How Can Medical Students Add Value? Identifying Roles, Barriers, and Strategies to Advance the Value of Undergraduate Medical Education to Patient Care and the Health System

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Abstract

Purpose

As health systems evolve, the education community is seeking to reimagine student roles that combine learning with meaningful contributions to patient care. The authors sought to identify potential stakeholders regarding the value of student work, and roles and tasks students could perform to add value to the health system, including key barriers and associated strategies to promote value-added roles in undergraduate medical education.

Method

In 2016, 32 U.S. medical schools in the American Medical Association's (AMA's) Accelerating Change in Education Consortium met for a two-day national meeting to explore value-added medical education; 121 educators, systems leaders, clinical mentors, AMA staff leadership and advisory board members, and medical students were included. A thematic qualitative analysis of workshop discussions and written responses was performed, which extracted key themes.

Results

In current clinical roles, students can enhance value by performing detailed patient histories to identify social determinants of health and care barriers, providing evidence-based medicine contributions at the point-of-care, and undertaking health system research projects. Novel value-added roles include students serving as patient navigators/health coaches, care transition facilitators, population health managers, and quality improvement team extenders. Six priority areas for advancing value-added roles are student engagement, skills, and assessments; balance of service versus learning; resources, logistics, and supervision; productivity/billing pressures; current health systems design and culture; and faculty factors.

Conclusions

These findings provide a starting point for collaborative work to positively impact clinical care and medical education through the enhanced integration of value-added medical student roles into care delivery systems.

Faced with increasing accountability for quality of care, health systems are redesigning practice environments to better align with payment reform and optimize care processes aimed at improving care.[1] New models of care focus on interprofessional care teams to achieve the quadruple aim, which focuses on improving the patient experience of care, population health, cost of care, and the work life of health care clinicians and staff.[2,3] Health systems and medical schools are increasingly seeking to build closer partnerships to accelerate the long-term success of this transformation by enhancing student engagement in value-added roles.[4–10]

Introduction

There is a pressing need for health professions programs and medical schools to transform educational experiences to more effectively align with evolving health systems. In decades past, students were often viewed as valued team members, performing tasks such as dressing changes, blood draws, and documentation, which arguably contributed significantly to their educational experience.[11] Over the past several decades, however, there has been a steady decline in the engagement of students in such roles. Today, students in both the preclerkship and clerkship curricula enter clinical sites largely as observers linked with attending physicians to learn "doctoring skills" (e.g., history and physical exam), professionalism, and key aspects of the doctor–patient relationship.[12] Because of several factors including regulatory requirements, increased focus on quality, and diminishing students' ability to document in the electronic medical record, opportunities to provide authentic contributions to team functioning are limited.[13,14] This preceptorship model requires time for physicians to mentor and educate students, which can decrease clinical efficiency and negatively impact productivity.[15,16] As a result, most student work is relegated to a peripheral and nonessential role on health care teams. The literature reporting outcomes of medical student work is notably limited and stems mainly from team-based quality improvement initiatives or service–learning projects.[17–19] In this paradigm, learners infrequently contribute to teams and are only viewed as valuable once they are able to make independent clinically based decisions, such as contributing to development of a diagnostic or therapeutic plan. This typically requires years of training. Although students often do add value during clinical rotations, medical schools rarely explicitly identify these contributions as systems skills. They are often subsumed under the general heading of "team player" or "outstanding student," and may not be thought of as significant contributions. At the same time, medical educators, health system leaders, and community stakeholders have come to believe that students can be better integrated into the health care

team and make meaningful, recognizable contributions to care starting early in undergraduate medical education (UME) and spanning into graduate medical education (GME).[10] Realizing this potential will depend on whether education leaders and stakeholders can successfully leverage the opportunities for students to improve the health of patients and populations while learning the core principles of health systems science (HSS).[20,21]

Between 2013 and 2016, the American Medical Association's (AMA's) Accelerating Change in Medical Education Consortium received grant submissions from a large percentage of U.S. allopathic and osteopathic medical schools through two rounds of grant funding, several of which explicitly proposed novel value-added roles for medical students.[22] An overarching goal of the funding initiative is to better prepare medical students to succeed in evolving health care systems. This report uses a thematic analysis of written data from a plenary workshop including the 32 U.S. medical schools in the AMA Education Consortium that explored this concept in depth. Our approach specifically explores and identifies the stakeholders of value from activities, roles, and tasks students could perform in current clinical experiences, novel value-added roles, and key barriers and potential strategies for students to add value to the health system.

