

## Commentary

# Consolidating Medical Education in Sudan During War

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## Abstract

### Background:

Providing quality medical education in Sudan faces challenges due to armed conflicts. This short communication explores practical solutions for ensuring the continuity of medical education during the conflict in the Sudanese context.

### Methods:

A comprehensive literature review covered relevant articles published from 1915 to 2023. Four major databases (PubMed, Scopus, Web of Science, and Google Scholar) were searched using keywords related to medical education, war, armed conflict, and affected countries. Data synthesis identified common themes, challenges, and trends and suggested solutions for medical education in conflict zones. Case studies from Ukraine, Liberia, and Iraq were included for a comprehensive understanding.

### Results:

Collaborative alliances among medical schools facilitate resource sharing and support. Engaging the Sudanese diaspora through virtual collaborations, mentorship programs, and faculty exchanges enhance educational experiences. Stable regions as educational hubs ensure uninterrupted academic progress for students from conflict-affected areas. Online and remote education, including asynchronous learning and social media platforms, overcome access barriers and fosters knowledge sharing. Ambulatory teaching provides practical experience and adaptability. Prioritizing faculty well-being and professional development through training and support is crucial. Emphasizing resilience and adaptability in student education prepare them for healthcare delivery in resource-limited settings. Research and innovation contribute to evidence-based strategies. International collaboration and support offer opportunities for knowledge exchange and infrastructure improvement.

### Conclusion:

Implementing collaborative strategies and innovative approaches helps Sudanese medical schools overcome challenges during armed conflicts and maintain quality medical education. These solutions empower students and faculty, enhance resilience, and contribute to improving healthcare systems in post-war Sudan.

**Keywords:** armed conflicts, war, health professions education, medical education, Sudanese diaspora

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## 1. Introduction:

Armed conflicts and wars have far-reaching and devastating effects beyond immediate casualties (1). The conflicts may harm health professional education, leading to disruptions in the teaching and learning process, faculty departures, and limited access to training sites in health services institutes (2). In Sudan, an armed conflict erupted on April 15, 2023, primarily centered around the capital city of Khartoum and the Darfur region. This ongoing conflict has significantly impacted various sectors, including medical education (3).

Previous studies have examined the impact of war on medical education in different regions. For example, Diehl HS (1942) examined the role of medical education during World War II, highlighting the necessity of adapting curricula and training to address wartime conditions (4). Similarly, Marusic MA (1994) conducted a study on the impact of war on medical education in Croatia, shedding light on the challenges faced by medical schools during the conflict (5). Challoner KR and Forget N (2011) also examined the effect of the civil war on medical education in Liberia, revealing the closure of medical schools and the displacement of faculty and students (6).

Srichawla BS et al. (2022) explored the impact of the war in Ukraine on medical students, revealing disruptions in medical education and the broader implications of conflict on students' access to resources and curriculum continuity (7). While these studies provided valuable insights, there is still a significant knowledge gap regarding the comprehensive barriers and interventions specific to maintaining health professional education during times of war (1).

This article intends to provide insights into the challenges faced by health professional education in Sudan during the times of war and propose strategies to overcome these obstacles drawing from case studies conducted in different parts of the world using a comprehensive literature review that was conducted to explore the impact of war on medical education, focusing on relevant articles published between 1915 and 2023 and presenting some of the case studies from the literature.

## 2. Methodology

A comprehensive literature review was conducted to explore the impact of war on medical education, focusing on relevant articles published between 1915 and 2023. The search encompassed four major databases: PubMed, Scopus, Web of Science, and Google Scholar, using keywords related to medical education, war, armed conflict, and

countries affected by conflict. The selected articles underwent a systematic screening process, including title and abstract assessment, followed by a full-text review. Data extracted from the literature were synthesized to identify common themes, challenges, trends, and suggested solutions regarding medical education in conflict zones. Case studies from Ukraine, Liberia, and Iraq, which faced similar situations, were included to understand the subject comprehensively. These case studies were selected due to their unique challenges during conflicts and the availability of relevant studies. Based on the findings from the literature review and case studies, a comprehensive analysis of suggested solutions was presented. These solutions encompassed various aspects of medical education, such as curriculum adaptation, support for faculty and students, resource allocation, and policy development.

### 3. Findings

#### 3.1. International case studies

##### 3.1.1. Medical education and war in Iraq

During the Iraq War, the field of medical education experienced significant disruptions and challenges due to the ongoing conflict. (8). The presence of armed conflict led to the shutdown of medical schools.

Additionally, the prolonged conflict led to severe shortages of essential medical resources, including textbooks, medical equipment, and experienced faculty. Despite the formidable adversities, the medical community displayed remarkable resilience and adaptability. They established support networks, explored innovative solutions, and shared knowledge to overcome the obstacles they faced. Rebuilding healthcare infrastructure, ensuring the availability of essential resources, and guaranteeing the safety of students and healthcare workers is crucial for cultivating a resilient healthcare system.

