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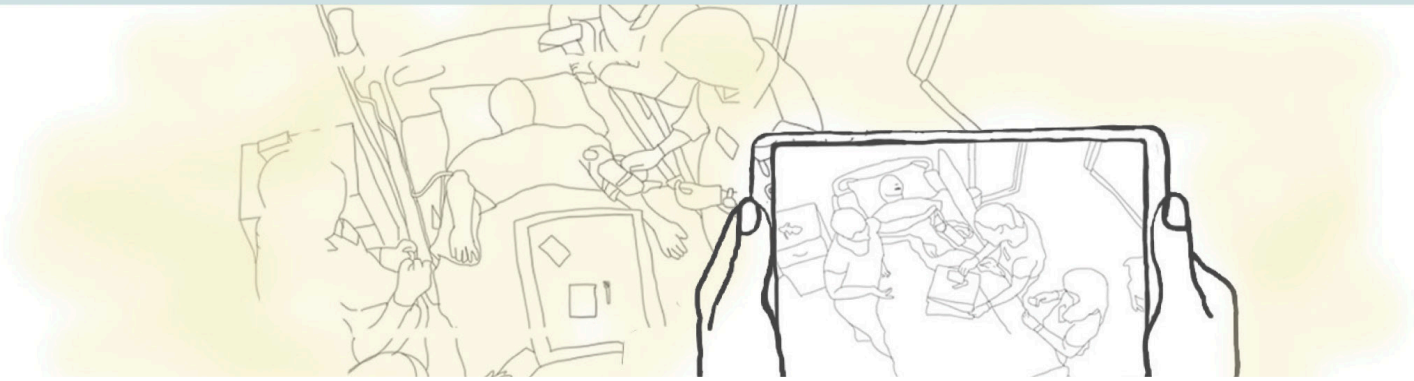
EXECUTIVE SUMMARY

Educating future physicians in the time of COVID:

A scoping review of online medical education



BACKGROUND

The COVID-19 pandemic, and our rapid move to online delivery of medical education, has significantly changed the work of medical educators and administrators, highlighting an important knowledge gap.

OBJECTIVES

Our scoping review was designed to respond to an urgent need to identify, organize, analyze, and share information about how medical education has been, and could be, best delivered in online formats, specifically:

What do we know about delivering online medical education that is

effective,

inclusive,

resilient?

Additionally, given the importance of hands-on clinical and procedural skills in Undergraduate Medical Education, we were interested in how we could guide decisions regarding best curricular formats amid COVID-19.

METHODOLOGY

We used a rapid scoping review methodology, following and adapting the Joanna Briggs Institute manual chapter on scoping reviews that includes the steps: 1. developing the review questions and review objectives; 2. determining the eligibility criteria; 3. developing the search strategy; 4. extracting, analyzing, and discussing the findings; 5. drawing conclusions and 6. discussing the implications for practice and further research.

Results

453 articles were ultimately included. These studies spanned the globe; however, the greatest number originated in the United States (103), with India (23), Germany (21) and the United Kingdom (19) being the next largest groups.

