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Healthcare workers' perceptions of postoperative care and implementation challenges in conflict-affected northwest Syria: a mixed-methods analysis

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ABSTRACT

Introduction Protracted violent conflict has severely reduced healthcare provision in northwest Syria (NWS), and this is especially concerning for postoperative care as conflict-related injuries have further compounded this strain. Without sufficient postoperative care, minor complications can evolve into life-threatening events. In this study, we aim to understand healthcare workers' attitudes, practices and perceptions regarding postoperative care in NWS and identify key barriers to postoperative care.

Methods Individuals with experience in health leadership positions in NWS were identified using purposive and snowball sampling and interviewed using a semistructured interview guide. Interview summaries were analysed using a standardised codebook to identify potential themes. In addition to these interviews, an online survey on hospital practices was sent to hospital administrators and non-governmental organisation leadership who disseminated the survey to all employees engaging in clinical work.

Results Eighteen key informants were interviewed, and 466 survey responses from doctors (39%), nurses (37%), medical technicians (13%) and administrators (11%) were recorded. Through key informant interviews, we demonstrate several barriers to postoperative care, including health system fragmentation, limited healthcare workforce, insufficient resources due to conflict, disinterest, and lack of clinical documentation and discharge standards. Survey respondents reported poor patient compliance (66%), lack of routine follow-up visits (42%) and non-sterile operating room instruments (42%) as primary reasons for postoperative complications. Identified pathways to improve postoperative care included increased staffing and training, improved operating room sterilisation, and enhanced patient follow-up and discharge processes.

Conclusion In conclusion, the health system in NWS is extremely overburdened from over a decade of violent conflict, increased demand for health services and insufficient resources. This has made implementing consistent and adequate postoperative care nearly impossible, contributing to unnecessary complications and mortality. Solutions to address postoperative complications in NWS must account for these complex realities and the broader context in which this system exists.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Northwest Syria has been deeply impacted by over a decade of crises including violent conflict, large-scale displacement, attacks on healthcare and an exodus of medical personnel. The resulting fragmentation of the health system is insufficient to meet the healthcare needs of the population particularly after the influx of war-related injuries. There is growing concern over the risks of postoperative complications and specifically around effective treatment of antimicrobial-resistant infections due to insufficient resources, funding and personnel. Despite this, there has been little research assessing postoperative care in this region or on barriers to providing such care.

WHAT THIS STUDY ADDS

⇒ To our knowledge, this is the first study that identifies barriers to postoperative care in northwest Syria including health system fragmentation, competing demands from funders, lack of available healthcare workers, and limited existing documentation processes. Our study demonstrates that most hospitals lack evidence-based standardised approaches to care following surgery and that patients are ill-prepared to identify warning signs of postoperative complications. Existing systems and techniques are largely unsustainable and create an environment in which standardised postoperative improvements would be difficult to implement. We offer recommendations for improving postoperative care and minimising postoperative complications in northwest Syria.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ By identifying the current attitudes and practices of healthcare workers and administrators in NWS regarding postoperative care, we can identify potential strategies for improvement. This study can inform quality improvement initiatives that hospitals or their funders could undertake to improve postoperative outcomes including increasing awareness about health-seeking behaviours, improving discharge consultation, streamlining communication channels and prioritising operative care at the funder level. It also identifies the need for increased resources in this setting to enhance patients' health and healthcare workers' well-being. Finally, this work demonstrates the feasibility of conducting research in an area heavily affected by conflict which may serve to encourage more research on perioperative care and outcomes in similar settings.

INTRODUCTION

Since 2011, Syria has been in a state of protracted conflict that has limited health services, severely damaged or destroyed healthcare infrastructure, and decreased the healthcare workforce.[1 2] The Syrian Network for Human Rights reports that over 230 000 civilians in Syria have been killed between March 2011 and March 2023.[3] Healthcare delivery has been politicised throughout the conflict, including over 2500 direct attacks on healthcare facilities, the torture and murder of over 900 healthcare workers[4] and the criminalisation of certain medical care.[5 6] Water, sanitation and hygiene (WASH) infrastructure has also been weaponised, not only through direct attacks but also through discriminatory provision of services and the denial of water.[5 7] The direct effects of the conflict as well as conflict's impact on displacement, the health system and WASH infrastructure have contributed to an increase in conflict-related injuries, infectious diseases and antimicrobial resistance.[8–11] In this context, the specialised management of conflict-related injuries[12] and high rates of postoperative complications, such as complex infections,[13] further complicate healthcare delivery.

