



Peri-operative management challenges in Gaza

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Abstract

Introduction: The ongoing conflict in Gaza, exacerbated by the large-scale assault by Israeli forces since October 7, 2023, has devastated the healthcare system. Continuous bombardment and a total siege have severely restricted access to essential medical supplies, fuel, and electricity, critically impairing the ability of healthcare providers to deliver necessary surgical care. This review highlights the challenges in both presurgical and postsurgical management under these extreme conditions.

Methods: This narrative review examines reports from health organizations, data, and accounts from medical personnel in Gaza. It focuses on the effects of infrastructure damage, resource shortages, and the psychological toll on healthcare workers to assess the challenges in surgical care during the conflict. It uses a variety of sources, including published material, news articles, grey literature, and personal accounts.

Results: Of 35 hospitals, 26 have been rendered inoperative due to damage, leaving the remaining centres to operate under dire conditions without essential supplies like anaesthesia, antibiotics, or sterile instruments. Basic surgical procedures have become life-threatening, as healthcare providers face overwhelming shortages of supplies and equipment. The lack of follow-up care for patients, combined with collapsing infrastructure, has led to significant increases in morbidity and mortality. Healthcare workers, operating under immense pressure, also face severe psychological strain, further hindering effective care delivery.

Conclusion: The conflict in Gaza has created a critical healthcare crisis, particularly in surgical care. Immediate international intervention is needed to rebuild healthcare infrastructure and provide essential resources. Without urgent action, the healthcare system will continue to deteriorate, leading to more preventable deaths and worsening the humanitarian crisis.

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Introduction

The Gaza Strip, a 365 km² region in occupied Palestine, has been under large-scale attack by Israeli forces since October 7, 2023. Approximately 2.2 million Palestinians—half of whom are children—have endured constant bombardment for 10 months. Attacks have targeted not only military and civilian sites but also hospitals and healthcare centres. On October 9, Israel imposed a total siege, blocking access to electricity, fuel, and essential supplies (1). The UN reports that 1.9 million Palestinians have been displaced, many multiple times, attempting to escape death (2). As of now, at least 39,653 people have been killed and 91,535 injured (3). The siege has further restricted access to fuel, electricity, sanitation, and food, putting the population at risk of malnutrition, disease, and psychological trauma.

Despite the urgent need for medical care, Gaza's health sector is severely depleted in staff, facilities, and equipment. Since October 7, the WHO reported 164 attacks on healthcare facilities and 160 healthcare personnel killed (4). These attacks have left 26 of 35 hospitals non-functional, with only nine hospitals and 18 primary healthcare centres operating at limited capacity with inadequate supplies (4). The electricity cutoff has disrupted essential services, especially surgeries, as hospitals rely on power for imaging equipment, anaesthesia, and life-saving machinery.

Gaza's peri- and post-surgical challenges are severe. International humanitarian law mandates that the occupying power ensure the population's food and medical supplies (5). However, due to supply restrictions, antiseptics are being replaced with vinegar, and surgeries are performed without anaesthesia. Plastic surgeons report reusing scalpels and operating in overcrowded wards (6). The lack of antibiotics, compounded by malnutrition, increases surgical site infections and delays healing. These factors have made even basic surgeries dangerous, highlighting the critical need to address the severe constraints facing Gaza's healthcare system.

Limited Access to Medical Supplies and Equipment

Between October 7, 2023, and May 30, 2024, Gaza's healthcare system suffered 464 attacks, resulting in 727 deaths and 933 injuries. A total of 113 ambulances—61 damaged—and 101 medical facilities, including 32 hospitals, were destroyed (7).

Since April, Gaza has faced severe shortages of medical equipment and medications. Humanitarian aid via the Kerem Shalom entry point has been significantly delayed by the Rafah border closure following Israel's offensive in southern Gaza, alongside red tape imposed by Israeli forces. This has led to long delays and dangerous gaps in aid distribution. Insecurity also prevents aid organisations from delivering supplies where most needed. Medical

demands are overwhelming across the Strip, with no substantial resupply expected soon.

The shortage of pharmaceuticals is critical. Without swift resupply, hospitals may halt operations. Many patients, including those with fractures and burns, are left without pain relief. Hospitals like Nasser and Al Aqsa have had to reduce dressing changes due to a lack of sterile gauze, heightening infection risks (8). Poor management of surgical cases has increased disability and mortality rates, with life-saving amputations prioritised over limb reconstruction. Rehabilitation services are also scarce (9).

Reports confirm many patients die daily in hospitals without receiving treatment, as a direct result of Israeli attacks on healthcare facilities and the severe shortage of medical supplies. Forty-year-old "Bassem Odeh" died in Al-Shifa Medical Complex due to bleeding wounds caused by an Israeli airstrike, while 38-year-old Samira Abu Awad died from untreated heart issues. Eid al-Jaal, aged 67, starved to death after Israeli forces encircled his home for several days. Hospitals across Gaza are no longer functioning, leaving many to die without medical care (10).

