




Review Article

Peer-Led Web-Based Research Education for Pediatric Surgery Residents in Sudan during the COVID-19 Pandemic (2020-2021): A Narrative Review of an Educational Intervention

Hani E. Bilal¹,, Wala Mohammed Rahma², Abdelhakam Abuelbasher Yousif³, Nosyba Omer⁴

¹ University of Khartoum, faculty of Medicine, Sudan

² Pediatric surgeon- King Faisal Medical Complex Taif

³ Assistant Professor College of Medicine Bahri University, Pediatric Surgery Specialist.

⁴ Pediatric surgery associate consultant King saud medical city.

Abstract

Introduction:

This narrative review evaluates a peer-led web-based research education intervention for pediatric surgery residents in Sudan during the COVID-19 pandemic (2020-2021), assessing its role in maintaining learning continuity and building research capacity in resource-limited settings.

Methods:

Pediatric surgery fellows led weekly online sessions via JITSY, with two streams for academic discussions and research activities. Pre-session article appraisals were shared via social media, and sessions featured resident presentations. A Google Forms survey (n=21) used Likert scales to gauge satisfaction, analyzed descriptively.

Results:

High satisfaction prevailed, with 76.5% strongly satisfied and 17.6% satisfied (94.1% overall). Participants favored hybrid formats (58.8% online/in-person), supporting adaptability in constrained environments.

Conclusions:

Peer-led web-based learning proved feasible and effective for surgical training during crises, fostering research skills and engagement. This model offers a scalable framework for low-resource contexts, warranting further evaluation for long-term impact.

Keywords: Peer-led learning, web-based education, pediatric surgery, research training, COVID-19, Sudan, low-resource settings, surgical residency.



Corresponding Author: Hani E. Bilal, University of Khartoum, faculty of Medicine, Sudan.

E-mail: hanielhaj1@gmail.com



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Introduction

Peer-led learning (PLL) is an educational approach where students assume teaching roles to help their peers understand and master new concepts. This method encourages active participation, collaboration, and shared responsibility for learning among students. PLL can take various forms such as peer tutoring, study groups, collaborative projects, and discussion forums. It enhances deeper understanding, improves communication skills, and fosters a supportive learning community¹. The City College of New York was among the first to implement real-life peer-led learning models, where reducing formal lectures and substituting peer-led sessions led to improved student attitudes and academic performance in Chemistry. This early success spurred further research confirming the effectiveness of PLL in diverse educational settings¹. In medical education, particularly in surgical residency training, having a broad support network that includes more knowledgeable seniors and peer interaction through problem-based learning environments has been shown to improve academic achievement and professional development². During the COVID-19 pandemic, the shift to online and web-based learning platforms became essential due to restrictions on in-person interactions. This transformation highlighted the potential of peer-led web-based education to maintain educational continuity, social support, and engagement despite physical distancing³. The use of peer-led online sessions in surgical education enables learners to develop critical skills beyond academic knowledge, including public speaking, teamwork, presentation abilities, and research appraisal expertise³. This educational innovation provides an accessible and cost-effective tool in resource-limited settings such as Sudan, where traditional face-to-face learning opportunities are often constrained⁴. Moreover, peer-led learning formats empower pediatric surgery residents to actively participate in their own education and build a culture of evidence-based practice and research within their community. Despite its advantages, challenges

remain in implementing peer-led web-based learning, including technological barriers, variability in learners' preparedness and motivation, and the need for faculty support to ensure content quality and learner engagement⁴ (4). Tailored strategies and continuous evaluations are necessary to optimize these educational interventions, enhance scalability, and sustain their impact in similar low-resource contexts⁴ (4).

This article presents an innovative experience with peer-led web-based research education for pediatric surgery residents and fellows in Sudan during the COVID-19 pandemic, aiming to support continuous learning, foster a research culture, and build capacity in challenging circumstances.

Methods

During the 2020 pandemic lockdown, pediatric surgery fellows facilitated a series of online sessions. Two concurrent streams were implemented, focusing separately on academic discussions and research activities. Prior to each session, carefully selected specialty-related articles were critically appraised, and an appraisal checklist was shared with fellows through social media platforms. In weekly sessions conducted via JITSY, moderators guided the discussions while a volunteer resident presented the study design and reviewed the appraisal checklist. To assess participants' experiences, an online survey was distributed using Google Forms, employing a Likert scale to measure satisfaction levels. Data were analyzed and summarized using descriptive statistics.

