

Skilled but displaced: navigating Sudan's surgical brain drain in the era of conflict

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INTRODUCTION

The migration of healthcare professionals from low- and middle-income countries (LMICs) to high-income countries remains a persistent challenge in global health. LMICs invest heavily in training medical personnel, yet many emigrate in search of better opportunities, leaving behind fragile health systems.¹ A 2023 systematic review confirmed that brain drain significantly disrupts population health outcomes across LMICs, particularly undermining health equity and global health security.¹

The ongoing war between the Sudanese Armed Forces and the Rapid Support Forces exemplifies one of the world's largest contemporary humanitarian crises, and has accelerated the critical outflow of Sudan's surgical workforce.² This commentary argues that Sudan's war-accelerated surgical brain drain exemplifies how fragile systems lose both skills and service capacity while catalysing low-cost adaptations that could inform a realistic recovery plan.

THE SCALE AND DRIVERS OF THE SURGICAL BRAIN DRAIN

Baseline surgical need and pre-war leakage

Before April 2023, Sudan was already experiencing substantial medical migration. The Sudan Country Commercial Guide reported that over half of Sudanese doctors were practising abroad prior to the war, reflecting severe brain drain driven by political instability, low wages and limited training opportunities.³ Recent analyses further indicate that approximately 30% of Sudan's estimated 3000 annual medical graduates emigrate each year, contributing to persistent workforce attrition across medical specialties including surgery.⁴ In the absence of effective retention policies, these long-standing migration patterns progressively weakened Sudan's health system

SUMMARY BOX

- ⇒ The conflict in Sudan has forced many surgical professionals to leave, severely reducing hospital surgical capacity.
- ⇒ The collapse of surgical services has led to preventable deaths and widened regional inequities in access to essential care.
- ⇒ Some continuity of care is maintained through diaspora-led support and humanitarian medical interventions.
- ⇒ Sustaining recovery will require coordinated protection, training and circular migration pathways involving the Sudanese diaspora.

and reduced surgical service capacity well before the onset of the current conflict.^{3 4}

War-accelerated exodus and service disruption

The 2023 war, however, catalysed an unprecedented exodus. Over two-thirds of Sudanese surgical practitioners reported being displaced, and more than half ceased practising due to hospital closures and insecurity.⁵

Recent data from a 2025 national survey identified approximately 389 general surgery residents enrolled in training across Sudan prior to the war, providing a conservative estimate of the surgical workforce pipeline at that time.⁶ The disruption of this already limited training pipeline means that even if active conflict subsides, recovery of the surgical workforce will lag by years.

The 2023 conflict introduced immediate threats to the lives of healthcare workers—more than 60 documented attacks on health facilities and over 200 incidents of violence against medical staff, including killings and abductions.⁷

As highlighted in a *BMJ Global Health* commentary drawing on first-hand narrative accounts from Sudanese healthcare workers, one doctor stated, 'I'm torn between fleeing for my safety and staying to help those in need'.² Beyond systemic collapse, migration



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decisions are often shaped by concerns for family safety and continuity, alongside disrupted training and career progression.¹

IMPACT ON SUDAN'S SURGICAL SYSTEM

Collapse and fragmentation of surgical capacity

Most public secondary and tertiary hospitals have suspended elective operations, while only a few tertiary and private facilities in relatively stable areas—such as the River Nile and Northern states—maintain partial theatre capacity. Surgical activity has largely contracted to emergency and trauma procedures, with limited elective services persisting in a handful of hospitals (eg, Meroe Hospital).⁸ Due to persistent shortages of basic supplies, patients are often required to provide their own gloves, sutures and syringes before surgery.⁹

Historical workforce data underscore how Sudan's health system was already marked by profound geographic inequality long before the current conflict. According to the Federal Ministry of Health's Annual Statistical Report (2015), Khartoum had nearly 29 doctors per 100 000 population, compared with fewer than 5 per 100 000 in Darfur and Kordofan states, with a national mean of only 20.5 doctors per 100 000.⁸ This uneven distribution of clinicians—and an even smaller share of surgical specialists outside the capital—meant that rural and peripheral regions were already critically underserved.

Access and health outcomes

The contraction of surgical services has had immediate and severe consequences for patient outcomes. Reduced theatre functionality, combined with surging demand for trauma, obstetric and paediatric emergencies, has markedly increased mortality from otherwise treatable surgical conditions. More than 70% of hospitals in conflict zones have closed, drastically limiting access to essential procedures.⁷ In El-Obeid, a 2 week power outage halted the only dialysis unit, resulting in 12 patient deaths.¹⁰ Elsewhere, women have died in obstructed labour without access to Caesarean sections, and trauma patients have succumbed to otherwise survivable injuries.¹⁰

A recent capture–recapture analysis estimated approximately 61 000 all-cause deaths and 26 000 intentional-injury deaths in Khartoum alone between April 2023 and June 2024, with the highest mortality recorded in Darfur and Kordofan.¹¹ These findings demonstrate how declining surgical access and escalating violence intersect to drive excess mortality. Without rapid stabilisation of the surgical system, preventable deaths from treatable conditions will continue to rise.⁷ Systematic postoperative follow-up for patients discharged early was largely not feasible due to insecurity, population displacement, communication disruptions and the collapse of routine outpatient and referral services in conflict-affected areas.