Infrastructure Damage and Human Resource Shortages

Patients and healthcare professionals in Gaza are in dire conditions due to limited access to medical supplies and equipment. The primary cause of the severe shortage of essential medical equipment and supplies is the ongoing blockade and damage, which have made it nearly impossible to obtain necessary resources (11). This has severely impacted surgeries, patient care, and overall healthcare provision.

Several factors contribute to the shortage. Hospitals are struggling to function due to a lack of fuel and medications caused by the embargo and war (12). Additionally, Gaza's healthcare system was already weakened by a 16-year blockade, which fragmented the nation's health infrastructure and services (13). These combined factors have led to an extreme shortage of critical supplies, including medicines, surgical tools, and diagnostic equipment, making it challenging for medical professionals to deliver adequate care. Gaza surgeon Ghassan Abu-Sittah describes the situation as critical, with shortages of bandages, IV fluids, and sutures (14). This strain has worsened the already fragile healthcare system, impacting both patients and healthcare workers.

The consequences of limited access to supplies are widespread. For instance, a Médecins Sans Frontières (MSF) surgeon faced difficulties due to inadequate supplies at Nasser Hospital, where patients were treated on the floor because the emergency room lacked beds. Medication was rationed, and critical devices for patient



monitoring were either broken or missing. The Indonesian field hospital in Rafah also faced a shortage of essential drugs like lidocaine, jeopardising the safety and quality of surgical procedures (15). These shortages make it increasingly difficult for healthcare providers to deliver safe and effective treatment.

Access to Specialised Care and Continuity of Care in Gaza

Since the war began, Gaza's healthcare system has faced immense challenges, affecting 2.3 million Palestinians (15). The bombing, blockade, and forced displacement have severely disrupted access to specialised surgical care, and the devastation of infrastructure has brought the population to a critical point (15). Hospitals, such as Al-Shifa, have sustained significant damage, making it difficult to offer comprehensive medical care. Supply networks have been disrupted, further limiting medical resources (14, 15).

Fuel shortages have worsened the situation by restricting the functioning of generators and medical equipment, creating a severe risk to patients' lives. Transporting patients and medical supplies has become increasingly difficult due to damaged roads and restricted access (16, 17). Médecins Sans Frontières (MSF) reported that both pre- and post-operative care have been heavily compromised. Surgeons are forced to reuse scalpels and perform surgeries without anaesthesia due to a lack of supplies (6, 15).

Follow-up care is also severely affected, as violence and restricted movement make it difficult for patients to receive necessary consultations and rehabilitation (18). These interruptions increase complications, resulting in greater morbidity and mortality. Many lives are lost due to the lack of continuous care, adding to the "silent killings" alongside those caused by bombardments (15).

The shortage of proper surgical facilities and follow-up care leads to delayed recovery and worsened outcomes. Gaza's healthcare crisis highlights the urgent need for international support to rebuild its healthcare infrastructure and ensure access to essential care for all (15).

Psychological Trauma and Limited Access to Mental Health Services

War profoundly impacts civilians' mental health (20). Since October 7, 2023, escalating violence in Gaza has led to a mental health crisis among its 2.1 million citizens, 65% of whom are under 25 (21). One of the primary mental health concerns is PTSD (post-traumatic stress disorder), experienced after exposure to traumatic events. This condition deeply affects both the physical and psychological well-being of individuals (22). Even

before the current conflict, 53.5% of Gazan children were suffering from PTSD (23), a rate up to 17 times higher than that in the US population (24). The ongoing war exacerbates this "social trauma," marked by forced migration, mass killings, and attacks on hospitals (22). These mental health issues, triggered by violence and genocide, are expected to persist long after the conflict ends (12). An MSF psychologist in Gaza described the pervasive anxiety, with people suffering insomnia and constant fear of being killed (25).

Healthcare providers face extreme pressure during the conflict. After the 2014 war, 89.3% of staff exhibited PTSD symptoms (26). In this conflict, PTSD prevalence among healthcare workers is expected to rise, with 38.7% at high risk of a clinical diagnosis (22). Hospitals, though protected by international law, are unsafe, with 471 Palestinians—including healthcare workers—killed during attacks like the strike on al-Ahli hospital (27). Providers are forced to make life-or-death decisions with inadequate supplies, which leads to feelings of guilt and professional inadequacy (26). The relentless stress and overcrowding in hospitals prevent staff from finding any relief (28).

Financial Constraints and Inadequate Rehabilitation Services

Palestine's financial crisis, worsened by the war starting on October 7, 2023, has severely impacted Gaza's healthcare system. Israeli Finance Minister Bezalel Smotrich's decision to block the transfer of Palestinian government clearance funds has worsened the situation (29). Bombing has destroyed most health facilities, making them unusable for medical procedures (12).