Method

Members of the AMA's Education Consortium of 32 U.S. medical schools undertook this investigation into value-added roles for students that spanned all points in the continuum of medical school, from the first through fourth years. For the purposes of this study, we defined value-added medical education as "Roles that are experiential and authentic, and have the potential for a positive impact on outcomes related to patients, populations, costs of care, or other processes within the health care system, and enhance student knowledge, attitudes, and skills in the clinical science or HSS."[6,10,21] HSS relates to an applied science that includes course work and application of various systems-related topics, including the evidence underlying interprofessional teamwork, population health, patient safety, and quality improvement.[21] The University of Illinois at Chicago, the central institutional review board for the Accelerating Change

in Medical Education initiative, determined that this study met criteria for exemption.

Medical education consortium meeting

In March 2016, a consortium-wide meeting was held to identify barriers and strategies to advance value-added medical education in UME. Educators or systems leaders from each school (121 total participants) gathered at the two-day meeting and contributed to discussions regarding value-added medical education. The AMA staff leadership team, advisory board members, additional educators and students from Penn State College of Medicine, and students from other consortium schools also participated. A plenary session conducted by two lead investigators (J.G., D.W.) facilitated activities designed to stimulate small- and large-group discussions regarding session objectives. Presenters provided an overview and additional information regarding the value of students in clinical settings. Sixteen small groups that included a range of five to nine participants were specifically asked to discuss and provide suggestions for the following questions:

- Considering current clinical roles for medical students, what specific tasks do they perform that add value to care delivery? What are potential opportunities for new or innovative value-added clinical roles?

- What are the challenges to creating value-added roles for medical students in health care settings? and

- What are potential strategies for overcoming these challenges?

Lastly, the large group reconvened to hear reports from each small group, with discussion of barriers and facilitators to advance value-added medical education. Field notes of these discussions were recorded by an AMA staff member, and all small groups submitted written responses using a structured form provided by the investigators. Sixteen forms were returned at the conclusion of the workshop.

Data analysis

Authors with experience in qualitative research methods led the analysis (J.G., M.D.). Our perspective when developing the plenary workshop was that students can add value to care delivery, and the intent was to help Consortium members think through the processes of implementing value-added roles for

students. As faculty members of one of the Consortium schools, two authors (J.G., D.W.) had initiated several local initiatives providing students the opportunity to add value to health systems. Additionally, two authors (M.D., R.H.) are employed by the AMA and are part of a team that supports the efforts of the Consortium schools. As a part of this undertaking, the AMA sought to discern barriers and facilitators encountered by grantee schools in implementing their grant projects, one of which was value-added roles for students.

Following the working conference, investigators employed a thematic content analysis and used constant comparative analyses to review and code written responses and field notes from workshop activities.[23,24] Two investigators (J.G., M.D.) independently analyzed a portion of the transcripts and field notes and then compared codes for inconsistency, and all authors came to consensus on the final codebook. Using this initial codebook, the same two investigators then independently coded the data. Through regular adjudication sessions, investigators identified the general categories and themes of priority areas related to value-added medical education. To enhance trustworthiness of the results, the technique of member checking was then performed with two medical educators to support the validity of the content analysis.[25–27] All authors discussed findings and agreed on final results and strategies.

Results

Our analysis produced several categories of results, including key principles of value-added roles and learning, the key stakeholders in value-added roles, methods to enhance current clinical experiences and new roles for students that add value, and barriers and strategies to promote value-added roles.

Key principles of value-added roles and learning

Participants identified three unifying principles that reflect student characteristics that enhance the opportunity for students to add value to patient care and the health system.

Students have time and are positioned to make a connection with patients. Students were considered in a prime position to meaningfully contribute to

patient care throughout medical school because of flexible schedules during clinical experiences and available time to perform tasks. While on clinical rotations, students' time was considered to be an "untapped" resource, which positions them to engage in a variety of activities that could add value, such as advocating for patients or obtaining information required for patient care decisions.

Students have a substantial technologically sound skill set.

Students were described as "tech-savvy" individuals, products of high-quality colleges and universities and often with advanced degrees and significant prior work experience, with the potential to add much to care delivery. This generation of learners brings a skill set often not yet mastered by more senior colleagues, including resident and attending physicians. Participants believed many students are well positioned to enhance patient care and team learning through the creative use of new technologies, including Web-based applications, social media, and smartphones. In doing so, students can share their knowledge of new technology with health professionals, faculty, and patients to improve care.

