Leveraging Technology to Overcome the "Scalability Problem" in Communication Skills Training Courses

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ABSTRACT

Although multiple consensus statements have called for large-scale efforts to improve clinicians' communication skills regarding a variety of difficult conversations in medicine, this goal will be difficult to attain because there are no readily scalable, validated communication skills training programs for clinicians. However, novel applications of existing technologies and approaches grounded in learning science can overcome the scalability barriers. Moreover, future advances in virtual reality and artificial intelligence are likely to greatly enhance the possibilities for communication skills training programs. The purpose of this paper is to propose a scalable, theoretically grounded method to train clinicians in advanced communication skills in medicine. First, we summarize four key principles of adult learning relevant to communication skills training in medicine. Second, we discuss recommended practices to design effective technology-enhanced educational interventions, with an emphasis on achieving high amounts of user engagement. Third, we synthesize these principles into a framework for a web- and videoconference-based platform for teaching advanced communication skills in medicine. Once developed, this low-cost, scalable training platform has the potential to allow thousands of clinicians to acquire the advanced communication skills needed for difficult conversations in medicine.

Keywords:
educational technology; education, medical; critical illness; decision-making

A skillful conversation between a clinician and a patient or surrogate is a critical step to effectively address many issues of vital public health importance. Examples include establishing goals of care near the end of life, persuading a patient with an opioid use disorder to begin treatment, overcoming vaccine hesitancy, and helping a patient decide whether to undergo lung cancer screening. However, there is ample evidence that many clinicians are unprepared for such conversations (1–3). Studies of audio-recorded encounters reveal that clinicians often fail to accomplish communication tasks widely viewed to be important in such conversations (3). For example, when discussing goals of care in the setting of advanced critical illness, clinicians often fail to elicit patients' values, convey prognosis, and provide emotional support (4–6).

Although multiple consensus statements recommend large-scale efforts to improve clinicians' communication skills, currently it may not possible to achieve this goal because there are no scalable, empirically validated methods to train clinicians in complex communication skills (7–9). The training programs that have been proven effective in randomized trials are delivered through in-person, multiday training workshops (10–12). These programs are critically important advances in the science of communication skills training, but they are not likely to be the sole solution because of major barriers to scalability. For example, such training programs generally require physicians to take multiple days off work and pay the costs to travel to a central location to receive training. They require paying for many hours of time for instructors and actors, who similarly need to travel to a single geographic location. They require extensive administrative effort to coordinate (e.g., securing a suitable venue, arranging meals, etc.). These costs and

logistical complexities may be especially burdensome for physicians who work in rural and underserved areas.

We propose a method to train clinicians in advanced communication skills that leverages technology to overcome the scalability challenges of existing training programs. First, we summarize four key principles of adult learning relevant to communication skills training in medicine. We then discuss best practices for designing successful technology-enhanced educational interventions, with an emphasis on achieving high amounts of engagement. Engagement refers to the learner's willingness to interact with the intervention and investment in learning the skill at hand (13). Using the insights from best practices of online educational methods and adult learning theory, we propose a web- and videoconference-based platform for teaching communication skills. Finally, we address challenges in developing this novel training platform and discuss future directions. If demonstrated to be effective, this training platform can be scaled to train thousands of clinicians in the communication skills needed for a variety of critically important conversations in medicine.

FOUR PRINCIPLES OF ADULT LEARNING

Creating a scalable communication skills training program first requires understanding how adults learn new skills. There are four principles that are especially relevant to clinicians learning complex communication skills, as follow: leverage learners' intrinsic motivation, incorporate deliberate practice, achieve spaced learning, and make learning a social process.

Leverage Learners' Intrinsic Motivation

Adult learners are most interested in learning subjects that have immediate

relevance to them. Learners' motivation is also heightened when they have a say in what and how they learn, when they see their own progress toward mastery, and when they feel accountable to other learners (14–17).

There are several implications of these insights for the design of technology-enhanced communication skills training programs. First, the training program should be tailored to the specific types of conversations the learner is likely to encounter (e.g., goals-of-care conversations in intensive care units [ICUs], counseling a patient about lung cancer screening, etc.) rather than solely addressing general communication skills. Second, the program should be designed to help learners connect the content with their own experiences, such as by including an exercise at the beginning of the training that encourages them to reflect on how breakdowns in communication negatively affect their professional life and patient outcomes. Third, to foster a sense of autonomy, the training program should provide learners with different options for how to interact with the subject matter, such as through written summaries, case studies, video exemplars of skills being performed by experts, and interactive exercises. Fourth, the program should explicitly recognize learners' progress, such as by incorporating awards (e.g., badges for completion of certain amounts of the training) or displaying a tally of points accumulated with progress.