##### 3.1.2. Medical education and war in Liberia

From 1980 to 2003, during the civil war, Liberia's healthcare and education services suffered due to theft, the destruction of medical school facilities, and the departure of faculty members. Liberia relied on volunteer or subsidized faculty members from partnering institutions to rebuild the medical education system. The scarcity of faculty and the destruction of facilities posed significant obstacles for students. International

assistance, including the support of the diaspora and collaborative efforts, played a vital role in addressing faculty shortages and improving medical education quality(6).

### **3.1.3. Medical education and war in Ukraine**

Medical education in Ukraine is highly regarded for its quality and affordability, attracting numerous native and international students annually (7,9). The ongoing war has significantly disrupted education in the country, forcing a shift to online delivery. This transition challenges students to acquire knowledge, practical skills, and clinical preparation. Limited internet access, faculty's digital proficiency, and damaged infrastructure further compound the difficulties. Comprehensive support and international cooperation are vital to mitigate these disruptions. Short-term measures include online courses, voluntary participation of professors, and addressing technical challenges. Long-term strategies involve aligning with international standards, modernizing the curriculum, and implementing quality assurance mechanisms. These efforts will improve medical education in Ukraine, producing well-prepared graduates. Proactive steps, including comprehensive support and international cooperation, are necessary to ensure quality education for medical students, despite the challenges caused by the ongoing war.

### **3.2. Medical education facing challenges in Sudan during the time of war:**

The conflicts and war in Sudan have severely affected medical schools and hindered their ability to provide uninterrupted education and training to aspiring healthcare professionals. The disruption caused by the conflict has limited access to resources, disrupted academic calendars, and negatively impacted the morale of students and faculty members. The following are some key challenges faced by medical education during the Sudanese war:

- i. Disruption of academic activities: The conflict disrupts the normal functioning of medical schools and universities. This disruption disrupts the continuity of learning and hampers the progress of medical students.
- ii. Inadequate resources and infrastructure: War caused damage to healthcare facilities, including medical schools and teaching hospitals resulted in hampering practical training opportunities for medical students (10) .

iii. The brain drain and shortage of faculty: It is a primary concern. The departure of educators and healthcare providers exacerbates the faculty shortage, thus affecting the quality of medical education.

iv. Safety concerns and limited clinical exposure: In conflict zones, medical students and faculty face increased risks to their safety while engaging in clinical training or providing healthcare services.

v. The psychological impact on students: This cannot be overlooked. Constant exposure to violence and trauma can have a significant psychological toll on medical students. Witnessing the consequences of war on individuals and communities can lead to emotional distress, burnout, and trauma, affecting their well-being and academic performance.

### **3.3. Exploring other possible solutions for medical education challenges during conflict in Sudan**

The profound effects of armed conflicts and wars on healthcare systems and medical education in Sudan necessitate practical solutions tailored to the Sudanese context. These solutions aim to ensure the continued provision of quality medical education despite the adversities of war. By considering collaborative approaches and innovative strategies, this study aims to suggest means to address the challenges medical schools may face during the conflict in Sudan.

#### **3.3.1. Collaboration and resource sharing:**

Establishing alliances among medical schools in Sudan can be a key solution. By fostering collaboration and sharing resources, these alliances can provide mutual support and address the challenges caused by conflict. Through this collaborative approach, expertise, faculty members, and infrastructure can be shared, helping to mitigate the negative impact of war on medical education in Sudan. Similar strategies have proven effective during conflicts in Ukrainian and Iraqi (7–9).

#### **3.3.2. Engaging the Sudanese diaspora:**

The involvement of Sudanese healthcare professionals and educators in the diaspora presents a significant opportunity to support medical schools in Sudan during challenging circumstances (11). Virtual collaborations, mentorship programs, and faculty

exchanges can facilitate the sharing of valuable knowledge and expertise, enhancing medical education within Sudan. Engaging diaspora faculty during times of conflict ensures a continued learning experience and provides specialized mentorship to students. Their unique insights and skills address medical education's challenges while maintaining cultural relevance (12). By serving as mentors, facilitating networking opportunities, and collaborating with international professionals, diaspora faculty prepare students to make meaningful contributions to post-war medical education and the overall improvement of the healthcare systems.

### **3.3.3. Utilizing stable regions within the Sudanese states:**

Despite the localized impact of conflicts in Sudan, medical schools in more stable areas can serve as educational hubs for students from war-affected regions. Students can pursue their education in safer environments by forging collaborative agreements between medical schools across different parts of Sudan. This approach ensures uninterrupted academic progress and exposes students to diverse healthcare settings within the Sudanese context. A similar experience in Nagorno-Karabakh in Armenia demonstrated the effectiveness of this approach (13).

### **3.3.4. Online and remote education:**

Embracing online learning platforms and remote education strategies was particularly crucial in Sudan during the war. Virtual classrooms can deliver lectures, facilitate discussions, and provide interactive learning experiences. By adopting technology, medical education can persist despite physical access challenges and ensure the continuity of education in the Sudanese context. Asynchronous online learning allows students to access educational materials and engage with content at their own pace without real-time interaction. It is imperative in regions with internet connectivity issues (9). It accommodates unstable internet connections by providing offline access to resources and flexibility in studying. Students can review materials multiple times and learn at their speed. Asynchronous learning ensures the continuity and accessibility of medical education during war, overcoming challenges in internet connectivity (14).