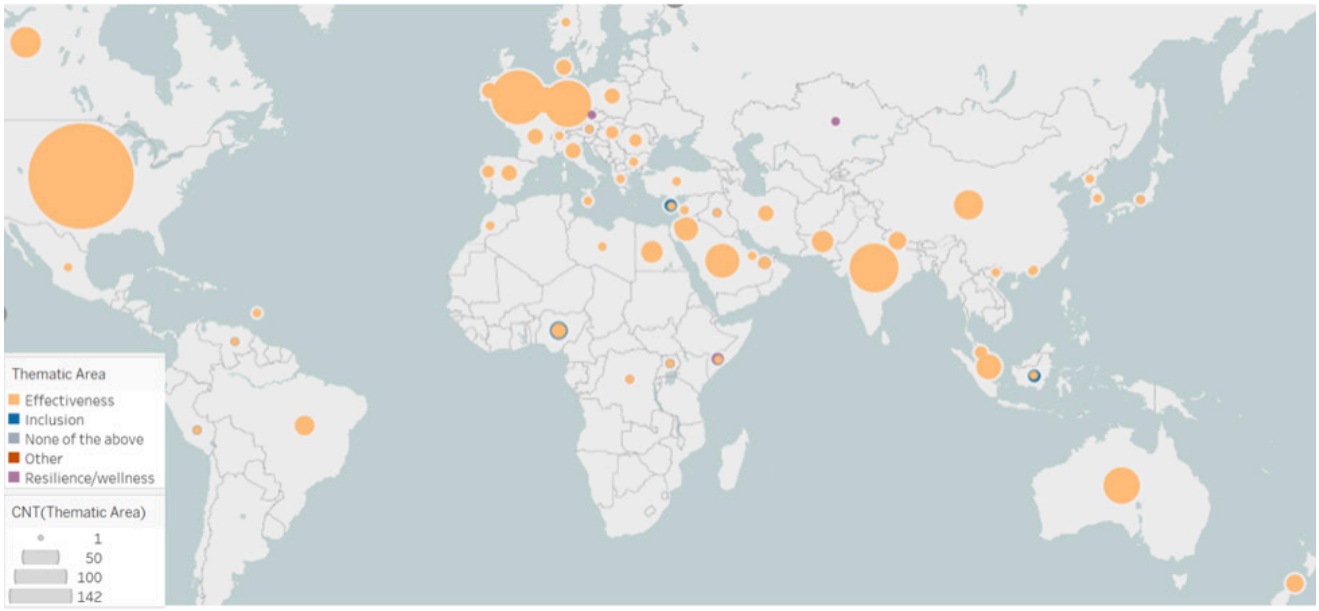


Figure 1: Thematic areas by geographic location

Over half of included articles were Research or Evaluation studies (54%). The remainder of publications were Descriptive (31%) or Opinion pieces (14%) or Other (1%).

Article type	# Studies	% of total
Research or Evaluation	246	54%
Descriptive piece	140	31%
Opinion piece	63	14%
Other	4	1%
Grand Total	**453**	**100%**

Of the 264 research/evaluation studies, 224 were Quantitative, 16 were Qualitative, 13 were Mixed Methods. Eleven were Review articles. Among these 264 research articles, the most common data collection methods were surveys (197), with tests being second (59). In descending order, the remaining methods were focus groups (9), other (8), interviews (7) and user data (3).