These effects have been stark in northwest Syria (NWS) where conflict has been especially devastating. Of the estimated 6.8 million internally displaced persons (IDPs) in Syria, an estimated 2.8 million reside in NWS.[14] Around half of these individuals continue to live in tented settlements rather than permanent housing.[15] Given their intersecting vulnerabilities, IDPs are especially impacted by the fragmentation of the health system.[15 16] In some areas of NWS, over 80% of IDP households reported difficulties accessing necessary healthcare.[17] The Government of Syria's Ministry of Health withdrew from areas outside of government control after the onset of conflict, leaving most of NWS to be served by several different subnational health systems. These systems have different leadership, governance structures, financing and goals in service provision.[15] The combination of institutional fragmentation, underfunding, limited training of healthcare workers and absence of leadership contribute to significant variation in quality of care across institutions.[18]

War-related trauma such as blast injuries, shrapnel wounds and other complex injuries have severely strained the region's fragmented health system as they are resource-intensive and frequently require medical expertise beyond routine trauma care.[19] Neighbouring countries hosting refugees are likewise frequently unable to meet the demands for this specialised care.[20 21] The need for non-conflict-related surgical care is also often higher during conflict,[22] and high costs of care pose untenable additional financial burdens on both Syrian and neighbouring health systems.[23] The potential for antimicrobial resistance is especially concerning given the noted breakdown of infection control procedures and antimicrobial stewardship throughout the conflict.[8 11] Healthcare facilities frequently lack the ability to sterilise surgical instruments and conduct resistance testing despite seeing increases in high-risk traumatic injuries from conflict[8] and the Türkiye-Syria earthquakes in February 2023.[11] The inability to maintain basic infection prevention techniques creates an environment where treatment complications are more likely to arise.

Despite this, few resources have been dedicated to assessing postoperative care and outcomes in this region. The postoperative period includes the 30 days following a surgical intervention and is the most critical period for the development and prevention of complications.[24] One study found that Syrian refugees experienced delayed surgical services, poor follow-up, and increased postoperative complications for cleft palate repair surgeries.[25] To our knowledge, however, there have not been any formal studies regarding postoperative care practices in NWS. Given the region's resource-constrained health system, identifying barriers to effective postoperative care can inform practices to decrease patients' time in healthcare facilities, decrease the possibility of nosocomial infections, and reduce morbidity and mortality rates. Our study aims to understand the attitudes, practices and perceptions of healthcare workers related to postoperative care in NWS and identify perceived barriers to postoperative care provision. This knowledge can help identify ways to improve postoperative care, prioritise resources and reduce future complications.

METHODS

Aims and study design

The aim of this study is to understand the current delivery of postoperative care in NWS, gain healthcare workers' and administrators' perspectives regarding postoperative complications and identify perceived key barriers to postoperative care. We used a mixed-methods approach consisting of semistructured interviews and a survey administered to hospital clinicians and administrators.

NWS consists of parts of Idlib and Aleppo governorates which fall outside government control. Our study examines postoperative care with greater focus on Idlib

governorate given the concentration of violence and displaced individuals. Targeted airstrikes and ground-based attacks on hospitals and medical personnel have resulted in the destruction of many facilities and the death of healthcare workers, leaving remaining facilities severely under-resourced and overwhelmed by the needs of the population.[6 26] To facilitate the involvement of their supported health facilities, we collaborated with Horizons for Humanitarian Relief Organization (AFAQ) (a non-profit organisation in Gaziantep, Türkiye, founded by and for Syrians). We also received support from the WHO Gaziantep office, Union of Medical Care and Relief Organizations and Independent Doctors Association.

Key informant interviews

Semistructured interviews were conducted by AFAQ to better understand the delivery of postoperative care, determine principal areas of concern and gain stakeholder perspective. An interview guide (online supplemental appendix 1) was developed to guide these conversations and focused on five objectives: (1) identify health system stakeholders in NWS, (2) understand the current conditions for postoperative care delivery in NWS, (3) understand the process of clinical documentation in healthcare facilities that offer surgery, (4) understand the basic structures of healthcare facilities in NWS as they relate to postoperative care and (5) understand the process of postoperative care after surgery in healthcare facilities.

Interviewees were selected using purposive and snowball sampling. Inclusion criteria were defined as follows: interviewees had to be at least 18 years old, fluent in Arabic or English, have access to Zoom or in-person interview space in Gaziantep and have held a current or former clinical position in NWS's health system, broadly defined. Interviews were conducted between April 2021 and May 2022 by a Syrian surgeon in person and via Zoom in private settings. Verbal consent was obtained. Interviews were not recorded due to safety and security concerns, and thorough notes were captured.

