal and immersive experiences in the clinic.<sup>50,51</sup> In addition, some authors have questioned the degree of student supervision in these settings, as well as the moral and ethical issues surrounding students performing higher-stakes clinical activities with vulnerable patient populations.<sup>53</sup>

**New Experiential Roles for Medical Students: Value-Added Clinical Systems Learning Roles**

While the culture of clinical settings has changed markedly and desired education outcomes are rapidly evolving, student experiences remain largely stuck in old models. The physician-centric professional development pathway supported by current-day student experiences (Figure 1) is beset with two critical problems. First, this pathway encourages a traditional, “sovereign physician” professional identity that is at odds with interprofessional practice.<sup>7</sup> Second, students typically have limited or no legitimate participation opportunities to become valued contributors to the community of practice. Through the community of practice lens, enculturation and transition from development to “physician contributor” is very slow and occurs in an educational model that is outdated and in need of modification. The critical educational challenge is

increasingly clear: How can educators now help learners become valued members of the community of practice (the same one where they will provide care in a few short years) while also learning about the changing health system themselves?<sup>54</sup>

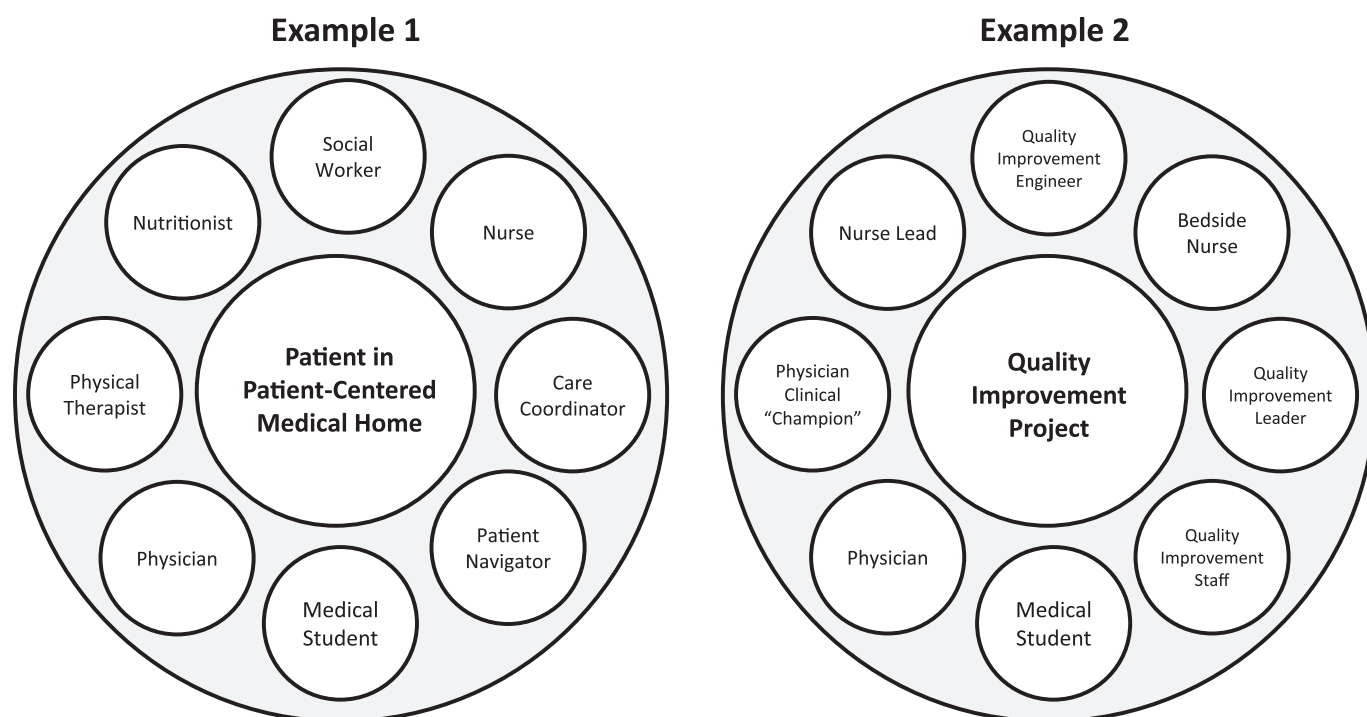
We posit that students can be embedded within health care's evolving interprofessional community of practice and also add value within the first month of medical school.<sup>19</sup> Medical students have been academically successful before matriculation and have participated in a range of life experiences; they would be highly sought employees if they had not chosen to enter medical school. They are entirely capable of participating in value-added medical education, or "experiential learning experiences [that] can also add value and capacity to the health system."<sup>30,55–57</sup> Importantly, in this model the value to the *system* needs to be balanced with value to the *student*. We propose the following expanded definition to address this balance:

