The Changing Landscape of the Preclinical Medical School Curriculum: Results from a Nationwide Survey of United States Medical School Curriculum Deans

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INTRODUCTION

In recent years, US medical schools have increasingly incorporated online learning into the previously classroom-based pre-clerkship (ie, “preclinical”) curriculum.1,2 The proportion of US medical students who attend live in-person classroom lectures has gradually declined, with learners instead choosing to watch recorded lectures online on their own time and at their own pace.1,2 These changes have been further accelerated by the coronavirus disease 2019 (COVID-19) pandemic, as medical schools have been forced to incorporate educational strategies that allow for remote learning and social distancing.2,5

With the shift from live in-person classroom learning to online learning, medical students have assumed greater control over their preclinical education. In addition to or in place of watching institution-specific recorded lectures online, they now incorporate a variety of external resources (ie, Aquifer, Boards and Beyond, First Aid, Pathoma, Sketchy, and UWorld) into their preclinical studies. These external resources are typically commercial study aids that can aid in learning, but also contribute to student debt and are not necessarily vetted by medical schools for accuracy and reliability.5 They have collectively been referred to as the parallel, medical student-directed curriculum.2,7 As the “parallel curriculum” gains popularity among medical students, there has been discourse among US medical schools regarding how to best align the formal, institution-specific curriculum with the ubiquitous “parallel curriculum.” Some medical schools have already started to integrate external resources into their curricula or subsidize individual student subscriptions to these external resources; however, discussion has also arisen about whether US medical students would be better served by a universal preclinical lecture curriculum that either incorporates many of these external resources or integrates optimized lectures from different institutions.1,8 Similarly, whether the preclinical curriculum should be shortened from the traditional 24 months to 12-18 months has also emerged as a topic of debate, with the increasing shift

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to a “parallel curriculum” and the transition of the US Medical Licensing Examination (USMLE) Step 1 to pass-fail perhaps playing a role in this discussion.

We conducted a nationwide survey of US medical school curriculum deans to collect information regarding the current structure of preclinical medical school curricula and to gather opinions regarding a universal preclinical lecture curriculum.

METHODS
A survey (Appendix) was created in Qualtrics for distribution to curriculum deans of the 155 allopathic US medical schools. The survey was composed of 11 items, each a mix of multiple-choice and free-text questions designed to collect information regarding the current structure of preclinical medical school curricula and to gather opinions about a universal preclinical curriculum.

A list of the 155 allopathic US medical schools was obtained from the Association of American Medical Colleges. Using the website for each respective institution, the names and email addresses for curriculum deans of all 155 allopathic US medical schools were identified, and the survey was distributed to these curriculum deans via email.

Between November 8, 2021, and January 31, 2022, responses were collected via Qualtrics. Up to 3 reminder emails were sent to non-respondents.

Data were aggregated and de-identified for statistical analysis. Frequency of responses to multiple-choice questions were compared, and responses to free-text questions were evaluated for common themes.

This study received an exemption from the Johns Hopkins Institutional Review Board (IRB00298607; September 28, 2021).

RESULTS

Survey Response
The overall response rate was 42% (65 out of 155 allopathic US medical schools). Of the responding US medical schools, 20% (13/65) were Top 25 US News & World Report Schools in 2022. A total of 38% (25/65) of responding institutions were private and 62% (40/65) were public. In terms of regional distribution, 25% (16/65) were in the Northeast, 28% (18/65) were in the Southeast, 23% (15/65) were in the Midwest, 12% (8/65) were in the Southwest, and 12% (8/65) were in the West.