Three initial interviews were conducted, and the interview guide was further refined to clarify questions and promote ease of use. These interviewees were also asked to recommend administrative or clinical leaders within health systems in NWS to include in the study (ie, snowball sampling). This sampling method has utility in accessing and gaining the trust of potential participants who may otherwise refrain from providing their insights due to security threats or distrust.[27] Interviews were conducted until knowledge saturation was achieved.

Interview analysis

De-identified secondary data (interview notes and summaries) were provided to the research team in English for analysis. After developing and agreeing on a codebook, four individual coders assessed the interview summaries using both inductive and deductive approaches. The summaries were compared after coding, and discrepancies were discussed. We identified key themes and patterns relating to the delivery of postoperative care and postoperative complications.

Surveys

In addition to the interviews, a survey (online supplemental appendix 2) was distributed to hospital clinicians in NWS between April and May 2022 via hospital administrators and non-governmental organisation (NGO) leadership. The aims were twofold: (1) to gain a broader understanding of postoperative care delivery past interviewees' experiences and (2) to ensure broad representation of clinician and administrator perspectives given the high level of fragmentation of the healthcare system in NWS. The survey consisted of 50 questions divided into seven sections: demographics, charting and discharge processes, clinical documentation, the role of NGOs, hospital administration, postoperative complications and follow-up care. It was distributed to hospital administrators and NGO leadership in both Idlib and Aleppo (hospital information can be found in online supplemental appendix 3), but respondents were asked to focus on their experiences in Idlib hospitals. Administrators and NGO leadership were asked to distribute the survey to all employees engaging in clinical work in their facilities. After 20 responses, the survey was edited for further clarity, and the initial responses were excluded from final analysis. As with the interview data, the de-identified survey data were provided to the research team. Responses were analysed using Stata/SE (V.18.0, StataCorp LLC, College Station, Texas); summary statistics were used to describe the cohort and their responses.

Patient involvement

Patients were not involved in the design and conduct of this study.

Ethical approval

This project was deemed exempt by the Johns Hopkins Bloomberg School of Public Health's Institutional Review Board (#24730) as we used de-identified data collected by AFAQ. We also received approval from the Idlib and Aleppo Health Directorates to conduct this work. All participants provided informed consent and were informed that the study was voluntary, they could refuse to participate at any point and their responses would not affect existing or future access to healthcare or employment.

RESULTS

Eighteen key informants ('interviewees') were interviewed for a total of 51 online hours and 24 in-person hours. A complete list of interviewees with their clinical experience and current affiliation is described in table 1. We have removed identifying information to protect their and their family's safety inside Syria and Türkiye.

From a total of 621 survey respondents, we only included individuals with clinical experience, so our final

Table 1 List of interviewees, their clinical experience and current affiliation.

Interviewee	Clinical role Years of experience	Current affiliation
1*	General surgery 20 years	NWS hospital
2*	Orthopaedic surgery 6 years	NWS hospital
3*	General surgery 10 Years	NWS hospital
4	Anaesthesiology 6 years	NGO
5	Neurosurgery resident In training	NWS Health Directorate
6	Orthopaedic surgery 5 years	NWS hospital
7	Orthopaedic surgery 10 years	NWS hospital
8	Vascular surgery 6 years	NWS hospital
9	Paediatric surgery 4 years	NWS hospital
10	Paediatric surgery 14 years	NWS hospital
11	Nursing 8 years	NWS hospital
12	Surgical technology 5 years	NWS hospital
13	Orthopaedic surgery 10 years	NWS health directorate
14	General surgery 5 years	NGO
15	General surgery 5 years	NGO
16	Emergency medicine 5 years	NGO
17	Pharmacy 5 years	NGO
18	General surgery 12 years	NWS hospital

Note that interviews took place over multiple sessions.
Current positions were left vague to ensure anonymity.
*Initial key informant
NGO, non-government organisation; NWS, northwest Syria.

cohort was 466 respondents with 181 (38.8%) doctors, 173 (37.1%) nurses, 62 (13.3%) medical technicians and 50 (10.7%) hospital administrators. Of all survey respondents, 66% worked in a clinical capacity, 23% in administrative roles and 10% with NGOs. Survey respondents were predominantly male (84.2%), between 25 and 44 years old (80.3%) and practised in inpatient (83.3%) or emergency room (17.0%) settings.