Value-added medical education involves experiential roles for students in practice environments that have the potential to positively impact individual patient and population health outcomes, costs of care, or other processes within the health system, while also enhancing student knowledge, attitudes, and skills in the clinical or health systems sciences.

Although value-added clinical learning roles existed in the past out of necessity, because of related workforce shortages, these types of opportunities have largely disappeared except in underdeveloped, largely global health, settings. We argue that a different necessity and rationale for these roles exist today. Namely, the physician domain of knowledge is no longer limited to basic or clinical science but also includes competencies in health systems science. This evolving domain requires the tacit and contextualized learning that occurs within communities of practice, including "affective and real patient learning," which may not directly map to competencies that are explicitly taught and evaluated in current educational models.<sup>16</sup> These competencies

span the complex map of patients' lives and the communities in which they live and are significantly underresourced and underappreciated. Our students not only can help to fill those gaps—they can learn and develop as collaborative health care professionals in the context of that "doing."

We propose a patient-centered, interprofessional, team-based care model for value-added medical education, where learners transition from the periphery to a more proximal zone of patient care and activity within health care's community of practice (see examples in Figure 2).<sup>12</sup> The community in our model requires *codependence* between all providers—one misaligned contributor can cause team functioning to be attenuated—and includes the patient at the hub with a variety of providers with multiple complementary skills and areas of expertise to care for the patient. In the traditional community (Figure 1), students are educated in a "mini-physician" pathway, are largely limited to viewing the health system through a physician-centric



**Figure 2** Examples of value-added clinical systems learning roles for medical students. In example 1, students can be embedded into primary care teams in patient-centered medical homes to work as patient navigators, identifying barriers to care, developing interventions, facilitating communication with staff, and identifying areas for improvement within the clinic. Mentorship can be provided by any of the interprofessional providers on the team. In example 2, students can be embedded into quality improvement teams and contribute by interviewing frontline staff about root causes of an issue and barriers preventing improvement, brainstorming improvement strategies, and contributing to improvement plans. Mentorship can be provided by any of the interprofessional providers on the team, including quality improvement staff. Modified with permission from Skochelak SE, Hawkins RE; AMA Education Consortium. Health Systems Science. St. Louis, MO: Elsevier; 2017.

lens, and enter the community after competence is achieved in traditional physician-based skills (i.e., after years of education). The value-added clinical systems learning roles in our model, however, allow students to immediately enter an interprofessional community that focuses on the overall needs of the patient and to simultaneously learn about both medicine and systems of care.<sup>58,59</sup> Students experience interprofessional collaboration beyond the classroom or simulation activities, relate to physicians on the team as colleagues rather than as apprentices, and make legitimate contributions to the team and patients. And as contributors to the community of practice, students can acquire new knowledge and skills in the same environment that they will one day practice in as physicians. Imagine a world where a student's absence leads to poorer team performance, rather than the current model where students are viewed as a burden to team functioning.