Students bring a unique inquiry and problem-solving mind-set.

In a clinical environment that can be focused on efficiency and checklists, students are felt to bring a "beginner's mind" approach to medicine. This approach includes a spirited inquiry and problem-solving mindset that can fuel healthy dialogue, analysis, and quality improvement, benefiting team functioning and patient care. By observing the health system with "fresh eyes" and with the time to access the patient's experience, students can generate and spread new ideas, reporting to leadership what they have observed.

Key stakeholders of value

Our collective work has identified the key stakeholders of "value" provided by students in patient care. We have organized these stakeholders into two main categories: the health system, and the educational system (see Table 1). For each stakeholder, benefits and "costs" to these groups are identified.

Enhancing current clinical experiences and new roles that add value

Participants identified numerous opportunities for students to increase their value to care in already-existing educational, community, and clinical settings—in particular, clinical clerkships and rotations (Table 2). Study participants identified multiple categories and specific activities where students could contribute meaningfully to health care and their own learning. In many instances, these proposed strategies are a

Table 1

Stakeholders, Benefits, and Costs of Value-Added Roles in Health Systems, From a Study of Roles, Barriers, and Strategies to Advance the Value of Undergraduate Medical Education, 2016[a]

Stakeholders	Benefits	Costs
Health system		
Patient(s)	• Improved outcomes • Improved patient experience • Lower utilization of resources or costs of care	• Discomfort/dissatisfaction with program • Stress or discomfort with process
Clinical educators	• Improved work efficiency • Gratification in fulfilling social responsibility of student education • Improved work experience	• Reduced clinical productivity • Additional resources • Concerns regarding quality of mentoring
Clinical or community site	• Enhanced quality improvement programs • Enhanced partnerships with community programs	• Resources and time required for student presence and work
Hospital system	• Improved relationships with community and neighboring health systems • Improved efficiency through optimal use of students and sparing other human resources	• Time and resources to fund programs
Educational system		
Learners	• Improved knowledge, skills, and attitudes in HSS • Improved attitudes of professional role identity • Improved attitudes of change agency potential • Improved intrinsic motivation for career development • Greater sense of civic responsibility for profession	• Competing demands of other courses • Competing demands of licensing examinations • Apprehension and anxiety from performing patient-centered tasks
Medical educators	• Improved knowledge and skills in HSS, thereby increasing education for other learners	• Investment in learning new concepts
Medical school	• Enhanced knowledge and skills in new initiative • Creation of meaningful clinical work for students • Enhanced credibility in fulfilling social commitment to the community	• Competing demands of curricular initiatives • Additional faculty/staff time

Abbreviation: HSS indicates health systems science.
[a]A portion of this framework was informed by Ogrinc GS, Headrick LA, Boex JR. Understanding the value added to clinical care by educational activities. Value of Education Research Group. Acad Med. 1999;74:1080–1086.

Table 2

Roles, Tasks, and Activities to Enhance Student Value in Already-Existing Educational, Community, and Clinical Settings, From a Study of Roles, Barriers, and Strategies to Advance the Value of Undergraduate Medical Education, 2016

Category/ subcategories	Specific items
Direct patient care	
History taking	• Perform advanced histories to clarify information about patient values and needs; document if permitted • Listen to patients and augment patient-centered care in clinical environments • Gain more information from patients about social determinants of health, barriers, and needs
Evidence-based medicine and practice contributions	• Probe health care team with provocative questions to advance care • Increase rigor and expectations for care delivery through questioning and inquiry • Facilitate evidence-based practice searches for teams to more quickly gather information • Provide insights to health care team and patients into technology and applications at the point of care • Employ geo-mapping methods to diagnosis, resources, and services
Patient education and counseling	• Educate patients about disease, treatments, clinical process, and care plans • Immediately after encounters, educate and/or coach patients, interpret the event, translate medical jargon, identify gaps in patient knowledge, and provide/create health education materials • Counsel patients with motivational interviewing
Clinical process extenders	• Collect health information outside hospital records for team-based care delivery • Perform "chart biopsy" of past encounters to promote well-informed decisions by health care team • Transport patient to and from locations within hospital • Perform blood draws and wound care; participate in triage activities and procedures • Add/edit information in the electronic health record and update information • Perform medication review or reconciliation at numerous points in the care continuum • Identify patient needs and administer screening tools • Provide follow-up after discharge from hospital via phone calls and home visits • Provide continuity for team; bridging fragmentation from duty hours
Patient advocates	• Spend time with patients, develop relationships, support psychosocially • Accompany patients to appointments • Provide liaison role between patients and health care team members • Decrease power differential between patient and physician through communication • Report and describe test results in a manner that is understandable to patients • Improve translation and language fluency during encounters • Advocate for patients by addressing structural inequalities • Assist patients with benefit and insurance forms • Engage patients missing appointments by assisting with transportation, motivation, and barriers • Prepare patients to use health portals at institutions • Participate in advocacy activities related to policy at the local and national levels