Stakeholders and healthcare workers

Interviewees identified fragmentation of the local health system and lack of available healthcare workers as two primary barriers to administering postoperative care. Interviewees named three main stakeholders in NWS's health system: health directorates (HD), the Syrian Interim Government's Ministry of Health (SIG MoH) and NGOs. Briefly, HDs were developed by healthcare workers in 2013 and largely coordinate the healthcare within their regions. They operate alongside the SIG MoH, which was intended to serve as the region's healthcare sector leadership but struggled with legitimacy and international recognition. Lastly, NGOs are responsible for funding, supporting and running most hospitals within NWS. Interviewees stressed that NGOs play a pivotal role in the region's healthcare sector. A more detailed description of NWS's health system can be found elsewhere.[10 28 29]

Interviewees noted that despite the shared mission of these entities, they often have different long-term goals (eg, expanding healthcare infrastructure, increasing access or improving outcomes) and use different approaches to achieve those goals. As such, pursuing new initiatives (such as those related to improving postoperative care) at a systems level is challenging, especially if reducing postoperative complications is not deemed a priority by all entities. One interviewee noted, 'You have multiple entities with multiple leadership and multiple strategic goals. Good luck trying to figure out a strategic plan that makes everyone happy'.

Many interviewees discussed the role of NGOs in health services provision given their prominence in supporting healthcare facilities in NWS. Several interviewees noted that such reliance on NGOs, as well as their oversight on facilities, has created friction with local healthcare workers. This ranged from 'mistrust between NGOs and local healthcare workers' to healthcare workers believing NGOs viewed them as 'a bunch of incompetent newbies'. Interviewees noted that this friction has often precluded efforts to characterise postoperative complications and leaves this responsibility to the surgeons who choose to track (or not track) their surgical outcomes.

Interviewees identified the shortage of healthcare workers as another primary barrier to providing postoperative care during the conflict. Because healthcare workers have been targeted throughout the conflict, many have fled the country or been killed. As a result, the number of doctors (surgeons in particular), nurses, and medical technicians is insufficient to meet the high demand. Surgeons and hospital administrators reported that most surgeons cover multiple hospitals in different towns and cities, which creates additional stress and an unsustainable lifestyle. One surgeon said, 'I barely see my family. I run between 3–4 hospitals every day. And because of the security checkpoints, I end up staying in one area for [a] few days before I go home'. Some interviewees noted cases where those with postoperative complications sought to hold surgeons legally responsible

for financial compensation, further straining surgeons' capacity to provide care. The paucity of surgeons makes it especially difficult to implement changes to postoperative processes. One administrator noted that 'surgeons are in extreme[ly] high demand. And as such, you can't tell them what to do. They tell you what they want and you try to comply.'With such high demand on individual surgeons, efforts to prioritise postoperative complication tracking are often believed to be infeasible, especially if the impetus does not originate from the surgeon.

Lastly, interviewees noted that individuals with no medical background have volunteered throughout the conflict to help respond to the influx of conflict-related traumatic injuries. These volunteers have become an essential component of the health system, with some now serving as nursing staff and medical technicians in emergency and operating rooms (ORs). One of the hospital executives noted, 'when I hire nurses or surgical technicians, I don't even ask them for proof of education or training! I just want someone to do the job! We are in dire need'. Though these individuals have been instrumental in building capacity to manage the influx of patients, this lack of clinical background or formal training frequently hinders both the delivery of postoperative care and its perceived importance.

Healthcare facilities in northwest Syria

According to hospital administrators and NGO leadership, many hospitals were destroyed in targeted airstrikes by the Syrian government and its allies at the beginning of the conflict. As a result, numerous makeshift field hospitals emerged, and these have since become standalone facilities. However, limitations in resources and infrastructure have led hospitals to specialise in only one medical or surgical discipline, and the transition back to multispecialty hospitals has been difficult due to resource constraints and ongoing conflict. An interviewee spoke to this point, saying, 'Hospitals are still functioning with the crisis mentality. We are trying to transition them toward [a] different mindset'. Another interviewee noted that due to overwhelmed facilities, some postoperative and trauma patients are discharged only 1–2 days after (or even on the day of) surgery even after undergoing major surgical procedures. Another interviewee commented that 'it's beyond not having enough money. We have serious issues sustaining basic protocols, safety measures, and even maintaining qualified healthcare workers'.