What kind of roles might students assume early in medical school? Current literature supports multiple opportunities, including, among others, serving as patient navigators, health coaches, quality improvement team members, and emergency medical technicians (two examples are shown in Figure 2).<sup>8,26,60,61</sup> With appropriate preparation and oversight, students can contribute to current health system needs by providing services not typically offered in certain settings—for example, linking with patients to provide education or psychological or emotional support, or to facilitate access to care or resources.<sup>62</sup> Outcomes of their work can include reducing readmissions and improving care transitions, patient health, and satisfaction. As students progress into traditional clerkships, they can use these acquired skills to continue making meaningful contributions to patients and care teams while focusing on developing their clinical skills.

Consider an example from our experience of first-year Penn State College of Medicine students working as patient navigators in a state-operated tuberculosis clinic. Students worked with a panel of patients enrolled in a directly observed antimicrobial therapy program to understand the patients' barriers to care and facilitate successful treatment. Working with multiple interprofessional team members, including

a nurse, patient navigator, and physician, these students monitored medication side effects, arranged transportation to and from the clinic, and provided social support. In other words, these students provided legitimate contributions while concurrently interacting with people and experiencing real-life issues that they were learning about in their health systems science course. On the end-of-year reflection exercise, one student discussed learning the microbiology and pathophysiology of tuberculosis, along with the biochemistry and pharmacology of treatment. The student also described the complexity of the directly observed therapy, which seemed simple from a physician-centric lens but was considerably more complicated when viewed from a systems lens. These experiences added value to the health system because they provided critical services (the tuberculosis clinic had only one overworked patient navigator prior to implementation of the student program), and they provided valuable opportunities for students to learn not only biomedicine but also how biomedicine plays out in real-world health systems. Contrast this experience with a traditional curriculum that might have linked the students with a community-based physician, focusing on exam room diagnosis and treatment with only a distant link to critical patient- and community-centered challenges.

### Implications for Professional Role Formation

As health systems move from a physician-centric community of practice with *independent* physicians to a community of *interdependent* providers aligned to optimize patient health, so must medical education. Medical educators must provide experiences that emphasize this interdependence rather than a facsimile of the physician-centric status quo that will not adequately prepare students to be collaborative physicians in evolving health systems. Value-added clinical systems learning roles allow students to enter the team-based community as legitimate peripheral participants and contributors *from multiple provider viewpoints* (e.g., patient navigator, quality improvement team member). This creates a unique opportunity to promote the development of a new professional identity—one that is attuned to understanding the big-picture, systems view of care processes.<sup>63–65</sup> Rather than

being at the periphery of the community for years, these value-added clinical systems learning roles can allow students to work their way into more central roles within the community of practice while experiencing the physician role through a different lens. Embracing a cohort of students who view their role as change agents in health care may allow the system to more swiftly realize the transformation needed to improve patient outcomes. Just as “digital natives” are individuals born and raised in the culture and language of information technology, we envision that early exposure to value-added educational roles will enable students to become “health system natives,” fluent in the language and culture of health systems science and interprofessional collaboration.<sup>66</sup>

### Anticipated challenges

There are several anticipated challenges in designing and implementing value-added clinical systems learning roles.<sup>67</sup> Implementing these new roles or modifying current experiential learning roles requires significant time, relationship building, and continuous improvement for success.<sup>7,27</sup> Scalable opportunities for students to contribute to team-based care models require functional teams in which students can be embedded and mentored. Unfortunately, evidence suggests that functional clinical environments are not the norm, thereby limiting potential opportunities for students.<sup>4,68,69</sup> In addition, students may not fully engage with such curricular innovations if licensing examinations and the residency selection process do not yet encourage and prioritize these learning domains.<sup>25,70</sup> Lastly, medical schools often do not closely collaborate with health systems, let alone systems that provide high-quality and low-cost operations. All of these factors potentially limit the diffusion of value-added clinical systems learning roles into educational programs.

### Conclusions

As medical education and health systems undergo significant transformation, medical schools must learn to successfully incorporate health systems science curricula, including experiential roles that fully immerse students into the evolving communities of practice in which they will be working. We believe our conceptual model for value-added

clinical systems learning roles would enable student contributions to patient and health system needs while advancing health systems science education.

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