The destruction of homes and livelihoods has increased poverty, limiting access to essential healthcare, including surgeries, rehabilitation, and mental health support (30). The Ministry of Health's reduced funding has caused the collapse of supply chains for vital medicines and equipment. Of 36 hospitals, only nine are partially operational, offering minimal services (12, 29). The situation is dire, with just two hospitals performing surgeries, over 130 ambulances destroyed, and injured people using cars for transport (12, 29, 31).

Seventy to eighty per cent of hospitalised patients have suffered amputations or spinal cord injuries, often without proper care (32, 33). Amputations are frequently linked to untreated wounds, burns, and fractures. Without anaesthesia, healthcare workers must distract patients during painful wound care (32).

Patients with spinal cord injuries face limited options: surgery requiring intensive care or conservative management. Both are nearly impossible due to the overwhelming conditions in Gaza. Rehabilitation services



are minimal, with just three sessions provided for patients needing at least seven, leading to severe complications and disabilities (32, 33). Hospitals like Sheikh Hamad and Al-Wafa, which had rehabilitation capacities, are now non-operational (33).

Infection Control, Hygiene, and Training Issues

Gaza's healthcare system has nearly collapsed since October 7, due to shortages of supplies, medications, and equipment (6). War conditions, such as overcrowding, poor sanitation, and lack of clean water, have led to rapid transmission of infectious diseases. Malnutrition and psychological trauma have further weakened the population's defences (34). Surgeons must reuse blunt scalpel blades during procedures (6). Israeli airstrikes have destroyed hospitals, which are overwhelmed by injured patients. Doctors lack anaesthetics, antibiotics, and antiseptics, forcing them to perform surgeries without anaesthesia and use vinegar and laundry detergent to clean wounds (14). This inadequate care leads to poor wound healing, infections like osteomyelitis, and increased morbidity (35, 36).

Laboratory capacity has severely declined, limiting disease surveillance. Restricted access and shortages of supplies have halted public health initiatives for disease prevention (9). Malnutrition, especially in vulnerable groups like children and pregnant women, further disrupts immune defences, increasing the risk of diseases such as measles, respiratory infections, cholera, and dysentery (6, 14). Reports show high rates of acute respiratory infections, diarrhoea, and skin infections, along with outbreaks of chickenpox, meningitis, mumps, and severe jaundice (9). The lack of diagnostic tests and essential drugs hinders effective treatment, leading to antibiotic resistance and unchecked infections (35).

Waterborne diseases, a major killer of children in Gaza, have also worsened due to a lack of clean water, increasing cases of cholera, typhoid, and hepatitis A (35, 37). Amid this devastation, infectious diseases pose a serious threat, calling for improved healthcare, immunisation, nutrition, and disaster response efforts (34, 35, 14).

Transportation Barriers and Limited Data Collection

The ongoing war in Gaza has destroyed much of its infrastructure, disrupting essential services, including transport (38). Transportation networks, crucial for mobility and access to services, have a significant impact on public health outcomes (39). In Palestine, transport and health have become increasingly complicated due to political boundaries, checkpoints, and road closures caused by debris from destroyed buildings (39, 40). These barriers delay medical care, leading to poor health

outcomes, increased stillbirths, reduced postnatal care, and negative mental health effects, especially on children (39).

For example, during a fuel delivery attempt, a Palestinian man with a gunshot wound died after waiting over two hours for approval to be transported for treatment (41). Similarly, during a WHO mission to transfer critical patients from Nasser Hospital, access was denied twice, resulting in five deaths in the ICU before transfers could be made (40).

As the war continues, delayed patient arrivals or underestimation of acute cases highlight the need for primary care physicians to be well-equipped to handle emergencies. However, they face obstacles such as a lack of essential equipment, insufficient ambulances, and limited training to deal with these critical situations (42, 43).

Conclusion

The wars in Gaza have created an unprecedented humanitarian crisis, particularly in the health sector. The destruction of medical infrastructure, blockades on essential supplies, and the targeting of healthcare facilities have worsened the suffering of civilians. Medical professionals face unimaginable challenges in providing peri- and post-surgical care under these conditions. These actions by Israeli forces violate international humanitarian law and human rights. The targeting of civilians and healthcare institutions, along with restrictions on medical aid, has caused immense suffering. Gaza's situation highlights how war and occupation devastate both human life and health systems meant to sustain it. The international community must act urgently to end the war, lift the siege, and hold those responsible for war crimes accountable. The people of Gaza, like everyone else, have a right to live in peace and dignity with access to medical care. Stopping the violence and restoring health services are moral imperatives and crucial steps toward justice and lasting peace in the region.

Conflicts of interest: None declared

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