While some facilities have expanded services to provide more comprehensive medical care, many hospitals continue to act independently and have limited means of communicating patient information across institutions. According to one interviewee, when patients with postoperative complications are transferred to other institutions, there is minimal effort to send documentation containing their medical workup and history with them. With hospitals missing basic supplies such as antibiotics and wound care materials, communication between facilities in the case of patient transfers is not deemed a priority.

Clinical documentation processes

Several interviewees noted difficulties in quantifying or tracking postoperative complications because they are simply not documented. In the interviews, hospital administrators reported that most field hospitals in NWS originally did not keep medical records given the emergency context. When field hospitals transitioned into permanent facilities, several hospital administrators attempted to establish medical record practices, though uptake was slow and staff were resistant. Despite this setback, the interviewed hospital administrators reported that most facilities maintain records (usually paper rather than electronic) of patient demographics, documentation of clinical progress and specific information required by funding agencies. In survey responses relating to hospital documentation, 97.0% reported using paper charts, and 22.9% reported using electronic charts. However, 29.3% of surveyed healthcare providers reported charting practices were not consistent in their facilities. An interviewee noted that even in a hospital with consistent documentation, postoperative complications may not be clearly documented as such to avoid patients viewing their outcome as a medical error or potentially casting a negative light on the operating surgeon, further complicating postoperative documentation practices.

Several interviewees felt that improved documentation was an essential first step in improving postoperative complications. However, they cited funding agencies' strict criteria and reporting requirements as obstacles to implementing new processes. The information required by funding institutions varies between hospitals, is often handled and stored differently than other patient data and is frequently prioritised by hospital administration over other clinical documentation. This prioritisation, however, is required to maintain funding: 'we have to be very diligent in keeping up with all the data that donors request! Otherwise, we would lose funding quickly and our entire hospital will cease to function'. Another interviewee described this as being 'stuck between two stones', with one being the funding agencies' strict criteria and the other being insufficient resources to fulfil those requests and maintain adequate patient care.

Inconsistent charting attitudes and practices were echoed by the survey respondents: only 15.4% felt their current documentation standards were 'frequent' and 'thorough.' While 45.3% noted that documentation had become a bigger focus in the hospital, 9.8% did not believe significant efforts were made towards change, and 40.8% felt that immediate improvements were needed. Eighty-seven per cent of surveyed administrators expressed interest in improving documentation practices. Among the 11.1% that reported no active effort in improving documentation, the main barriers were lack of resources or finances (56.8%) and lack of staff training (56.8%). Additionally, one interviewee stated, 'we are open to