Delivery of Preclinical Lecture Content
Prior to the COVID-19 pandemic, the majority of institutions (53/65; 81%) reported that their pre-clinical lectures were delivered in-person with optional attendance, recorded live, and subsequently uploaded online (Figure 1A). The next most common mode of lecture delivery was in-person and mandatory but without online upload (4/65; 6%). Only one institution offered preclinical lectures pre-recorded and fully online prior to the pandemic, and one institution noted that lectures were not utilized at all in their preclinical curriculum. Among the 53 institutions that offered in-person, optional lectures with subsequent online availability in the pre-pandemic period, 43 (81%) anticipated continuing this method over the next 1 to 3 years, 4 (8%) anticipated adding a livestreaming option and 3 (6%) anticipated transitioning to a pre-recorded, fully online preclinical lecture curriculum. (Figure 1B). Among the 4 institutions with in-person, mandatory lectures with no online availability, 3 (75%) planned to continue this method, and 1 (25%) planned to change to in-person with mandatory attendance and recordings uploaded online. Overall, a total of 4 (4/65, 6%) of the institutions planned to offer a pre-recorded, fully online lecture curriculum within the next 3 years, and many institutions anticipated also incorporating live-streaming, additional online resources (eg, interactive syllabi with embedded videos), or both, into the preclinical lecture curriculum.

Delivery of Small Group Content
In terms of small-group content, the majority of institutions anticipated delivering preclinical small-group content in-person (49/65; 75%), but many planned to use a hybrid format of online and in-person content (15/65; 23%).

Length of the Preclinical Curriculum
Most institutions currently allocate 1.5 years (45%) or 2 years (45%) to the preclinical curriculum (Figure 2A). Forty-two percent of institutions (27/65 respondents) anticipated decreasing the length of time allocated to the preclinical curriculum over the next 1 to 3 years (Figure 2B). Of the institutions with a 2-year preclinical curriculum, 8 out of 29 (28%) did not plan to change the number of years, 18 out of 29 (62%) anticipated decreasing to 1.5 years, and 1 out of 29 (3%) anticipated decreasing to 1 year. Similarly, 3 out of 29 (10%) of the institutions with a 1.5-year
curriculum anticipated decreasing to 1 year, and 1 out of 29 (3%) anticipated decreasing to 1.25 years. Overall, only 1 out of 65 respondents (2%) anticipated increasing the number of years allocated to the preclinical curriculum, with an anticipated change from 1.5 years to 2 years. Of those institutions who anticipated changing the number of years allocated to the preclinical curriculum, some felt that the shift of Step 1 to pass-fail influenced their decision (6/28; 21%), but the majority did not (22/28; 79%).

Integration of External Resources into the Preclinical Curriculum

Approximately 48% (31/65) of institutions reported incorporating existing video lectures or question banks from external resources into the formal preclinical curriculum, with Osmosis and Pathoma as the most common for video lectures and UWorld as the most common for question banks (Figure 3). A total of 54 out of 65 (83%) institutions also reported subscribing to or providing subsidy to medical students for a variety of external resources, with institutional subscriptions to UWorld (38%) and subsidizing individual student subscriptions to UWorld (29%) being most common (Figure 4). No institutions reported that their current preclinical lecture content was created exclusively from external resources.

Opinions Regarding a Universal Preclinical Lecture Curriculum

A total of 54% (35/65) of respondents felt that there should either definitely (yes) or possibly (maybe) be a
universal preclinical lecture curriculum (ie, standardized pre-clerkship lectures across all medical schools in the United States) (Figure 5).

In free-text comments, themes emerged about advantages of a universal preclinical lecture curriculum:

1) Standardized lectures could allow for faculty to focus on active learning.

“Frees up faculty from lecturing to a handful of people and gives time to develop more interactive sessions.”

“These online resources provide the opportunity to stop wasting faculty time preparing lectures and focus more time on experiential learning.”

2) Students are already using external resources as a universal preclinical curriculum.

“My faculty and I are very frustrated by the lack of (lecture) attendance.”

“Our students already pretty much do this and we need to get on board.”

3) A repository of lectures that faculty can choose from could be ideal to allow for some degree of customization by faculty at each school.

“I think a core curriculum a la the Khan Academy would be great.”

“Even a menu of available lectures for schools to choose from would be helpful.”

“I think it makes sense if there were a pool of lectures that institutions could pick and choose from.”

“I suppose a best practices resource compendium could be useful, but I wouldn’t want a required shared curriculum.”
Content should be accessible and widely available.