(Table continues)

reorientation or more explicit delineation of student activities that may once have been integral to student roles, or methods to enhance or extend student roles and activities while in clinical settings.

For new and innovative roles, our participants identified seven opportunities for student engagement that, to our knowledge, are not widely used in the United States and international medical schools currently, but have the potential to be incorporated into educational settings (Table 3). Emerging possibilities include patient navigators, health coaches, care transitions facilitators, and patient safety analysts.[10,20] Participants focused on the capability of students to assess a patient or health system issue and to participate in directly enhancing the care of patients or improving systems of care. All of these roles require continuity and longitudinal working relationships to reach their potential.

Barriers and strategies to promote value-added roles

Six main barriers to advancing value-added roles in UME were identified, along with corresponding strategies to overcome these barriers. Figure 1 is a key-driver diagram that depicts the goals, key barriers, and proposed potential strategies that influence the challenges.

Student engagement, skills, and assessments. Participants identified that students may be unlikely or unwilling to engage in novel roles because of their prioritization of preparation for licensing examinations and lack of baseline skills to perform new tasks. Additionally, if the roles were to enhance learning in HSS, participants believed formal assessments would be needed to track students' acquisition of skills. Strategies to address these challenges could include connecting systems-based experiences with learning goals in clinical sciences.

Balance of service versus learning. Participants raised concern about having the students perform service, or perceived "scut" work, for the betterment of others and their education. Sample strategies include developing new value-added roles, furthering understanding of the balance between learning and service, and a complementary research agenda to demonstrate the impact of student activities.

Table 2

(Continued)

Category/subcategories	Specific items
Education role	
Team members	• Educate mentors and team members about up-to-date information, care processes, new technologies • Provide assistance using knowledge and skills about technology • Keep physicians "fresh" by challenging with evidence-based medicine
Peers and medical school	• Educate medical students (MS1–2) in clinical skills education; serve as "near-peer" mentors (MS4) • Teach colleagues about wellness and burnout • Incorporate as educators into teaching programs offered in the health professions school • Review and design preclinical curricula after completing curriculum • Evaluate education program and provide continuous improvement
Service–learning	
	• Enhance service–learning opportunities that align with community needs • Provide community education and vaccination programs at local schools • Coordinate community health fairs • Lead and facilitate care at student-run free clinics • Develop "prevention produce" initiatives to improve nutritional eating in communities • Enhance community outreach programs by expanding services and student participation on a continuum
Research and systems projects	
	• Perform quality improvement projects that inform improvement in care delivery • Perform research projects aligned with care delivery advancement • Perform research that addresses local and broader needs in clinical and basic science • Lead/perform community-based needs assessments • Assist with standardization of electronic health record for quality initiatives and projects • Perform workflow/systems analysis, which allows for identification of "blind spots" in care delivery

Resources, logistics, and supervision. Participants identified several resourcing and logistical barriers to new roles, which include aligning student and clinical site schedules, robust understanding and supervision by site mentors, and arranging legal documentation for students to be performing such work. Sample strategies include developing flexible student schedules, dedicating time in curricula for new roles, and building a scalable network to accommodate all medical students.

Productivity and billing pressures. Because most of the mentorship would be undertaken by site providers such as physicians and care coordinators, these individuals would need to increasingly balance their mentorship time with their need to maintain clinical workload and billing of encounters. Proposed strategies include a reconsideration of reimbursement for medical education and a focus on evaluating the return on investment to the health system through new roles.