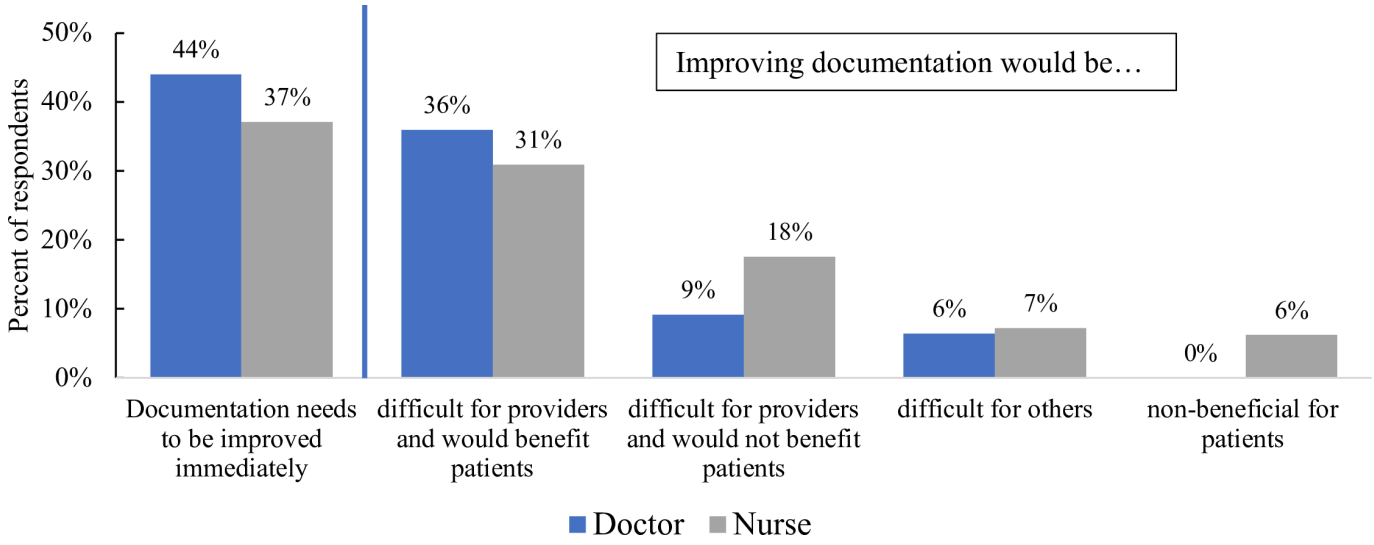

Figure 1 Perceptions of doctors and nurses (out of the total respective survey respondents) regarding improving documentation practices in their health facilities.

any QI (quality improvement) project, but you have to get the approval of the funding NGO. Otherwise, I will make them angry and risk losing my funding'. Across all survey respondents, the majority agreed that documentation changes would benefit patient care (73.9%), though 9.2% of doctors and 17.0% of nurses felt that improved documentation would not benefit patients (figure 1).

Postoperative care practices

Interviewees noted several key limitations in typical postoperative clinical care. First, most hospitals lack an evidence-based and systematic approach for care delivery in the immediate postoperative period, and clinical decisions vary within hospitals and often with the same surgeon. Second, several interviewees reported that patient education and instructions are often entirely omitted from the discharge process, leaving patients ill-prepared to leave the clinical setting. The responsibility to manage postoperative wounds typically falls to family members who also lack instructions or requisite education. Regarding the hospital's discharge practices, survey respondents noted discharge instructions being communicated in a variety of ways: 99 (35.5%) reported limited written instructions, 111 (40.0%) reported comprehensive written instructions and 158 (56.7%) reported verbal communication of discharge instructions by a nurse or doctor. Notably, 27.6% reported that discharge instructions and practices varied by staff even within the same hospital.

Third, hospitals rarely have streamlined follow-up protocols. In cases where the hospital has an established outpatient clinic, it is the patient's responsibility to arrange follow-up care. Frequently, the appointment is with a new surgeon. In hospitals without outpatient facilities, it is uncommon for patients to be evaluated after surgery at all. In an interview, a nurse stated: '… once they leave, they are on their own most of the time. Getting to see a surgeon after discharge is very difficult'. In the survey, 53.0% of respondents noted that patients are provided follow-up appointment instructions, and only 35.8% noted that patients are given instructions for emergency situations.

Interviewees believed that patients are often unaware of complications that develop in the postoperative period because they are not taught to recognise warning signs. Even if a patient can recognise a developing complication, they frequently cannot communicate with a qualified healthcare provider or seek care (figure 2). In instances where a patient can seek treatment at a hospital, the lack of clear documentation of the original surgery, forced migration due to conflict and poor communication among healthcare facilities and clinicians make it difficult to identify and treat the complication appropriately. Interviewees reported that these factors frequently lead to devastating results, including fatality, even from treatable complications. Surgeons felt the blame for postoperative complications fell unfairly on them, with one stating, 'the issue of surgical complications is quite complex. Everyone wants to blame the surgeon! But I am one piece of the big picture! How come no one looks at the big picture?' Another noted, 'everyone criticises us. What do you expect us to do? We are spread so thin'.

Survey respondents were divided on the importance of postoperative care. The majority of respondents (65.5%) deemed it important or top priority, while 28.6% felt it was an unimportant issue. Respondents felt as though poor patient compliance (66.3%), non-sterile OR instruments (42.4%), lack of routine follow-ups (42.0%), and poor hospital cleanliness (39.2%) were key contributors to postoperative complications (table 2). This complexity was reflected in an interviewee who stated, 'trust me, I do want to minimise complications. We all do. But it's not that simple. There are so many factors!'

Finally, survey respondents identified a variety of interventions they believed would improve postoperative