Pei et al. (2019) concluded that online learning offers advantages in enhancing knowledge and skills among undergraduate students, making it a promising approach in undergraduate medical teaching (15).

### **3.3.5. Social media platforms in medical education:**

During times of war, social media platforms such as Facebook, Twitter, Telegram, and YouTube can serve as valuable tools in medical education. Social media in medical education can bridge the gap caused by the disruptions of war, enabling learners to continue their education, connect with experts, and stay updated on the latest research and medical developments. These platforms offer opportunities for distance learning, collaboration, and knowledge sharing, making them particularly suitable for medical education in conflict-affected areas where access to traditional educational resources may be limited (16–19). Medical professionals and students can form dedicated groups, share educational content, and engage in discussions, fostering a sense of community and peer support. Additionally, the accessibility and visual nature of platforms like YouTube enables learners to access educational videos at their own pace, enhancing understanding and retention of information.

### **3.3.6. Introducing ambulatory teaching:**

Implementing ambulatory medical education for students offers practical experience in real-world settings during the times of war. It fosters adaptability and resourcefulness as students learn to deliver care with limited resources and collaborate with diverse healthcare professionals (20). Exposure to diverse patient populations cultivates cultural competence and empathy. Through community engagement, students contribute to public health initiatives (21). Ambulatory medical education develops resilience, preparing students to serve effectively in conflict-affected regions.

### **3.3.7. Training and support for Sudanese faculty working in Sudanese medical schools:**

Supporting Sudanese faculty members is crucial to ensure the quality of medical education during war. Adequate training and support, including workshops, webinars, and capacity-building programs, can equip faculty with the necessary skills and knowledge to navigate the difficulties of teaching during conflict. Emotional and psychological support mechanisms should also be in place, prioritizing the well-being of Sudanese faculty members.

### 3.3.8. Strengthening resilience and adaptability:

Resilience and adaptability should be emphasized as core competencies for Sudanese medical students. Integrating these skills into the curriculum prepares students to navigate the challenges of war and provide effective healthcare in resource-limited settings within Sudan. Practical training in emergency medicine, trauma care, and disaster response equips students with the necessary skills to address immediate healthcare needs during conflicts within the Sudanese context.

### 3.3.9. Research and innovation in Sudanese medical education:

Encouraging research and innovation within the Sudanese context is crucial to develop context-specific solutions. Research initiatives focused on understanding the impact of war on medical education, evaluating intervention effectiveness, and identifying best practices that can inform evidence-based strategies within Sudan. Innovation in educational methods, technology integration, and curriculum design can further enhance the resilience and adaptability of medical education in Sudan during times of war.

#### *International Collaboration and Support for Sudanese Medical Education:*

Seeking collaboration and support from international organizations, NGOs, and academic institutions is vital for Sudanese medical education during times of war. Partnerships can facilitate the exchange of knowledge, resources, and expertise, enabling Sudanese medical schools to access support in curriculum development, faculty training, and infrastructure improvement. International collaboration and support tailored to the Sudanese context can significantly contribute to overcoming the challenges faced by medical schools.

## 4. Conclusion:

In conclusion, consolidating medical education in Sudan during times of war is a complex task. The challenges include disruptions in the teaching and learning process, faculty shortages, damaged infrastructure, limited access to resources, and safety concerns. To overcome these challenges, collaborative approaches, engagement with the Sudanese diaspora, online and remote education, the use of social media platforms, ambulatory teaching, faculty training and support, resilience-building, research and innovation, and international collaboration are key strategies.



By forming alliances among medical schools, sharing resources, and collaborating, Sudanese medical education can be better equipped to navigate the impact of war. Engaging the diaspora and utilizing stable regions within Sudan can provide support in terms of faculty expertise and resources. Embracing online and remote education, along with effective use of social media platforms, ensures the continuity of education despite conflict. Ambulatory teaching provides practical experience, while faculty training and support enhance teaching quality. Building resilience and adaptability in students, promoting research and innovation, and seeking international collaboration are crucial for overcoming the challenges.

Implementing these strategies will contribute to consolidating medical education in Sudan during times of war, enabling the production of skilled healthcare professionals who can contribute to the post-war recovery and development of Sudan's healthcare system. It is crucial to proactively address the challenges, collaborate effectively, and adapt to ensure the continuity of medical education and the provision of quality healthcare services in war-affected regions.

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As this study is a short communication, no acknowledgments are included.

## Ethical considerations

Since there was no data collection or involvement of human subjects in this study, ethical considerations are not applicable.

## Competing interests

The authors declare no conflicts of interest.

## Availability of data and materials

This is not applicable to this type of article.

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## Abbreviations and symbols

None-Governmental Organizations (NGOs)

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