Results

A total of 21 responses were gathered. 76.5% of the respondents were strongly satisfied with the sessions, 17.6% were satisfied, and 5.9% expressed neutrality. None of the respondents were unsatisfied. Furthermore, 58.8% of the respondents preferred research activities to be conducted both online and through physical attendance, while 35.5% preferred to continue online.

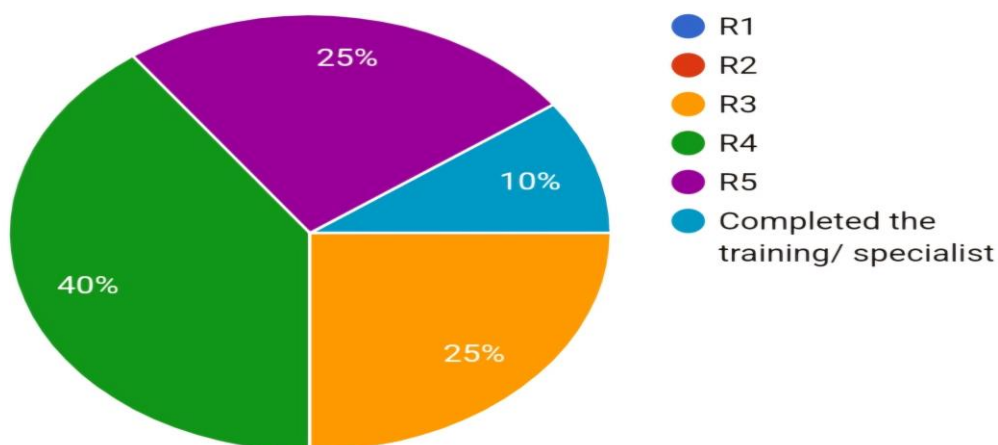


Figure (1): Shows the distribution of the participants throughout the training years

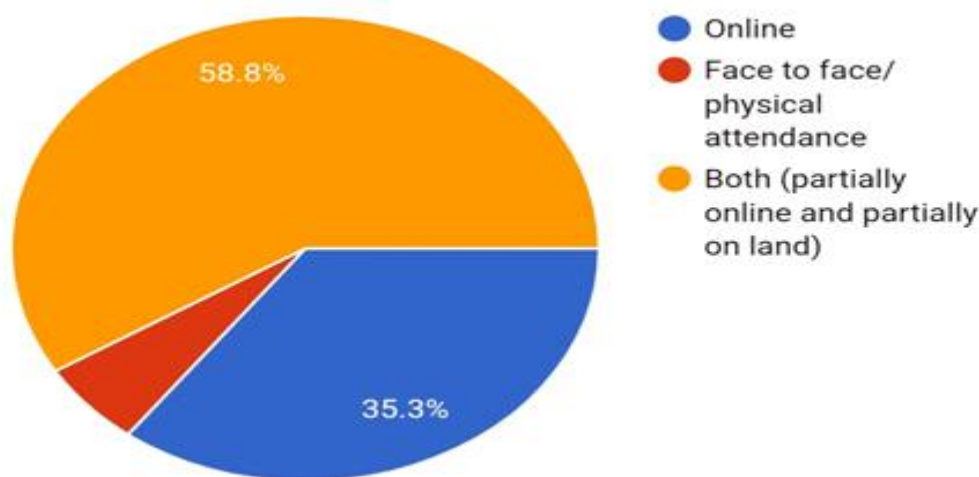


Figure (2): Shows the participants' preferred means of conducting the sessions in the future

Discussion:

The shift to peer-led web-based learning during the COVID-19 pandemic presented both challenges and opportunities for medical education in Sudan. Our experience demonstrates that such initiatives can effectively sustain academic continuity and foster research skills among pediatric surgery residents, even in resource-limited settings 1. The high satisfaction rates observed in our cohort—94.1% reporting strong or moderate satisfaction—align with international studies showing that peer-led teaching enhances engagement, supports collaborative learning, and improves perceived educational value 2 3 4. A key strength of our model was its adaptability to local constraints. The use of web-based platforms enabled residents to participate actively despite physical distancing,

a finding echoed in recent literature on digital education in low-resource contexts 1 4. Moreover, the preference for a hybrid approach (58.8% favored both online and in-person sessions) suggests that blended formats can maximize flexibility while preserving the interactive and supportive aspects of traditional education 4. This is particularly important in regions where access to specialized training is limited. Our intervention also contributed to the development of essential professional competencies, including public speaking, teamwork, and research appraisal—skills that are critical for evidence-based practice and are consistently highlighted in studies of peer-led medical education 2 3 1. By empowering residents to take leadership roles in their own learning, our program helped cultivate a culture of research and continuous improvement within the pediatric surgery community. Despite these

benefits, our study has limitations that must be acknowledged. The self-selected nature of participants, small sample size, and lack of matched data may affect the generalizability of our findings, a common challenge in early-stage educational interventions 4. Additionally, ongoing technological barriers and variable learner preparedness require targeted strategies and continuous evaluation to ensure long-term sustainability 1 4. In summary, peer-led web-based learning offers a viable and scalable solution for maintaining surgical education during crises and in resource-constrained environments. By linking our results to the broader literature, we underscore the potential of such models to build capacity, promote research culture, and advance educational equity in global health 1 4. Future efforts should focus on refining these approaches, expanding their reach, and assessing their impact on both individual competencies and institutional outcomes.

Limitations

The results of this study should be interpreted in the context of several limitations. First, study participants were self-selected and likely biased toward teaching and learning from peers. Second, surveys were anonymous and optional. Given the anonymity, survey data were not matched, and therefore results reflect aggregate, rather than individual, changes. Third, survey response rates were around 50%. Although adequate, responding participants may potentially differ from non-responders. For example, responders may have different motivations and may represent the extremes of those unsatisfied versus satisfied. This phenomenon was shown via the qualitative responses, which were negatively biased overall. This sample size is small and especially important to consider about student instructors, as it may limit generalizability.

Conclusions

The experience of implementing peer-led web-based learning for pediatric surgery fellows in Sudan during the COVID-19 pandemic successfully demonstrated the potential of distance education as a practical and effective

training method in low-resource settings. Led by pediatric surgery fellows, these sessions not only facilitated continuous learning despite pandemic-related disruptions but also contributed significantly to capacity building within the residency program. Participant feedback underscores the value and acceptance of this model, suggesting that integrating peer-led online education into surgical training can enhance research culture and academic engagement. This pioneering initiative in Sudan offers a scalable framework that can inform and inspire similar educational innovations in other resource-constrained environments globally, setting a valuable precedent for future advancements in surgical education.

Authorship:

All authors attest that they meet the current ICMJE criteria for Authorship.

Ethics approval:

Ethical approval was not applicable for this study, as our institution does not mandate approval for reporting individual cases or case series.

Informed consent attestation:

Not applicable for this review.

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Declaration of competing interest:

The authors declare that they have no known competing financial interests or personal relationships that

could have appeared to influence the work reported in this paper.

References

1. International school of Hoo Ch Minh city:(Peer-Led Learning – Definition, Benefits & Its Applicationhttps://www.ishcmc.com/news-and-blog/peer-led-learning/May 2024

2. Vaughan S, Sanders T, Crossley N, O'Neill P, Wass V. Bridging the gap: the roles of social capital and ethnicity in medical student achievement. *Med Educ.* 2015 Jan;49(1):114–123. doi: 10.1111/medu.12597. <https://eprints.whiterose.ac.uk/85422/> [PubMed] [CrossRef] [Google Scholar]
3. Spratte, Brooke Namboodri; Hollis, Alison Nancy; Hollis, Emily Susan; Cole, Yasemin Cunan; Bennett, William Cannon; Alexander, Seth Mckenzie; Parton, Trevor; Beck Dallaghan, Gary L. Near-peer Learning in Medical Education: An Evaluation of a Student-led, Online COVID-19 Course. *Education in the Health Professions* 4(3):p 110-115, Sep–Dec 2021. | DOI: 10.4103/EHP.EHP_38_20
4. Steinert Y. Student perceptions of effective small group teaching *Med Educ.* 2004;38:286–93