ADAPTATIONS AND COPING MECHANISMS

Diaspora support and telemedicine

The Sudanese medical diaspora has provided continued professional support through teleconsultations, virtual mentorship and remote supervision of operations using messaging and video platforms. Although network instability has limited coverage, this approach has facilitated real-time triage, intraoperative guidance and limited, case-based postoperative input where connectivity allowed, as well as remote training in conflict-affected regions.¹²

Humanitarian actors

Humanitarian organisations, including Médecins Sans Frontières (MSF) and the International Committee of the Red Cross (ICRC), have re-established trauma theatres, trained local health personnel and supplied essential materials. Evidence from other conflict-affected settings indicates that humanitarian interventions can temporarily expand service capacity but may also compete for limited local staff and disrupt national monitoring systems if not well coordinated.¹³ Integrating humanitarian operations within national recovery and workforce plans is important to ensure that temporary assistance supports long-term service restoration.¹³

SHORT-TERM AND LONG-TERM CONSEQUENCES

Short-term implications

In the immediate aftermath of the conflict, acute workforce depletion and service disruption have forced widespread unplanned task shifting, with junior doctors and non-specialist providers performing complex surgical procedures beyond their formal training. This has increased perioperative risk, variability in clinical decision-making and dependence on improvisation in resource-constrained environments.^{5 7} Concurrently, rising emergency caseloads, inadequate supervision and shortages of essential supplies have intensified burnout, moral distress and attrition among remaining surgical staff.^{2 4 7} These pressures have disproportionately affected peripheral and conflict-affected regions, further widening geographic inequities as surgical care becomes increasingly concentrated in safer or private facilities.^{2 5 8}

Long-term implications

Over the longer term, sustained disruption of surgical training pathways poses a more insidious threat to workforce recovery. The prolonged suspension of postgraduate rotations and repeated interruptions to national examinations have reduced trainees' exposure to index cases, undermining skill acquisition, cohort competency and accreditation continuity. Simultaneously, the loss and displacement of senior surgeons have eroded mentorship structures and institutional memory, weakening the quality and continuity of surgical education nationwide.^{4 6} Without deliberate efforts to stabilise training, retain senior expertise and re-establish supervision, short-term coping strategies risk crystallising into a

persistent skills gap, delaying recovery of surgical capacity even after active conflict subsides.^{4 6}

Toward sustainable recovery and global responsibility

Rebuilding Sudan's surgical workforce requires coordinated short- and long-term strategies. Immediate priorities include protecting health workers under international humanitarian law, restoring essential surgical infrastructure—power, oxygen, sterilisation and supply chains—and establishing systems to monitor surgical activity and workforce distribution.¹³ Interim measures should ensure supervised task-shifting protocols, continuity of salaries, physical safety and psychosocial support for remaining staff.¹⁰

While NGOs are vital in emergency care, full operational control risks fragmented governance and weakened accountability. Humanitarian organisations often provide care where governments cannot, but long-term integration with national systems is essential.¹⁴ Time-limited agreements under Federal Ministry of Health frameworks, adhering to national reporting and building local capacity, provide a more sustainable approach.

Addressing long-standing workforce attrition and weak retention structures that predated the conflict requires guaranteed consultant posts for returning specialists, recognition of overseas training in promotion pathways, rural hardship allowances with housing and portable pensions or social protection. Accredited regional training hubs with distributed supervision, protected rotations and digitally monitored logbooks could strengthen the training pipeline during instability.¹ Structured diaspora engagement through joint academic appointments, time-limited fellowships and remote supervision may reduce permanent attrition while preserving professional mobility.

These measures shift recovery from crisis mitigation to institutional strengthening. Medium-term efforts should target the full perioperative workforce—surgeons, anaesthetists, obstetricians, nurses and technicians—while ensuring ethical international recruitment per the WHO Global Code of Practice.¹⁵ Long-term recovery depends on circular migration models enabling clinicians to train abroad and return with secure posts, fair compensation and academic recognition, embedding resilience into the health system.

CONCLUSION

Sudan's surgical workforce crisis illustrates the intertwined effects of conflict, migration and system fragility. Safeguarding Sudan's surgical capacity requires coordinated international and domestic commitments to security, training and ethical collaboration.

Retaining, supporting and restoring Sudan's surgeons—and the broader perioperative team—is not merely a national obligation but a shared global

responsibility. With decisive, structured action, Sudan can begin to rebuild a resilient surgical system capable of serving its people once again.

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