

Assessing Medical Students' Comfort with Telemedicine

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Objective: The Association of American Medical Colleges (AAMC) has recommended that the provision of telemedicine services become an entrustable professional activity (EPA). Given its increased scope, medical student comfort with telemedicine was explored.

Methods: An institutional review board–approved 17-question, anonymous voluntary survey was created based on the AAMC's EPAs and administered to students at Northeast Ohio Medical University across 4 weeks. The primary outcome of this study was to assess medical students' self-reported telemedicine comfort levels.

Results: The response rate was 141 students (22%). At least 80% of students believed that they were able to gather essential and accurate patient information, counsel patients and families, and communicate effectively across a broad range of social, economic, and cultural backgrounds using telemedicine. In total, 57% and 53% of students, respectively, believed that they were able to gather information and diagnose patients using telemedicine as well as they did in person, 38% of respondents believed that their patient's health outcome was the same via telemedicine or in-person visits, and 74% of respondents wished that telemedicine was formally taught in school. Most of the students believed they could effectively gather essential information and counsel patients via telemedicine, but there was a notable decrease in confidence for medical students when comparing telemedicine and in-person care directly.

Conclusions: Despite the EPAs created by the AAMC, students did not self-report the same comfort level with telemedicine as they had with

in-person patient visits. There are opportunities for improvement in the telemedicine medical school curriculum.

Key Words: entrustable professional activity, medical education, telehealth, telemedicine

An emerging trend in the ever-evolving field of medicine is the routine use of telemedicine. Catalyzed by the coronavirus disease 2019 (COVID-19) pandemic, this tool has improved patient access to medical care. The Centers for Disease Control and Prevention notes a 154% increase in the use of telemedicine between March 2019 and March 2020. By June 2020, 35.8% of healthcare visits were conducted by telemedicine.¹ Prepandemic, only 4% of health centers had the existing technological infrastructure to provide telemedicine care.¹ Through the pandemic, 95% of health centers reported using telemedicine to provide care.¹

Government legislation has been passed to widen access to telemedicine and increase reimbursement rates to healthcare providers.² In addition to outpatient visits, telemedicine has grown to create virtually monitored intensive care units and improve monitoring for chronic patient conditions on medical floors.³ In a recent American Medical Association survey of more than 1500 physicians, 80% of the respondents indicated that telemedicine improved the timeliness of care and 68% were highly motivated to increase telemedicine use in their practices.³

Telemedicine has changed how we can practice medicine. The format has increased access to care and ease of follow-up, especially when there are transportation difficulties. As a result, there are opportunities for telemedicine to be formally incorporated into the medical school curriculum. Although telemedicine has not yet been formally incorporated into the Liaison Committee on Medical Education accreditation standards, the Association

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Key Points

- Of all of the survey respondents, only 80% of students believed they could provide and communicate effectively across a range of socioeconomic and cultural backgrounds using telemedicine.
- Only 57% of the students believed that they were able to create equally as effective a therapeutic alliance using telemedicine.
- In total, 57% and 53% of students, respectively, believed that they were able to gather information and diagnose patients as well as they were using telemedicine as they were in person.
- A total of 74% said that telemedicine education should be incorporated into curriculum.

of American Medical Colleges (AAMC) has taken action to discuss its importance.⁴ The AAMC has made an entrustable professional activity (EPA) based on providing telemedicine services.⁵ EPAs are defined as activities that an organization expects its participants to perform independently and competently.⁶ Through these EPAs, the AAMC delineates multiple competencies, including the ability to effectively gather information, engender trust, communicate, and use epidemiological sciences to improve care provision.⁵

Given the prevalence of telemedicine today, we wanted to explore medical student comfort with the provision of medical care through telemedicine. We hypothesized that although medical students believe that diagnostic and counseling abilities do not differ between telemedicine and in-person appointments, the therapeutic alliance and overall quality of care would be perceived as lower when using telemedicine.

Methods

A 17-question, anonymous voluntary survey was created on Qualtrics (Provo, UT) for medical students to complete (a sample of the survey can be viewed at <http://links.lww.com/SMJ/A329>). The survey consisted of six demographic questions followed by 11 questions assessing students' comfort with telemedicine. The survey was estimated to take 10 minutes to complete and could be executed on the participant's computer, tablet, or smartphone. Data were stored on password-protected files. The only people with access to the data were those listed on the institutional review board.

The survey was distributed to all 632 medical students at Northeast Ohio Medical University (NEOMED) via a link in an e-mail. Inclusion criteria for respondents included being a NEOMED student, 19 years or older, and a proficient English-language speaker. The project was reviewed by the institutional review board and determined to be exempt human subjects' research. The survey was active for 4 weeks. At the time of the survey, no formal telemedicine curriculum was in place for NEOMED students in preclinical years. All of the survey respondents were provided a 1-year-long Doximity Dialer Pro subscription upon survey completion. Respondents also could opt out of this subscription. For those who signed up for the free subscription, student e-mail addresses were stored in a separate survey so that the data could remain anonymous.