4) Universal lectures could allow for Step 1 to be a prerequisite, and then medical school could focus more on clerkships.

“If we go to universal, why not start medical (school) after passing Step 1? Cultural studies suggest that acculturation takes about 4 years. We can use this time more wisely and [engage in] formative longitudinal small group experiences.”

In free-text comments, themes emerged about the disadvantages of a universal preclinical curriculum:

1) Concerns about barriers to faculty buy-in and possible resentment.

“I totally support the idea of a universal core curriculum, but given human nature, don’t see the needed faculty acceptance.”

“I don’t think it will be possible to get universal adoption.”

“Having prescribed specific lecture content across 3 campuses, in our experience many faculty very much resent the lack of autonomy and the inability to personalize their style and message.”

2) Concerns about stifling curricular innovation and institutional individuality.

“We should not just be teaching to USMLE. Each institution has its own flavor and this should be emphasized in the curriculum.”

“Pre-clinical courses at research-intensive medical schools will be different from those at schools training mostly primary care clinicians. There should be flexibility for a diverse range of curricula.”
"This does not allow for accommodation for unique populations and culture."

"Different institutions have different priorities and foci. It can’t be one size fits all for everyone."

"It would not allow any customization for local circumstances. For example, certain genetic conditions are seen with greater [or lesser] frequency here than in other parts of the country with different population bases."

"We don’t have a universal patient population/community. Preclinical curriculum should be as connected with patient populations as the clinical curriculum."

3) Concerns about recruitment (ie, that students choose schools based on the different lectures at each school).

“Our surveys of accepted and non-accepted students indicate faculty and the specific curriculum are high on the list of reasons for choosing a particular school.”

**DISCUSSION**

In this nationwide survey of US medical school curriculum deans, we found that the landscape of preclinical lecture curriculum delivery is anticipated to change over the next 1 to 3 years. Of the responding institutions, many US medical schools anticipated increasingly incorporating online learning into the preclinical lecture curriculum by utilizing a mix of recorded institutional lectures and external resources. In addition, the majority of institutions also anticipated consolidating their preclinical curriculum to 12 to 18 months. In terms of lecture content, we found that approximately half of the responding institutions felt that a universal preclinical lecture curriculum should either possibly or definitely be considered for all medical students nationwide.

That a majority of responding medical school deans would consider the concept of a universal lecture curriculum is not altogether surprising. The unprecedented rate of changes in medical discovery and in US health care systems, and the need for increased attention to topics such as racism in medicine and care of a diverse patient population, necessitate frequent and major changes to curriculum that may not be feasible for many institutions. Expensive, large-scale efforts at curriculum reform have demonstrated that medical schools often need to replace up to 25% of their curriculum over all 4 years to adequately address changes in health care structure.

Additionally, medical student learning preference has shifted away from traditional, in-person lectures to online lectures that can be viewed on a student’s own time and at their own (often sped-up) pace. Between 2018-2020, an Association of American Colleges survey indicated that over one-third of second-year medical students “almost never” attended in-person lectures, a percentage that will only continue to increase. However, despite this evolving trend, our survey shows that most institutions were still offering in-person lectures (with recordings subsequently uploaded online) prior to the pandemic even with poor attendance.

Even more surprisingly, most institutions plan to continue this mode of delivery over the next 3 years rather than shifting to a fully online lecture curriculum. This continuation may reflect an overall lack of faculty protected time, expertise, and technology resources to support this major shift. This technology and expertise gap is only exacerbated by the availability of external medical education resources. Catalyzed by the shift to remote learning during the COVID-19 pandemic, company-led medical education has now become one of the fastest growing markets worldwide. Medical schools, who have traditionally relied on a small number of faculty to produce 1-hour lectures using basic presentation software, are now forced to compete with large multifaceted teams who can create short, animated video lectures with high production value.