Incorporate Deliberate Practice

To learn a skill, one must practice it (18–22). However, simply practicing a skill without receiving expert feedback may not yield improvement in performance. First described by Ericsson in 1993, the concept of deliberate practice involves learners

exerting effort to improve performance by practicing a specific skill, receiving expert feedback on their performance, and then repeating the skill while attempting to incorporate the expert feedback. A key element of deliberate practice is identifying a skill or subskill that is just outside the learner's comfort zone and focusing on it. It generally does not involve practicing an entire task (e.g., a complete goals-of-care conversation) but rather zeroing in on the portion with which the learner is struggling. For example, a clinician may be competent in performing most aspects of a goals-of-care conversation with a patient with end-stage lung disease but may struggle with how to broach the option of comfort-focused care. Deliberate practice would involve the learner focusing on that particular aspect of the conversation without practicing the entire goals-of-care conversation.

Skills practice allows learners to find the words that feel authentic to them to accomplish the skill and then develop comfort accomplishing the communication skill with those words. Expert feedback reinforces good performance, corrects mistakes, and directs learners toward the path of further improving their skills. Combining the two into deliberate practice creates a learning loop that allows the learner to practice a skill, receive expert feedback, apply that feedback in the moment, and then experience its impact on their improved performance.

Achieve Spaced Learning

Distributing learning in smaller pieces over a period of weeks or months, which is called "spacing," has been shown to improve long-term retention compared with intensive training over a short period of time (23, 24). Spaced learning has been shown to be effective for clinically relevant skills in

medical education (25). Spacing challenges learners to retrieve their prior knowledge and thus facilitates consolidation in long-term memory. In addition, spacing allows learners to benefit from the memory consolidation that occurs during sleep. Interweaving learning sessions with sleep has been shown to promote retention (26).

The implication of this for the design of communication skills training is that engaging learners for shorter sessions over the span of weeks and reexposing them to the information periodically over time might improve long-term retention.

Make Learning a Social Process

Learning as part of a group of learners, rather than in isolation, has a number of beneficial effects. First, learning in groups creates a sense of support that can be motivating (27). Second, being part of a group increases individual accountability, especially if there is an expectation that learners will demonstrate the learned skills to their peers. Moreover, being able to compare one's performance with peers has been shown to increase individual effort (28). Third, observing and critiquing others' performance of a skill can deepen learning by exposing learners to how others approach the skill being learned and require them to think critically about what they are seeing. Fourth, learning in a small group environment with peers can facilitate learner engagement by allowing opportunities for learners to teach each other (29).

The implication of this for the design of communication skills training is that programs can be designed to include features that create accountability to a group of learners, such as pairing independent online learning with skills practice sessions in which learners are asked to demonstrate the communication

skills they have acquired in front of their peers.

DESIGNING SUCCESSFUL TECHNOLOGY–ENHANCED EDUCATIONAL INTERVENTIONS

Technology-enhanced training programs hold great potential to overcome barriers to scalability when teaching advanced communication skills because they circumvent challenges such as the cost, time needed away from work and administrative complexity required of in-person training programs. Although some clinicians have negative associations with online learning, these concerns seem grounded in their exposure to poor-quality online programs, such as courses that simply include video recordings of lengthy lectures with accompanying slides. However, there is growing literature demonstrating the effectiveness of internet-based and technology-enhanced training (30, 31), which looks nothing like the ordinary programs to which many clinicians have been exposed. In many ways, technology-enhanced programs have the potential to be superior to in-person programs. In addition to incorporating the basic learning principles described previously, effective online education should capitalize on the advantages of online learning while avoiding its potential shortcomings.

Capitalize on the Strengths of Online Learning

Although some view internet-based training programs as attractive merely because of their scalability and convenience, there are pedagogical advantages to online training compared with traditional classroom-based training.