The primary outcome of this study is to assess medical students' self-reported comfort with telemedicine. Secondary outcomes include trends that may arise from demographic information, including age, medical school year, sex, and race. Analysis was done in Excel (Microsoft, Redmond, WA) and consisted of frequency distributions and χ^2 and *t* tests, with a significance level of $P < 0.05$.

Results

In total, 141 of 632 students at NEOMED completed the survey (response rate 22%) (Table 1). Of this group, 9% of students

were first-year medical students (M1s) ($n = 13$), 22% of students ($n = 31$) were M2s, 35% of students ($n = 50$) were M3s, and 33% of students ($n = 47$) were M4s (Table 1). At NEOMED, the clinical curriculum begins in the third year; thus, 31% of respondents were in their preclinical years and 69% of respondents were in their clinical years. For those in their clinical years, exposure to telemedicine was dependent on the rotation site and the attending physician.

In this survey, most respondents were M3s and M4s, female, White or Asian, and between 19 and 24 years old (Table 1). In terms of sex, the survey respondent data were somewhat representative of the NEOMED demographic data.⁷ In terms of ethnicity, 42% ($n = 66$) were Asian, 41% ($n = 64$) were White respondents, and 3% ($n = 5$) were Black respondents. Hispanic

Table 1. Demographic data

	No. (%)	
Class		
M1	13 (9)	
M2	31 (22)	
M3	50 (35)	
M4	47 (33)	
	Respondent data (%) NEOMED data, %	
Sex		
Male	57 (40)	42.1
Female	81 (57)	57.9
Nonbinary	2 (1)	Not listed
Prefer not to say	2 (1)	Not listed
	Respondent data (%) NEOMED data, %	
Race		
White	64 (41)	68.4
Black/African American	5 (3)	8.8
Native American/Alaska Native	1 (1)	Not listed
Asian American	66 (42)	14
Arab/Arab American	10 (6)	Not listed
Hispanic	6 (4)	5.3
Not listed	4 (3)	3.5
	No. (%)	
Age, y		
19–24	94 (66)	
25–29	37 (26)	
30–34	7 (5)	
35–39	2 (1)	
≥40	2 (1)	
	No. (%)	
English fluency proficiency		
Native/bilingual	123 (87)	
Full professional	17 (12)	
Professional working	1 (1)	

A total of 141 of 632 students at NEOMED completed the survey (response rate 22%). M1–M4, medical school year 1–4; NEOMED, Northeast Ohio Medical University.

Table 2. Telemedicine comfort

I am able to _____ via telemedicine	Strongly disagree (%)	Somewhat disagree (%)	Neither agree nor disagree (%)	Somewhat agree (%)	Strongly agree (%)
Gather essential and accurate patient information	2 (1)	2 (1)	5 (4)	65 (46)	68 (48)
Counsel patients and families	2 (1)	5 (4)	6 (4)	70 (49)	59 (42)
Communicate effectively across a broad range of SES and cultural backgrounds	1 (1)	14 (11)	11 (8)	73 (56)	31 (24)

SES, socioeconomic status.

and “Not Listed” were represented fairly equally to the NEOMED demographic data; however, 6% (n = 10) of the survey respondents were Arab/Arab American and 1% (n = 1) of respondents were Native American. No demographic data were provided for Native Americans and Arab Americans on the NEOMED Web site.

Per survey results, 94% and 89% students believed that they could gather essential information and counsel patients via telemedicine (Table 2). Despite the shifts toward a greater emphasis on providing culturally competent care, only 80% of students believed they could communicate effectively across a range of socioeconomic and cultural backgrounds using telemedicine (Table 2).

Only 57% of students believed that they were as effective in creating a therapeutic alliance and gathering information using telemedicine as they were when meeting patients in person (Table 3). Furthermore, only 53% of respondents believed that they could diagnose patients as well using telemedicine as they could in person. In total, 80% of the students felt comfortable providing patients with appropriate education via telemedicine (Table 3).

Thirty-eight percent of students believed that their patients would have the same health outcome via telemedicine as they do during in-person visits (Table 4); additionally, 96 (74%) respondents said that telemedicine education should be incorporated into the curriculum. Twenty-one percent of students expressed that they wanted more training in telemedicine technology, and 18% said that they wanted more training in telemedicine etiquette and diagnosis, respectively (Table 5).

Discussion

In 2021, 23% of adults reported having had a telemedicine appointment in the last 4 weeks.⁸ In 2022, 38% of adults self-reported

receiving medical care through telemedicine.⁹ Given the prevalence of telemedicine, a concerted effort must be made to integrate it into the medical school curriculum and continually assess student comfort with the method.