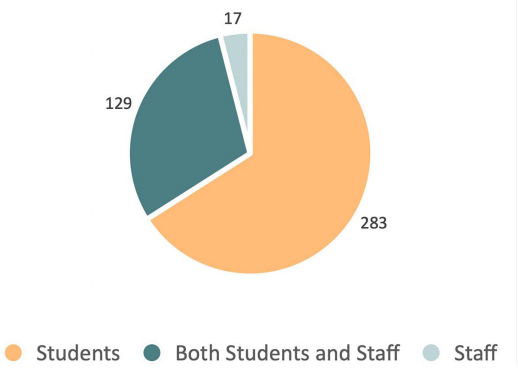


Figure 2: Populations represented in included studies

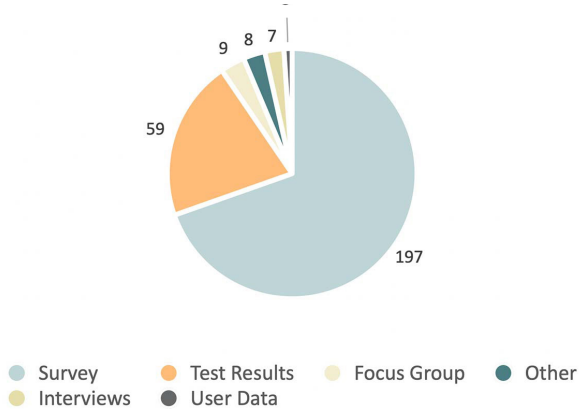


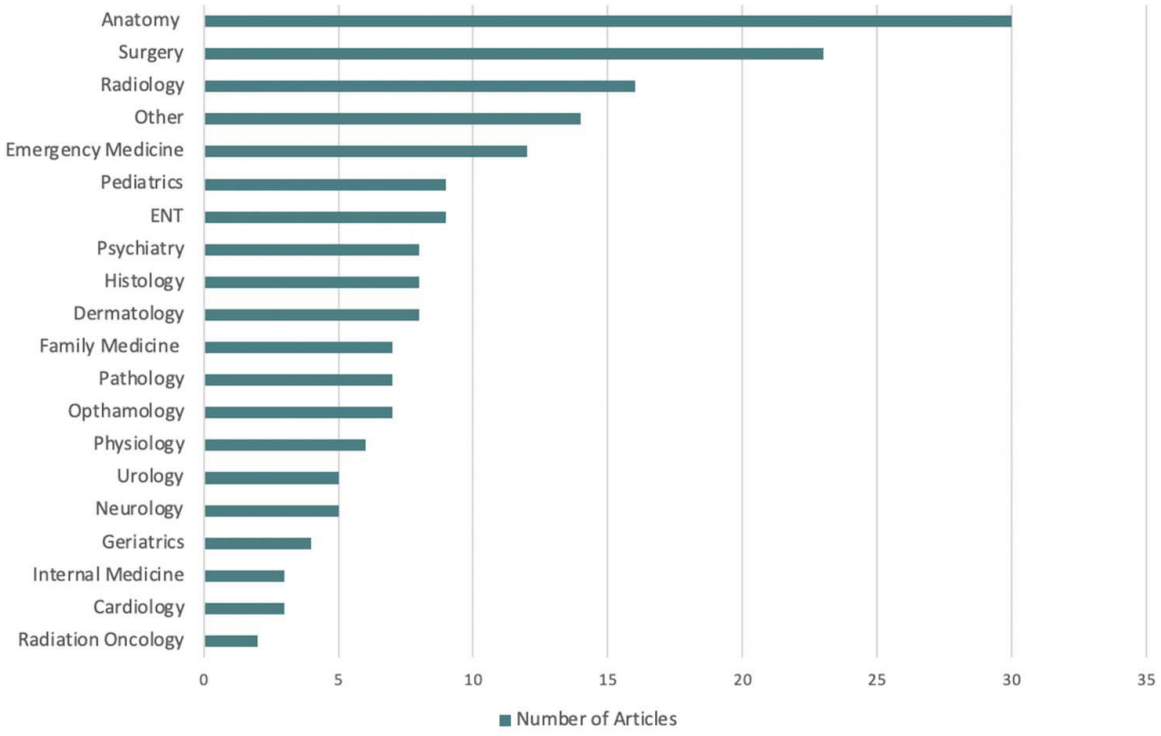
Figure 3: Data collection methods

We identified 41 studies that claimed a particular theoretical orientation, whether with respect to research or education. The most frequent theoretical orientation was Constructivism (8), with Adult Learning Theory (general) (5) being the second largest.

In terms of populations, 283 studies focused on medical students, 17 involved teachers and other staff, while 129 included both groups.

Figure 3: Populations represented in included studies

Eighty-eight papers focused on the pre-clerkship/clinical years while 245 focused on the clerkship (clinical) phase of UGME. One hundred and eighty-eight studies considered both pre-clerkship and clerkship. Not all included articles focused on a particular medical education content area. However, of the 186 that did, the following areas were represented:



**Other category: Forensic Medicine; Endocrinology; Gastroenterology; Global Health; Microbiology; Nephrology; Regenerative Medicine; Respirology; Virology; Wilderness Medicine*

Figure 4: Specialty focus areas in included studies

We identified a wide variety of online learning modalities being used, including virtual lectures, patient simulations, tutorial groups, serious games, academic panels, and e-learning modules. These modalities incorporated a wide variety of online learning tools. We documented 616 total instances of online tool use in the 453 studies that met inclusion criteria. Diverse apps were included in online UGME delivery. Of the 32 apps featured, the most common category was student engagement apps (e.g., polling apps) (12), while the second most common group of apps related to Self-Directed Learning tools (8).

We focused on three thematic areas (effectiveness, inclusion, resilience). Effectiveness predominated (68%), followed by Resilience (17%) and, Inclusion (14%).