Online training allows learners to work at their own pace, which is important because learners often have different baseline

competencies. A perennial challenge of classroom-based teaching is to accommodate the needs of diverse learners, who vary substantially in the amount of instruction needed to acquire competence. In contrast, internet-based programs can readily accommodate diverse learners with different baseline competencies. In addition, it is common for an individual learner to have "uneven" competence across multiple different skills. Internet-based programs offer learners the ability to tailor their own learning by spending more time on content that is challenging for them and moving quickly through content that they are comfortable with. Better balance between the ability of the individual and the challenge of the training task can promote a sense of flow (immersion or absorption into an activity), which, in turn, can improve the movement of information from the working memory to the long-term memory (32, 33).

Internet-based programs can also more readily incorporate spacing than traditional classroom-based teaching programs for health professionals because, logistically, it is far easier for practicing physicians to complete online modules that are separated in time than it is for them to assemble numerous times for classroom-based teaching.

Finally, internet-based training programs make it easy for material to be presented in multiple formats, such as text, audio, video, and animations, which can enhance engagement by allowing learners to select the format best suited to their personal preferences. Presentation of the material in different formats also allows learners to access the information both visually and phonologically, increasing the likelihood of retention (34–37).

Minimize the Drawbacks of Online Learning

One of the main shortcomings of online learning programs is that completion rates for such programs tend to be low (38). There are a variety of strategies to counter this, ranging from ensuring that the design of the program is engaging and interactive to building in accountability, such as through the use of an instructor who monitors and encourages progress, or institutions requiring successful completion of the course as part of ongoing professional development.

Another potential shortcoming of online learning programs is that they often force learners to learn in isolation, with limited interaction with peer learners. The social isolation of many online learning programs may negatively impact their effectiveness because the act of engaging with others about the material is often an important aid to learning. One strategy to counter this is to incorporate synchronous (i.e., live online) or asynchronous discussion groups into the training program. Asynchronous discussions allow learners to engage in a dialogue over time while also giving them time to think about and craft their responses. When well designed, such discussion features can yield richly interactive experiences (39–44). Moreover, research suggests that students perceive online discussions to be more equitable and democratic than in-person discussion (45), to be more group-centered rather than authority-centered (46), and to result in higher-quality interaction with peers (47).

A VISION FOR SCALABLE COMMUNICATION SKILLS TRAINING

To illustrate what a scalable communication skills training program could look like, we use the example of a training program currently in development to teach physicians how to engage in a goals-of-care conversation with the surrogate decision-maker of incapacitated, critically ill patients. This is a crucial

conversation that many clinicians in ICUs feel ill prepared to conduct at an expert level (48). Currently, the only published training program to teach these skills to physicians involves a multiday, in-person format with an instructor, multiple standardized patients, and a small group of physician-learners (10). This training program is outstanding, but available to a select few.

Overview

As an alternative to the in-person training format, we propose an online training program that combines *1*) brief, interactive modules that learners complete independently, *2*) asynchronous online discussions among a group of learners that are supervised by an instructor, *3*) deliberate practice sessions conducted by videoconference, and *4*) a final certification exam conducted by videoconference.

The objective of the course is to teach multiple complex communication skills, such as disclosing news of a poor prognosis, emotionally supporting family members in crisis, discussing different pathways of care, eliciting patient's values and preferences, and attending to the psychological conflict that often arises within surrogates facing end-of-life decisions. The course is designed to be completed over 4 weeks, with learners devoting ∼2.5 hours per week to the training. Each week, learners independently complete two online modules, participate in asynchronous online discussion about two topics covered in the online modules, and then participate in a 1-hour deliberate practice session that allows them to receive expert feedback on their performance of the skills they learned in the two online modules. These deliberate practice sessions are conducted via videoconference (e.g., Skype or Zoom), led by an instructor, and involve six to eight learners who iteratively interact with

a standardized patient to practice the core skills and receive expert feedback (Table 1, Figure 1).

Asynchronous Online Lessons

Each self-paced online module covers one or two core communication skills (e.g., discussing prognosis and providing emotional support). The main design attributes of the online modules are that they are relatively brief (20 min), are highly interactive, and use a variety of formats to convey content (video, audio, text, and animations).