Studies show that the most contributory factor leading students to feel culturally competent was life experiences before medical school.¹⁰ As a medical community, we ought to ensure that medical curricula provide students with the confidence they need to address patients from different cultural and socioeconomic backgrounds. Of note, however, is the large shift of medical school curricula during the last few years to emphasize the significance of social determinants of health (SDOH). As we move more toward telemedicine and are better able to obtain a snapshot of a patient’s life through video visits at his or her home, their SDOH become more visible. It is vital that we continue to educate medical students on SDOH, especially in the context of telemedicine. Studies show that when medical students are more involved in SDOH screening, patients have greater access to necessary resources and receive more appropriate referrals, leading to better outcomes.¹¹

Although most students report that they are able to gather information and counsel patients via telemedicine, there was a notable decrease in confidence for medical students when comparing telemedicine and in-person care directly. Similarly, a 2018 meta-analysis showed that the therapeutic alliance that formed virtually in psychotherapy sessions was inferior to that which formed during in-person appointments.¹² Other studies showed that some providers felt unable to tailor telemedicine to patient needs and found it more difficult to portray friendliness and collaboration.¹³

In our survey, fewer than 60% of respondents believed that they were able to gather information and diagnose patients as well using telemedicine as in person (Table 3). Most of the respondents for this

Table 3. Telemedicine vs in-person comfort

I am able to _____ equally as effectively via telemedicine as I am able to in person	Strongly disagree (%)	Somewhat disagree (%)	Neither agree nor disagree (%)	Somewhat agree (%)	Strongly agree (%)
Create/maintain a strong therapeutic alliance	8 (6)	33 (25)	16 (12)	58 (45)	15 (12)
Gather information	7 (5)	32 (25)	17 (13)	57 (44)	17 (13)
Diagnose my patient	10 (8)	36 (28)	14 (11)	59 (45)	11 (8)
Provide patient education	2 (2)	13 (10)	11 (8)	62 (48)	42 (32)

Table 4. Perceived telemedicine vs in-person care outcomes

	Strongly disagree (%)	Somewhat disagree (%)	Neither agree nor disagree (%)	Somewhat agree (%)	Strongly agree (%)
My patient's health outcome is the same via telemedicine or in-person visits	7 (5)	28 (22)	45 (35)	40 (31)	9 (7)

survey were on their clinical rotations, and the patient interview examinations for those classes were mostly virtual because of the impact of COVID-19. Although some providers experienced discomfort with telemedicine, many physicians thought it was much more important to provide care through telemedicine than to cancel appointments or significantly postpone them for in-person care.¹⁴

When telemedicine visits do occur, students tend to be a more passive part of the care team, because there are typically more limited roles for students to participate. This may lead to a decrease in telemedicine comfort, especially because there is limited integration into the preclinical curriculum. As shown by Tables 3 and 4, most respondents trust their clinical skills, but there is still a difference in perceived comfort and outcomes with in-person visits versus telemedicine visits. As a result, the knowledge gap that students are trying to fill is largely because of a lack of comfort with the technological aspects of the medical encounter. One solution is for medical schools to consider holding more simulations for students to practice telemedicine skills and lectures that review the main functions and features of telemedicine platforms. If students are given more telemedicine training before their clinical years, then they may be able to participate more fully in clinic visits. For example, the medical student can initiate the visit, and the resident or attending can fill in knowledge gaps after the student has finished asking questions.

Other concerns that arose multiple times through the study were telemedicine etiquette, how to effectively conduct physical examinations, and how to adapt the line of questioning to accommodate the limitations of telemedicine. A 2020 study showed that an 8-hour telemedicine curriculum yielded a 92% self-perceived improvement in comfort and ability to conduct video-based patient encounters, including telemedicine etiquette, and the physical examination.¹⁵ Other studies show that when telemedicine was incorporated as part of the current objective structured clinical

examinations during COVID, not only did students welcome this change but also the examination was able to show care gaps in telemedicine that had not been identified in the past (physical examination skills, ability to use telemedicine features for examination/laboratory results).^{16,17}

The limitations of this study included that data were assessed from a single medical school. Some medical schools may have a more robust telemedicine curriculum than NEOMED. Other limitations may include the significant lack of representation of M1 students in this survey, although M1s have the least exposure of all medical school classes to telemedicine. Furthermore, a majority of the age demographic included in this survey is 19 to 24 years, which is not fully representative of the average age of medical school students nationwide. Future directions for this project include expanding the survey to medical schools nationwide, longitudinally, with quantity and years of exposure to telemedicine as independent variables.

Conclusions

Despite the EPAs created by the AAMC, students are not self-reporting the same comfort level with telemedicine as they are in-person patient visits. The AAMC should consider issuing more formal requirements in the form of Liaison Committee on Medical Education accreditation standards. Medical schools can consider creating a curriculum to increase student comfort with telemedicine and including telemedicine as a part of objective structured clinical examinations.

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Table 5. Interest in learning specific aspects of telemedicine

Aspects	No. (%)
Telemedicine etiquette	58 (18)
Telemedicine technology	69 (21)
Gathering patient information	34 (11)
Diagnosis	59 (18)
Patient counseling/education	40 (12)
Telepresence	56 (17)
Other ^d	6 (2)

^dPhysical examination (×4), more detailed line of questioning because of physical examination limitations.

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