# Understanding the Profile of Surgery Performed in Humanitarian Environments: A Scoping Review

Dr Lisa Levenberg, Dr Jane Smith
University of Exeter, Extreme Medicine

University of Exeter

## Introduction

The dramatic increase in humanitarian disasters occurring globally has resulted in more than 235 million people affected, with a considerable proportion requiring surgical intervention (1,2). Access to safe surgery in resource-constrained environments is severely limited. This is further exacerbated during humanitarian crises, characterised by high numbers of traumatic injuries, with significantly impeded healthcare services. In addition, various other surgical pathologies, including obstetric and general surgical emergencies, remain commonplace during these disasters (3,4,5). Therefore, humanitarian surgeons need to be competent in performing a broad array of surgical procedures. Greater insight into the profile of surgical pathologies in humanitarian settings will facilitate pre-deployment training and an optimised surgical response (6).

## Review Question

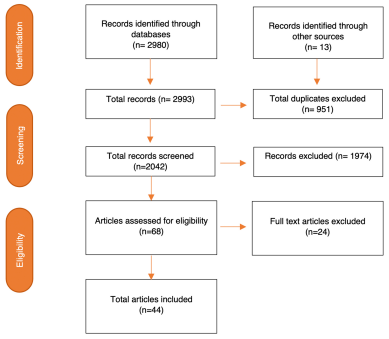
What is the profile of surgeries performed in vulnerable populations affected by humanitarian crises?

## Methodology

| Inclusion Criteria | Exclusion Criteria |
|---|---|
| • Any age and sex | • Qualitative data |
| • Individuals suffering from a surgical condition requiring a surgical intervention | • Military articles if reporting surgical caseload data only on military personnel |
| • Surgical procedures performed in a humanitarian setting | • Only a single type of surgical procedure or surgical specialty evaluated |
| • Studies published from 2003 until 2023 | • Studies not meeting inclusion criteria |
| • Studies published in English | |

A search of Ovid MEDLINE, EMBASE and Global Health, as well as the grey literature, was conducted using keywords to identify relevant studies. These articles were uploaded to Rayyan and screened using titles and abstracts against eligibility criteria. Relevant full text articles were then obtained to produce a total of 44 included articles for data extraction and analysis.

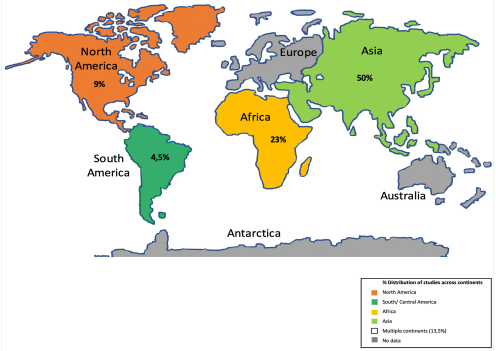
### PRISMA Flow Diagram




*PRISMA flow diagram demonstrating studies identified, excluded and included according to eligibility criteria.*

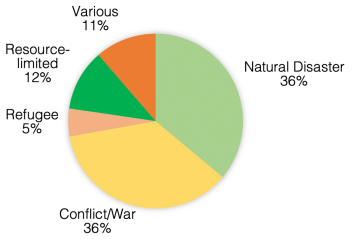
## Results

### Geographical Distribution of Studies




*Graph demonstrating geographical distribution of studies with the majority of humanitarian aid provided in Asia (50%) and Africa (23%) suggesting the greatest need for surgical care arises in these low-resourced settings. The diversity in geographical distribution implies that this review may be representative of the global surgical disease burden.*

### Types of Humanitarian Environment




*Graph demonstrating the type of humanitarian environments occurring across studies.*

The most common humanitarian emergencies in this review were natural disasters (36%) and conflicts (36%). Surgical aid was predominantly provided by military teams (39%), Medecins Sans Frontieres (25%) and other Non-Government Organisations (18%) with local government (11%) and Foreign Medical Teams (8%) also contributing.

| Comparison of the length of deployment with the median number of surgeries performed for that time period | | |
|---|---|---|
| **Length of Deployment** | **No. of studies covering this time period** | **Median no. of surgeries performed** |
| 0-3 months | 15 | 345 |
| 3-12 months | 7 | 345 |
| 1-5 years | 16 | 1,798 |
| >5 years | 6 | 22,963 |

*Table demonstrating significant variability in length of deployment of humanitarian missions ranging from 3 days to 237 months with the project duration influenced by the type of crisis occurring. The number of surgeries performed increased with the length of deployment.*