As summarized in Figure 2, each module begins with a video in which an instructor introduces and provides commentary on the skill. After that, learners view a video of an expert demonstrating the skill and then complete a variety of interactive exercises designed to help the learners gain experience with the skill. The interactive exercises include viewing a video of a physician poorly performing the skill in some way and then providing a written response about how the physician could improve the performance; once the learner has entered a response, she is able to view an expert's written critique of the same video. By observing and critiquing poor performance, the learner develops skills of discernment that can enhance their own communication. This process of learning, in which one comes to recognize the elements of strong and weak performance by critiquing another individual's work, is described in the literature on peer review (49, 50). Learners will also compose sample language that feels authentic to them for each communication skill and then see an expert's language for the same skill. Having learners compare their responses with those of experts further hones their ability to distinguish the characteristics of good communication. This comparison between learner and expert answers has been used

Table 1. Learning principles and corresponding program elements

Learning Principle	Program Elements	Research Basis
Intrinsic motivation	Brief, easy-to-navigate modules	Increases motivation by raising expectancies (18)
	Content focus on high-value, immediately applicable skills	Increases motivation by emphasizing practical value (18)
	Interactive format and multimedia content	Enhances engagement (13, 34)
	Frequent low-stakes assessments and final evaluation	Increases accountability and sense of mastery (55–57)
Deliberate practice	Video critique of flawed performance	Builds skills of observation and discernment (49, 50)
	Composing sample language and comparing with expert's language	Further hones their ability to distinguish the characteristics of good communication (51, 52)
	Targeted communication skills practice	Provides time on task- and goal-directed practice (18, 58, 59)
	Expert feedback during practice sessions	Provides just-in-time feedback (60, 61)
Spaced learning	Spaced practice between learning sessions	Provides opportunities for forgetting and relearning (23, 24)
	Learning boosts	Allows learners to retrieve prior knowledge and promotes long-term memory consolidation (25)
Social learning	Peer involvement in synchronous practice sessions	Enhances social presence and community-building (39, 43)
	Instructor involvement in synchronous skills practice sessions	Enhances instructor presence, which is essential in online learning (44, 62–64)
	Asynchronous discussion via discussion board	Promotes peer-directed dialogue, reflection, and critical thinking while allowing everyone to participate and giving learners time to compose thoughts (53)

successfully by the research-based Open Learning Initiative at Carnegie Mellon University (51, 52). Each module also contains optional material, such as additional readings, additional "pro-tips" from experts, and case studies with commentaries. Learners must pass a quiz to proceed to the next module. The design of the online modules promotes spacing by engaging learners for short sessions over the span of weeks and reexposing them to information periodically over time (23–25).

Asynchronous Online Discussions

Each week, learners participate in asynchronous online discussions about two
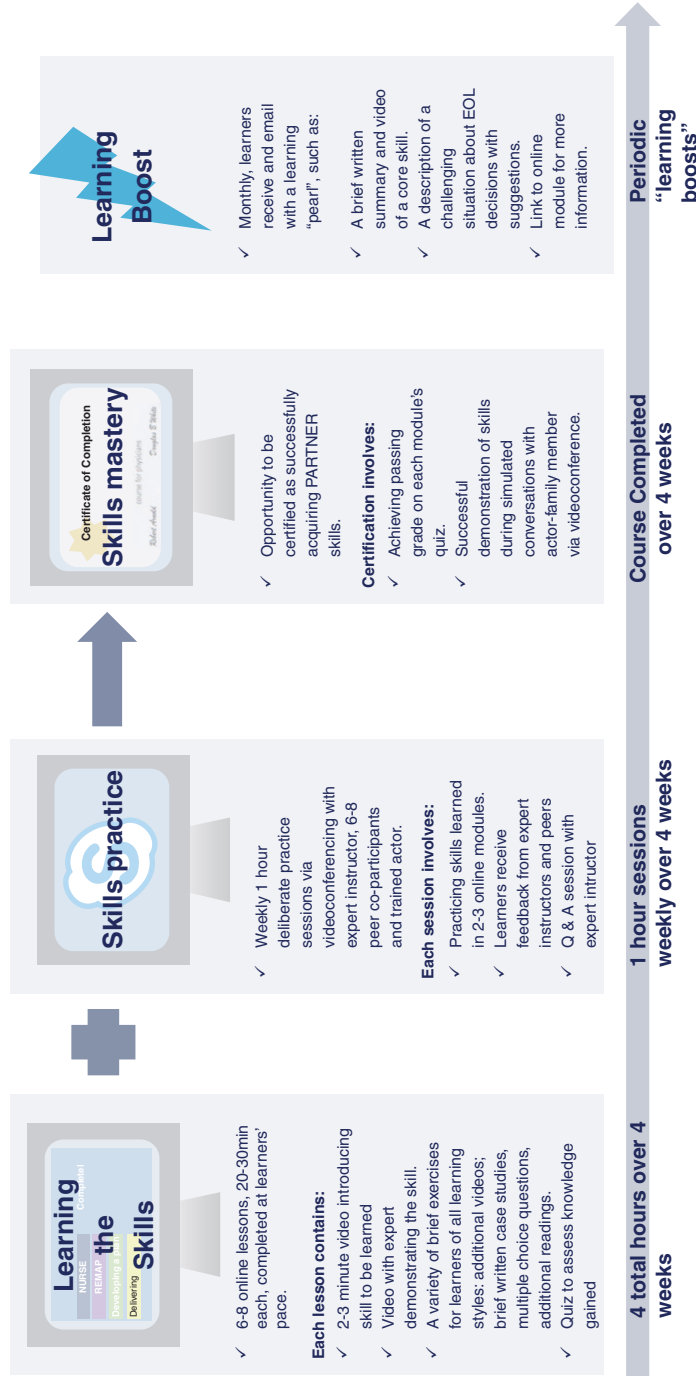
Learning the Skills