Current health systems design and culture. Several groups identified their concerns that the design of the health system may not be fully conducive to embedding students into new roles and sites. For example, if students were to perform population health management roles in primary care clinics or other community sites, a data analytics infrastructure along with skilled faculty oversight would be needed. For many health systems, this capability does not yet exist. Additionally, the idea of students performing team-based tasks would be new to academic faculty and staff, who might offer resistance. Strategies for addressing these health system barriers might include collaborating with systems to design students into new delivery models, and prioritizing longitudinal interprofessional learning relationships between students and workplace teams.

Faculty factors. Faculty and staff were identified as having limited time and effort allocated to take on new mentorship roles for students. Several faculty members raised questions about the availability of mentors with the appropriate HSS skill set. In addition to the clear need for faculty development in HSS, educational leaders need to explicitly address the narrow perception that only physicians can effectively mentor future physicians.

Additional strategies. Additionally, we identified three key themes regarding strategies to advance the value-added agenda. First, participants identified the need to educate clinical educators and health systems leaders in a new set of learner goals and expectations, with a particular focus on the concept of value-added roles. The target outcome of this effort would be a supportive environment for workplace learning that is aligned with collaborative, 21st-century clinical practice. Second, continuity of learning and working relationships for students in clinical sites was considered a critical component of success. Value-added roles depend on longitudinal exposure that supports acclimation and the development of authentic, trusting relationships with faculty, staff, and patients. Curriculum leaders interested in implementing continuous learning and working relationships for students should also explore and develop a set of "best practices" for addressing logistical and regulatory barriers. Last, a prerequisite to value-added roles is the provision of sufficient touch points for students in systems of care. While these touch points could be added to existing clinical placements and rotations, care must be taken to balance expectations and priorities. Truly meaningful experiences may well demand that educators take a hard look at competing curricular demands to increase student exposure to value-added roles.

Discussion

These findings delineate potential next steps for reimagining the value that

Table 3

Potential New Roles for Medical Students to Add Value to the Health System, From a Study of Roles, Barriers, and Strategies to Advance the Value of Undergraduate Medical Education, 2016

Role	Description	Potential tasks
Patient navigators, health coaches, or "hot-spotters"	Students can be linked with clinical sites/programs to work with patients to achieve better outcomes, thereby extending the resources of the program. Patients can be identified by numerous mechanisms, including patients who are superutilizers of care, those with complex medical conditions, or those in need of targeted interventions.	Acquiring an in-depth history to identify challenges/barriers to care, assessing health literacy, performing home visits to assess safety, accompanying patients to appointments, performing motivational interviewing, educating patients about disease processes or care plans, assessing adherence, and helping facilitate patient access to health portals, specialist providers, transportation, and community resources.
Care transitions facilitators	Students can be linked with clinical sites/programs that focus on the transition between settings, such as hospital and primary care clinic transition. Patients can be identified by readmission rates or those believed to be vulnerable during the transition.	In-depth interviewing with patients prior to the transition to review care plans, assess home situation and patient understanding, and help coordinate transportation and follow-up appointments. Following the transition, tasks can include phone calls to review care plans and ensure awareness of need for follow-up.
Safety and patient care analysts	Students can be integrated into health system processes by following a patient's course through the hospital or ambulatory care setting. Patients can be identified by preselected risk factors, or from a convenience sample.	Analyzing the patient experience or process, identifying insufficiencies or vulnerable points in the continuum, and reporting results using the appropriate mechanism. Students can continue engaging with patients after they are discharged through phone calls or home visits. These activities can identify any medical errors or systems failures that were experienced by the patient. Students can report findings to hospital teams and initiate conversations about findings.
Quality improvement team extenders	Students can be integrated into quality improvement teams throughout health systems. Projects can be identified by anticipated duration, degree of complexity, and when aligned with students' available time.	Authentic contributions to the project team, including clinical assessments of the issue, interviews with key stakeholders, observations of clinical processes, collection of data, analysis, and presentation.
Population health managers	Students can be integrated into care teams to create physician-based or clinic-based patient registries stratified by disease process/clinical variable, and identify gaps in care for the population of patients. Patient populations can be identified by quality metrics such as results of laboratory tests.	Using data analytics, operationalizing screening tools with patients or the population of patients, geo-mapping of resources/services, performing community or clinic-based needs assessments, designing or working on quality improvement project teams.
Patient care technicians or medication reconciliation assistants	Students can be trained to perform the tasks of a patient care technician and integrated into care teams in both ambulatory and hospital-based settings.	Performing intake assessments, acquiring vital signs, and assisting in triage duties. An extension of these roles could include medication reconciliation with patients during the intake process.
Medical scribes	Students can be trained to perform scribing activities and linked with provider-based teams in ambulatory and hospital-based settings to extend the work of providers.	Note taking and scribing of provider–patient encounters.