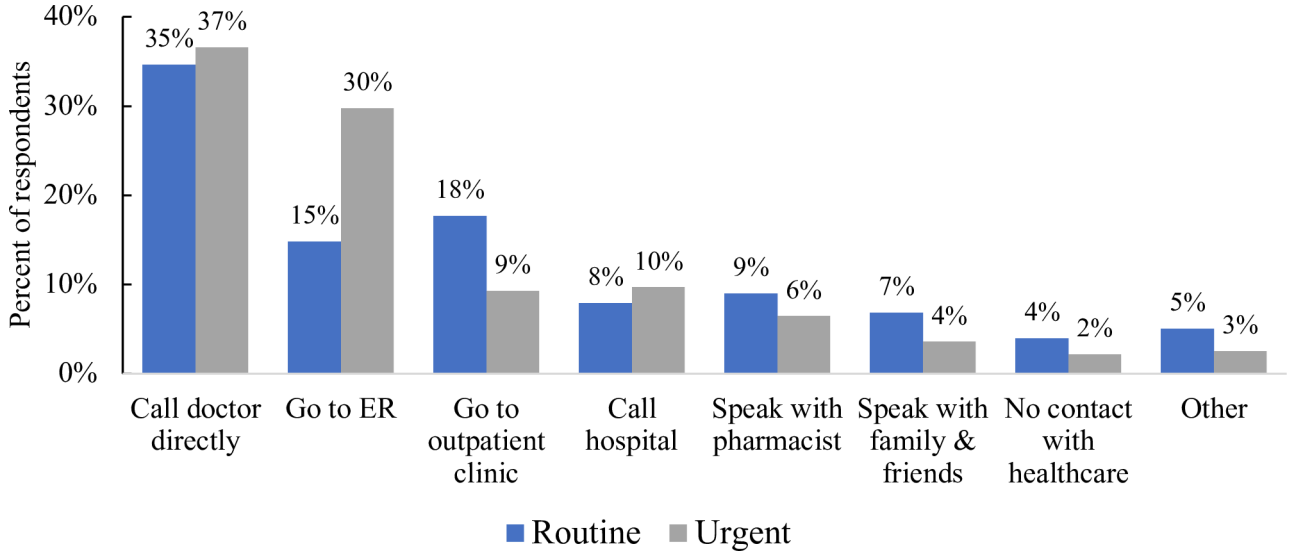

Figure 2 Patients' preferred method to contact and/or receive healthcare if postoperative concerns arise, per respondents. Survey respondents could select multiple answers. ER, emergency room.

complication rates including increasing staffing of doctors (66.9%); increasing staffing of nurses, medical technicians and other hospital staff (56.6%); providing more training for doctors (45.9%); improving sterilisation in the OR (50.0%); improving patient follow-up (42.6%); improving the discharge process (39.7%); and providing patients with better health education (43.0%).

DISCUSSION

This mixed-methods study discusses the subjective factors that contribute to the burden of postoperative complications in NWS and focuses specifically on barriers to improving care. The region's fragmented health system, compounded by severe shortages in medical staff (and especially surgeons), has created an environment inhospitable to systematic change and standardisation of postoperative care practices. Our survey respondents and interviewees noted key contributors to this situation as being discord between funding organisations, administrators and healthcare workers; lack of healthcare infrastructure and basic medical supplies; poorly established clinical documentation practices; and unstructured discharge, follow-up and general postoperative care practices. This study has highlighted that the status quo for hospitals in this environment is likely unsustainable. While the prospect of improving patient outcomes was welcomed by most, this is difficult to achieve in a setting already significantly under-resourced and over-burdened.

Table 2 Perceived potential causes of postoperative complications

Perceived potential complication cause	No. of responses n=255	Percent
Poor patient compliance	169	66.3%
Non-sterile OR instruments	108	42.4%
Lack of routine follow-up	107	42.0%
Poor hospital cleanliness	100	39.2%
Lack of training for hospital staff	95	37.3%
Barriers to follow-up care	82	32.2%
Lack of training for surgeons	77	30.2%

OR, operating room.

There are many published studies on the delivery of health services in Syria[30] and other conflict settings that have reported on the range of surgical services provided,[31 32] the utility of task-shifting (ie, the provision of surgical care by non-surgeons),[33] the feasibility of specific procedures in low-resource settings[34 35] and the management of war-related traumatic injuries.[36 37] Nearly 14 years after the beginning of the war in Syria, there have been many efforts to re-establish healthcare facilities, provide avenues for receiving surgical care,[38] characterise the volume and type of surgical care provided[22] and highlight surgical achievements in a low-resource setting.[39] Similar to this study, previous work has demonstrated how the destruction of healthcare facilities and lack of infrastructure has affected surgical care,[40 41] and there is a known increased burden of antibiotic-resistant wound infections in conflict settings in the Middle East.[42–44] By focusing this study on postoperative care and complications, we have highlighted key components of patient care that may contribute to these higher rates of infections and complications: non-sterile OR instruments and poor hospital cleanliness being frequently reported potential contributors.