- ✓ 6-8 online lessons, 20-30min each, completed at learners' pace.

Each lesson contains:

- ✓ 2-3 minute video introducing skill to be learned
- ✓ Video with expert demonstrating the skill.
- ✓ A variety of brief exercises for learners of all learning styles: additional videos; brief written case studies, multiple choice questions, additional readings.
- ✓ Quiz to assess knowledge gained

4 total hours over 4 weeks

Skills practice

- ✓ Weekly 1 hour deliberate practice sessions via videoconferencing with expert instructor, 6-8 peer co-participants and trained actor.

Each session involves:

- ✓ Practicing skills learned in 2-3 online modules.
- ✓ Learners receive feedback from expert instructors and peers
- ✓ Q & A session with expert intructor

1 hour sessions weekly over 4 weeks

Skills mastery

Certificate of Completion

- ✓ Opportunity to be certified as successfully acquiring PARTNER skills.

Certification involves:

- ✓ Achieving passing grade on each module's quiz.
- ✓ Successful demonstration of skills during simulated conversations with actor-family member via videoconference.

Course Completed over 4 weeks

Learning Boost

- ✓ Monthly, learners receive and email with a learning "pearl", such as:
- ✓ A brief written summary and video of a core skill.
- ✓ A description of a challenging situation about EOL decisions with suggestions.
- ✓ Link to online module for more information.

Periodic "learning boosts"

Figure 1. Overview of online communication skills training program. EOL = end of life; Q&A = question and answer.

Overview of Online Modules

Topic Introduction	VIDEO: **Expert introduces and explains skill**	**2-3 minutes**
Demonstration of Skill	VIDEO: **Expert demonstrates skills with a family in an ICU**	**2-3 minutes**
Interactive Exercises	WRITTEN TEXT: **to provide more details on the skills** CASE STUDIES: **to explore appication of skills** BRIEF VIDEOS: **that illustrate common errors** INTERACTIVE EXERCISES: **drills in which learners type responses to specific scenarios presented in videos**	**15 minutes**
Skills Assessment	QUIZ: **Brief assessment of skills mastery**	**2-3 minutes**
		20-30 minutes

Figure 2. Overview of asynchronous online training modules. ICU = intensive care unit.

topics covered in the online modules, conducted via a discussion board within the online training program. The instructor initiates the discussion with an open-ended question to the group about the communication skill. Over the course of the week, learners contribute their responses, read others' responses, and post comments, additional replies, or questions that continue the dialogue. The instructor monitors the conversation and provides guidance or suggestions as needed. Online discussion helps to promote social learning by encouraging a sense of connection over the self-paced components of the training (53).

Deliberate Practice Sessions via Videoconference

Weekly throughout the training program, the group "convenes" for a 1-hour live deliberate practice session conducted via videoconference. The session is designed to replicate the experience of receiving in-person coaching from an expert. After brief introductory remarks by the instructor to set the agenda and expectations, each learner engages with the standardized patient to practice the skill, receives feedback from the expert and peer learners, and then repeats the skill. An important attribute of the videoconference interface is that it allows the learner who is interacting with the actor playing the surrogate to only see the video of the surrogate on their screen,