medical education can contribute to patients and the health systems in which care is provided. The enhancement of current learner activities with interprofessional care team members and potential integration of new roles to add value to the health system merits consideration in both everyday clinical activities as well as medical education reform discussions.[28] The concept of value-added roles is emerging in the literature, and given the increasing focus on HSS in UME as a pivotal area of learning in addition to basic and clinical science, the need for new experiential opportunities is on the rise.[20,21] As shown in our results and the literature, the potential ways in which students can add value are broad, ranging from point-of-care contributions, longitudinal patient outreach, and quality improvement initiatives.[6,17,18,29] Student apprehensions about their responsibility in these new experiences and the tension for students to focus their education on clinical skills and board examination performance were primary perceived barriers and have been identified in prior work.[30] Additional long-term efforts, such as reconfiguring the format and role of board examinations in residency placements, will be required to facilitate successful design, implementation, and sustainability of new programs.[14,31]

Our findings highlight a notable disconnect between faculty ideas for value-added roles and faculty perception of barriers in achieving those roles. Key opportunities suggested for students to make a difference for patients focused on contributions that are largely independent of faculty workload—for instance, availability to go into greater depth for medical information and evidence-based decision support, and time to engage underaddressed needs through patient counseling and advocacy. On the other hand, some prominent challenges to value-added roles focused on attending physician factors such as time, efficiency, and risk factors for burnout. Certainly, student educational needs can strain already-stressful clinical loads—but this occurs almost exclusively in the realm of traditional educational expectations for faculty—namely, direct observation, patient-based teaching, and feedback. It is notable that this view of students as a liability, fulfilling or not, also colors the view of students in roles that should be either neutral or possibly even an asset to health system performance and patient
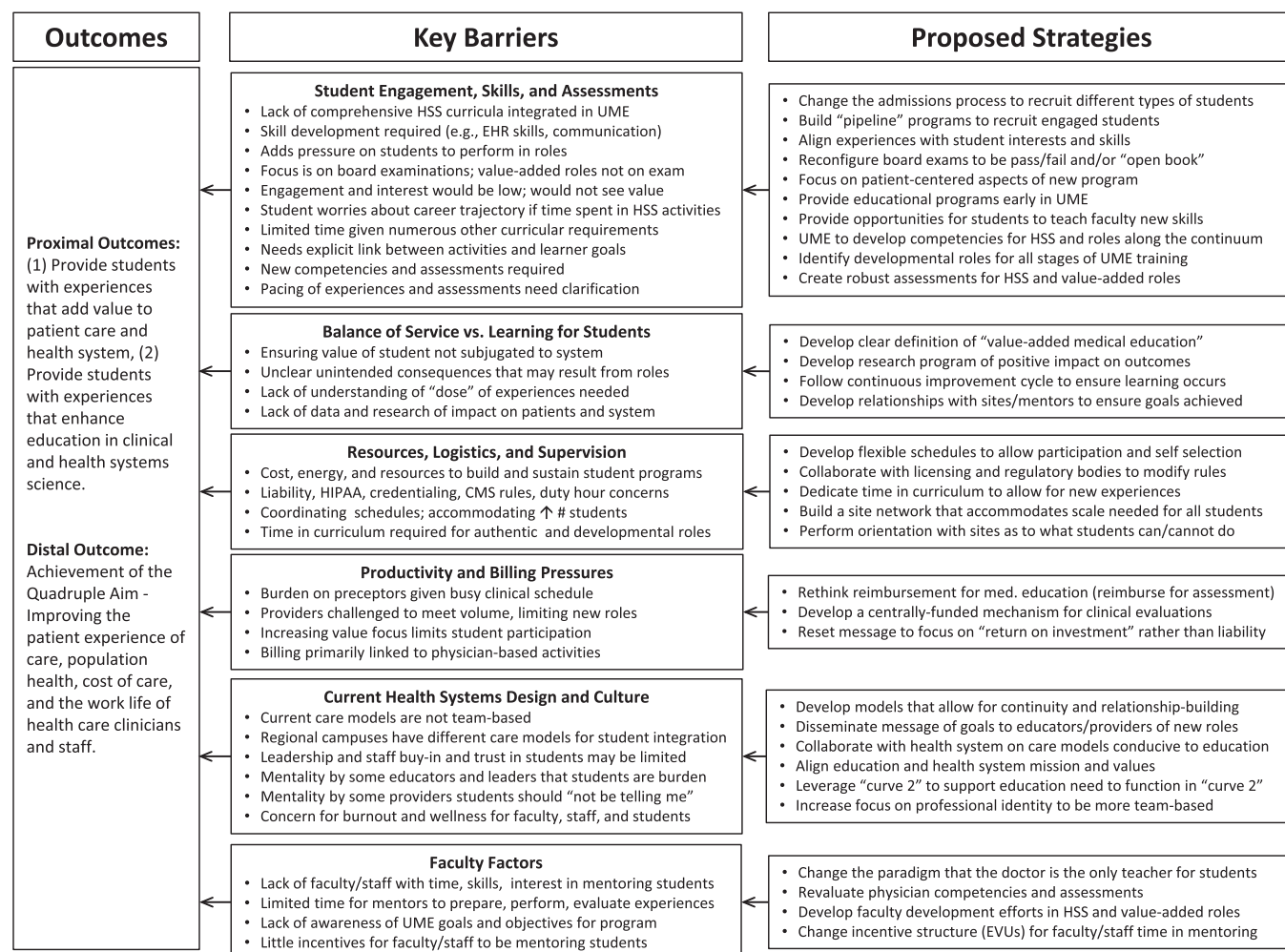
Figure 1 Key-driver diagram of outcomes, barriers, and proposed strategies for advancing value-added roles in undergraduate medical education, from a study of roles, barriers, and strategies to advance the value of undergraduate medical education, 2016. This figure demonstrates the relationships between the outcomes (proximal and distal), "key-driver" factors, and the potential interventions that could potentially influence the key drivers. Abbreviations: HSS indicates health systems science; UME, undergraduate medical education; EHR, electronic health record; HIPAA, Health Insurance Portability and Accountability Act of 1996; CMS, Centers for Medicare and Medicaid; EVUs, educational value units.