Through the key informant interviews, we have noted the extreme clinical burden placed on healthcare workers—especially surgeons—and how the effects of the

conflict extend into their personal lives. Studies specifically exploring the experiences of healthcare providers in conflict zones in Northern Ethiopia[45] and Yemen[46] identified similar hardships experienced by healthcare workers. The motivations driving Syrian healthcare workers to continue working in strenuous conflict zones are deeply rooted in intrinsic and extrinsic moral, humanitarian and patriotic values.[47] However, an unsustainable system is likely pushing the boundaries of such motivations as surgeons suffer the weight of preventing and treating postoperative complications in hospital settings that are not fully equipped to do so.

This study has further highlighted key barriers to postoperative care as being limited documentation and structures for tracking care after surgery. This study has noted difficulty in establishing charting systems and consistent charting practices, which would be critical in managing patients' postoperative complications. While survey respondents generally viewed improving documentation as helpful to patients' postoperative care, many felt this was not a top priority or that improving documentation practices was only one component of larger systemic and contextual barriers. There are some examples of successful innovations to improve healthcare provision in this area, such as the Syria Tele-ICU program where specialists outside of Syria provided consultations for patients in intensive care units in NWS. This programme achieved its success partly through implementing a cloud-based electronic medical record for physician documentation that improved visibility and communication between healthcare workers.[48] This is notable because many interviewees and survey respondents in this study highlighted the absence of efficient communication and documentation as key barriers in delivering quality postoperative care.

Recommendations

Though we recognise the complexity of factors that make improving postoperative care in this setting difficult, we outline several recommendations to minimise postoperative complications in NWS. These recommendations are not meant to be comprehensive but are drawn from the interviews and survey responses in this study as potential areas of improvement to the delivery of postoperative care. Given the challenges with healthcare delivery highlighted in this paper, we recognise that implementation of these changes will require significant time and dedicated resources. As such, these recommendations reflect a potential starting point for future work.

1. Increase awareness about health-seeking behaviour after surgery within the local community: such education can help patients and their families identify potential postoperative complications early and can encourage patients to seek postoperative care proactively.
2. Improve discharge consultation: each patient should receive a detailed discharge consultation by a qualified clinician before discharge from the hospital.
3. Improve communication channels: patients frequently do not have opportunities to communicate with their surgeon or other healthcare providers after surgery, which hinders their ability to discuss concerns. The development of a standardised postoperative care protocol within each health system could enhance communication, limit variability in care practices and increase health workers' ability to monitor patients for complications.
4. Work with funding organisations to prioritise postoperative care: because hospitals are frequently bound to the priorities of their funders, a top-down approach may allow hospitals to implement necessary changes that would otherwise be difficult to support.

Limitations

This study has several limitations. Though we conducted numerous interviews and had many survey respondents, we may not have captured the full breadth of healthcare workers' perspectives. We distributed the survey to individuals in a variety of different hospitals and received responses from respondents with greatly varying roles and clinical experience. However, many respondents did not provide the name of the hospital(s) in which they work, so we were unable to determine the true distribution of responses. This non-response may be due to concerns around anonymity, safety or retaliation, which is why the question was optional. Given the number of responses and breadth of initial distribution, however, we believe that we were able to achieve sufficient coverage. There may also be bias arising from our sampling technique as we relied on snowball sampling for interviews and internal survey distribution to hospital staff. However, such techniques have been validated for use in similar studies, and the diversity of our participants indicates this was unlikely to significantly influence our results. Finally, the online survey was self-administered, which may have led to response bias, though this would likely be non-differential.

CONCLUSION

The health system in NWS is overburdened by more than a decade of conflict and compounded crises that make the task of improving postoperative care seemingly Sisyphean. While active conflict caused many of the early challenges, the lack of governance, poor healthcare infrastructure and limited postoperative care delivery have led to limited adaptability of the health system and continued decline of postoperative care delivery. Barriers to providing this care include systematic under-funding, the presence of multiple health system stakeholders with often competing priorities, insufficient availability of healthcare personnel and limited resources. However, we must stress the importance of the work that healthcare personnel

are able to perform even within this context; as an interviewee stated, 'our staff is extremely resilient and driven by true passion. They really show up to work every day with energy and love for their local community. That's what keeps them going'. While the required interventions to improve postoperative outcomes are complex and multidimensional, our study affirms that there are invested stakeholders who are interested in pursuing interventions to improve postoperative care. With increased funding support and by tailoring approaches to the context in NWS, changes in postoperative care practices can be achieved despite Syria's protracted conflict.

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