1. Effectiveness: Strengths and Challenges

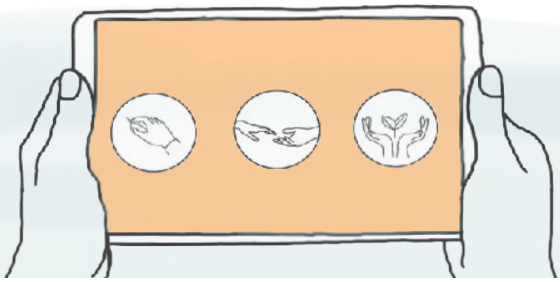
Strengths	Challenges
1. Flexibility	1. Poor internet connectivity and infrastructure
2. Innovative teaching approaches	2. Inadequate online learning devices
3. Innovations in virtual resources, curricula	3. Lack of appropriate physical space
4. Minimization of barriers for student progression to residency	4. Incompatible microphones, cameras, and software, and more
5. Expanded role of medical students in UGME design and delivery	5. Physical ailments caused by increased screen use
6. Expanded role of residents in UGME teaching	6. Diminished student engagement and participation
7. Multiple potential channels for in-class communication	7. Logistical, financial, legal, psychological and ethical challenges involved in online assessment
8. Development of telemedicine skills	8. Delivering hands-on skill and/or clinical learning offered by traditional clinical electives and clerkships, cadaver-based learning
9. Innovations in formative assessment for students and teachers	9. Gaps in technological proficiency (both students and teachers)
	10. Threats to residency transition: exposure to specialties, references, interviews
	11. Establishing online teacher presence
	12. Diminished connection, belonging, spontaneity found in face-to-face interactions
	13. Emotional detachment brought by screen-mediated interactions

2. Inclusion: Strengths and Challenges

Strengths	Challenges
1. Virtual clerkship rotations	1. Inequitable access to internet, equipment, other resources
2. Innovative, low-cost simulations	2. Inequities in residency selection process
3. Greater accommodation of diverse communication and teaching/ learning needs	3. Disproportionate impact of COVID, online learning on HE students, staff, low-resource countries
4. Innovations in inclusive teaching and learning	4. Expensive UGME tools
5. Increased resource sharing	
6. Development of innovative, low-resource curriculum materials	
7. Revising virtual curricula to be more inclusive	
8. Greater attention to digital divides	

3. Resilience: Strengths and Challenges

Strengths	Challenges
1. Transition to online learning has proven staff and student resilience	1. Fear and uncertainty about the future
2. Virtual offerings have assuaged student fears and frustrations	2. Increased isolation, grief, and loss amid fewer supports
3. Great time and/or flexibility for at-home wellness activities	3. Difficulty focusing and reduced motivation and time management
4. Virtual offerings can be designed for psychological safety and emotional wellbeing	4. Increased levels of anxiety and depression
5. Virtual tools can help reduce test anxiety	5. Risk of unmanageable workloads for staff
6. Virtual platforms can offer emotional and psychological supports, Virtual mentorship, peer support, and informal check ins	



Key messages

The three themes of our review, Effectiveness, Inclusion, and Resilience, are inextricably linked within online UGME. Quality medical education requires attention to relational elements, social cohesion, and support for mental and emotional wellbeing. This need is particularly urgent for medical students from Historically Excluded (HE) communities and low-resource countries, who faced disproportionate mental health burdens prior to COVID-19. We provide below a set of 12 implications, and related recommendations, for research, practice, and policy to capitalize on this moment of critical transition.

IMPLICATIONS FOR RESEARCH:

Medical Education would benefit from:

1. more rigorous, theoretically informed research in online learning;
2. broadening the types of research questions being addressed about online learning;
3. more in-depth, qualitative investigations of lived experiences of online learning; and,
4. a thorough, focused review of literature in Simulation and Virtual Reality.

IMPLICATIONS FOR PRACTICE:

Medical Education would benefit from:

1. identifying content areas that are amenable to online learning;
2. considering virtual electives and rotations to increase exposure to non-core clinical areas;
3. seizing the opportunity to weave inclusion into all aspects of online UGME;
4. finding opportunities to integrate feedback into online learning resources;
5. considering the benefits of online assessment; and,
6. embracing creativity born of necessity.

IMPLICATIONS FOR POLICY:

Medical Education would benefit from:

1. designing and implementing curriculum focused on telemedicine; and,
2. ensuring that online education is delivered in a safe, inclusive, and supportive manner.