To our knowledge, this is the first study to gather information directly from medical school curriculum deans regarding the current structure of preclinical medical school curricula and potential changes going forward. The strengths of our study include the use of a survey that incorporated both multiple-choice and free-text questions, allowing for a more thorough and nuanced assessment of respondent opinions. With regard to the limitations of our study, it must be noted that with an overall response rate of 42%, our results do not fully capture information from all medical schools nationwide; however, responding institutions
were notably diverse in terms of geographic distribution and public vs private designation. Additionally, because a single individual at each responding institution completed the survey, it is important to recognize that differences in opinion may exist among faculty members within a single institution.

Over the past few years, many medical educators have predicted an inevitable shift in the preclinical medical school curriculum—a shift that increasingly incorporates the use of new technologies and online learning. We are hopeful that our findings will spark additional national dialogue regarding future directions of medical education and continued reimagining of the preclinical medical school curriculum.

References

SUPPLEMENTARY DATA
Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.amjmed.2023.10.021.
APPENDIX

Survey

1. What is your position within the medical school (ex: Associate Dean for Curriculum)?

2. Prior to the COVID-19 pandemic, how were pre-clinical lectures at your institution delivered? (Select one)
   - Pre-recorded and fully online (1)
   - In person with optional attendance and uploaded online (2)
   - In person with mandatory attendance and uploaded online (3)
   - In person with mandatory attendance and not uploaded online (4)
   - Other (5) ________________________________________________

3. How do you anticipate your medical school will deliver pre-clinical lectures over the next 1-3 years? (Select one)
   - Pre-recorded and fully online (1)
   - In person with optional attendance and uploaded online (2)
   - In person with mandatory attendance and uploaded online (3)
   - In person with mandatory attendance and not uploaded online (4)
   - Other (5) ________________________________________________

4. How do you anticipate your medical school will deliver pre-clinical small group content over the next 1-3 years? (Select one)
   - Fully online (1)
   - In person (2)
   - Hybrid online and in person (3)
   - Other (4) ________________________________________________

5. Prior to the COVID-19 pandemic, how many years were allocated to pre-clinical curriculum? (Select one)
   - 1 year (1)
   - 1.5 years (2)
   - 2 years (3)
   - 2.5 years (4)
   - Other (5) ________________________________________________

6. Over the next 1-3 years, do you anticipate that you will change the number of years allocated to pre-clinical curriculum? (Select one)
   - Yes (1)
   - No (2)
   - Skip To: 7 If 6. Over the next 1-3 years, do you anticipate that you will change the number of years allocated... = No

   6a. How many years do you anticipate you will change to? (Select one)
       - 1 (1)
       - 1.5 (2)
       - 2 (3)
       - 2.5 (4)
       - Other (5) ________________________________________________

   6b. Did the shift of Step 1 to pass/fail influence your decision to change the number of pre-clinical years? (Select one)
       - Yes (1)
       - No (2)

7. Do you think that there should be a universal pre-clinical lecture curriculum for all medical students in the United States? (Select one)
   - Yes (1)
   - Maybe (2)
   - No (3)

8. (Optional). Please use the space below to provide any additional thoughts or comments on a universal pre-clinical lecture curriculum for all medical students in the United States.
9. Which of the following pre-clinical resources does your institution subscribe to or provide subsidy for? (Select all that apply)

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<th>Institutional subscription (1)</th>
<th>Subsidize individual student subscriptions (2)</th>
<th>Do not subscribe or subsidize (3)</th>
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10. Does your institution integrate existing videos or questions from these resources into the pre-clinical curriculum? (Select one)
   ○ Yes (1)
   ○ No (2)

Skip To: 11 If 10. Does your institution integrate existing videos or questions from these resources into the pre-clinical curriculum? = No

10a. Which of the following resources do you integrate into your pre-clinical curriculum? (Select all that apply)

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<th>Resource</th>
<th>Integrate videos (1)</th>
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10b. If your institution integrates resource videos into the curriculum, is the **pre-clinical lecture content** exclusively created from these videos? (Select one)
   ○ Yes, we exclusively use videos from resources to create our lecture content (1)
   ○ No, we use a mix of these video resources and faculty lectures to create our lecture content (2)
   ○ N/A (3)

11. (Optional). Please use the space below to provide any additional thoughts or comments.