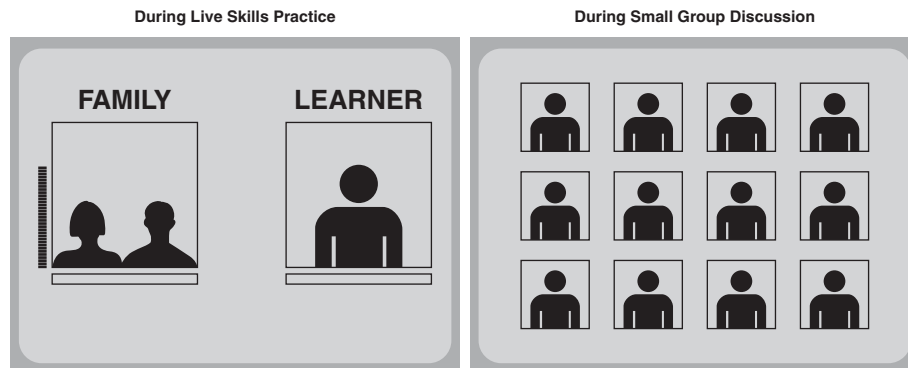## Overview of Videoconference Interface

Figure 3. Illustration of videoconference interface for skills practice sessions.

whereas the instructor and learners who are observing the interaction see a split screen that contains a video feed of both the learner and the surrogate decision-maker. The videoconference interface also contains a "discussion mode" in which video of all of the learners and the instructor are visible on the screen (Figure 3). Incorporating these elements allows trainees to learn from one another's strategies and experiences while promoting accountability and social connectedness, which contribute to motivation and persistence.

Certification

Learners complete a certification exam at the end of the training program in which they interact via videoconference with an actor portraying a surrogate decision-maker. Case details are provided to the learner before the examination. The encounter is videorecorded and then scored by an instructor using a standardized review template. Learners who earn a passing grade receive a letter confirming their certification and those who do not earn a passing score are eligible to retake the examination.

Booster Learning

Finally, monthly "learning boosts" are sent to the learners via e-mail and contain a relevant learning pearl, such as a brief video demonstrating how to respond to a challenging situation during a goals-of-care conversation. The learning boosts are designed to both review basic content covered in the course and to extend the learning to more challenging situations.

POTENTIAL CHALLENGES AND FUTURE DIRECTIONS

There are several key challenges to, and unanswered questions around, using web and online technology to overcome the scalability problem with communication skills training programs. First, despite the economies of scale that arise from using a web and videoconference training platform, developing individual courses will require a significant investment of time and money. However, we expect that this training platform will be far more cost effective over time compared with in-person training programs, which register high costs from every participant in terms of travel, lodging, course registration fees, and the opportunity cost of time away from remunerative clinical work. Even with these advantages, access and clinician time may remain barriers. The training would still require time away from billable work if completed during clinical hours, whereas, if clinicians complete this training after hours, it could disadvantage groups who already experience disproportionate hardship from the inequities in the medical profession, such as women and single parents. We expect that this training would fulfill Continuing Medical Education or Maintenance of Certification requirements and thus could be leveraged without adding additional hours.

Second, it requires different skills of instructors to coach learners via videoconference than in a classroom, and instructors will need focused training on how to effectively facilitate deliberate practice sessions conducted via videoconference. However, best practices are emerging to support instructors in making this transition (54).

Third, preserving the emotional and social experiences of training programs, which are likely critical to their effectiveness, may be difficult even with a well-designed set of synchronous and asynchronous group discussion features. Before dissemination, the training platform we have developed needs to be formally assessed in a randomized

trial to establish its effectiveness in improving clinicians' performance in actual patient encounters. We also need to rigorously assess whether our strategies to achieve retention are effective. Subsequently, it will also be important to conduct comparative effectiveness studies with in-person training programs as the comparator arm.

This platform could also help address racial and socioeconomic inequities in medicine by making communication skills training more accessible to individuals who serve disadvantaged populations, such as in safety-net hospitals, in which resources may not exist to fund clinician travel. It may also facilitate exposure to racially and ethnically diverse simulated patients as well as provide a platform for a curriculum on standing against racism and responding to racism in medicine.

In the future, technologies that are currently under development hold great potential to strengthen online communication skills training programs and decrease costs. For example, advances in virtual reality technology and artificial intelligence may make it possible for learners to practice their communication skills in conversations with avatars that are fully automated and highly realistic. This advance would circumvent the need to use actors in skills practice sessions, thereby decreasing training costs and also allowing the use of numerous avatars of diverse cultural backgrounds to allow training in cross-cultural communication.

Clinicians across the world need effective training for the crucial conversations in medicine that are required to overcome major public health problems. The technology currently exists to create these programs, and major advances in healthcare delivery are within reach.

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