care. And it also highlights the traditional perception that medical education is the job of physician educators. Other members of the health care team, who in reality might have a greater role in enabling and supporting student value, are underappreciated as mentors and teachers. It is somewhat sobering that the group of providers surveyed here were largely educators from major academic medical centers, highlighting the perceptual transformation that may be required to successfully refocus educational efforts on potential student value to patient care and the health system.

Several limitations exist in this work. First, the educators and system leaders entered the workshop with varying degrees of experience in implementing value-added roles for students. For example, some participants listed patient navigation,

health coaching, medical scribing, and participating in quality improvement teams as novel ways to integrate students into value-added roles, while others listed these experiences as already existing in their medical schools and health systems. Next, the investigators had assumptions about the potential for student work to add value, which may have influenced the design and analysis phase of the work.[26,32] We also recognize that two investigators are employed by the AMA, and that these AMA-supported projects were specifically designed to advance education and bridge acknowledged gaps between education and medical practice. One significant component of bridging this gap is the creation of value-added roles for medical students. Therefore, educational goals of the grant program may have influenced the exploratory intent of this work. However, we believe these results represent

a broad-based consensus of U.S. medical educators in the topic area.[22,26] Although the current study has identified barriers and strategies for integrating students into value-added roles, further research is needed to prioritize this work on the basis of resources and capacity. Additional research is also needed to better define and quantify the contributions of medical students to education and health systems in which they learn and serve.[9] Lastly, all participants were leading education projects in the United States, and therefore these results are situated in a market-driven health care context, potentially limiting the transferability of findings to international settings.

Recommendations have been made for medical education to increase the contributions of medical students to health care, but little scholarly work

has advanced this field. We believe this study can provide an important starting point for rigorous inquiry into the characteristics of successful interventions and the outcomes and impact of student value-added roles in clinical settings. Key barriers and strategies identified here can be used to promote the development and implementation of workplace models that can be probed and tested through current or evolving quality and value metrics. An additional outcome of intense interest to both medical schools and health systems is the successful education of systems-ready physicians. This study lays important groundwork for both implementing and studying value-added enhancements and innovations in the context of patients, systems, and educational programs.

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