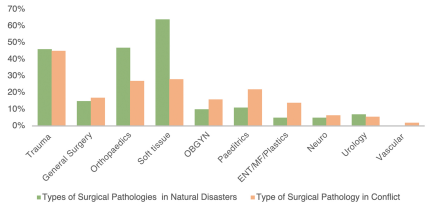
| Surgical caseload data of studies with complete data n=7 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Authors** | Goudard | Trudeau | Rahman | Trelles | Read | Wong | Barbier | **Mean(%)** |
| **No of surgeries** | 385 | 59,928 | 87,968 | 831 | 222 | 93,385 | 431 | - |
| **Procedure (%)** | | | | | | | | |
| Trauma | 2 | 48 | 17 | 38 | 91 | 20 | 36 | **36** |
| General Surgery | 38 | 6 | 16 | 14 | 11 | 23 | 18 | **18** |
| Orthopaedic | 31 | 11 | 3 | 8 | 22 | 7 | 9 | **13** |
| Soft tissue | 17 | 32 | 14 | 16 | 63 | 4 | 25 | **24** |
| OBGYN | 5 | 16 | 32 | 24 | 1 | 38 | 8 | **18** |
| Paediatrics | 13 | 37 | - | - | 12 | 19 | - | **20** |
| ENT/ Plastics/ Max Fax | 2 | 3 | - | - | 1 | 1 | - | **1,75** |
| Neuro | - | 0,02 | - | - | 2 | 6 | 0,5 | **2** |
| Urology | 5 | - | - | - | - | 2 | 2,5 | **3** |
| Vascular | 0,5 | - | - | - | - | - | 1 | **0,75** |
| Other | - | 0,2 | 18 | - | - | 5 | - | **8** |

- Significant heterogeneity in data reporting made interpretation challenging - only 7 studies had complete surgical caseload data.
- The review findings suggest **trauma (36%) contributes most significantly** to surgical diseases in humanitarian environments with violent trauma constituting the main trauma load.
- The remainder of the surgical caseload comprised surgical procedures for **soft tissue injuries (24%)**, general surgery (18%), obstetrics and gynaecology (18%) and orthopaedics (13%).
- **Caesarean sections** accounted for about **half of all obstetric** surgeries.
- The age limit defining paediatric cases varied between studies, however, the mean **paediatric surgical caseload** in this review was **20%.**
- **Surgical subspecialties** only contributed a **small percentage** to surgical care utilisation suggesting that specialist surgeons, although valuable, are not essential in providing high quality surgical care in humanitarian contexts.

| Comparison between surgical caseload data expressed as mean % for 7 complete studies vs all 44 studies | | |
|---|---|---|
| **Procedures** | **Mean % for 7 complete studies (range)** | **Mean % for all studies (range)** |
| Trauma | 36 (2-91) | 42 (0,5-100) |
| General Surgery | 18 (6-38) | 20 (1-81) |
| Orthopaedics | 13 (3-31) | 29 (1-98) |
| Soft Tissue | 24 (4-63) | 32 (1-90) |
| OBGYN | 18 (1-38) | 20 (0,1-86) |
| Paediatrics | 20 (12-37) | 22 (2-100) |

*Table comparing the mean % of surgical procedures performed for all studies with those of the 7 studies with complete surgical caseload data. Trauma remained the highest source of surgical care utilisation followed by soft tissue procedures. The mean and median values for each category were comparative, therefore, the mean % was selected for analysis.*

### Burden of Surgical Pathology in Natural Disasters vs Conflict Zones




*Graph comparing surgical procedures in natural disasters with conflict zones. The majority of surgical procedures performed in natural disasters were for soft tissue (64%) and orthopaedic (47%) injuries, in contrast to mostly trauma procedures (45%) in conflict zones. This is in keeping with the anticipated injury patterns specific to these contexts.*

## Discussion

| STRENGTHS | WEAKNESSES |
|---|---|
| Evaluated large number of studies in various crisis contexts across multiple continents | Only 10% of titles and abstracts screened by second reviewer and full text articles only screened by author |
| Thorough search of grey literature to ensure all relevant articles captured | Did not include foreign language literature |
| Information specialist consulted to optimise search strategy approach | Inconsistency in describing and categorizing surgical pathologies |
| Built on gaps in previous research contributing to increased understanding of humanitarian surgical landscape[7] | Underestimation of serious surgical emergencies where complex injuries were transferred to higher level care and not included in surgical caseload data |
| Included paediatric population | No outcomes data assessed |
| Included military studies where civilian populations were treated | Heterogeneity of reporting between studies |

### Lessons Learnt

- A **standardized data capturing tool** should be developed to ensure accuracy and consistency in recording of surgical procedures in humanitarian environments.
- This will assist in evaluating **outcomes data** to optimise the quality of surgical care.
- This review determined that surgeons deploying to humanitarian environments require **competency** in performing essential **trauma, soft tissue, general surgery, orthopaedic, obstetric and gynaecology,** as well as **paediatric** procedures.
- Humanitarian surgeons **need not be highly skilled surgeons**- healthcare workers and local staff trained in commonly performed procedures could successfully fulfill this role.

## Conclusion

The demand for surgical care increases significantly in humanitarian environments and surgeons aiming to address this need require wide-ranging skills and adaptability. This review has provided insight into the profile of surgical procedures performed in humanitarian contexts enhancing the understanding of the required capabilities of humanitarian surgeons, guiding resource allocation and training programmes. In addition, it has identified gaps in evidence such as a lack of morbidity and mortality data on surgical interventions in these settings. Addressing these issues and advancing the skillset of surgeons delivering care, including cultivating the abilities of local staff, will contribute to reducing the unmet global surgical disease burden.

## References

1.Guisolan SC et al. Health and security risks of humanitarian aid workers during field missions: Experience of the International Red Cross. Travel Med Infect Dis. 2022 Mar;46:102275. 2. Kohrt BA et al. Health research in humanitarian crises: an urgent global imperative. BMJ Glob Health. 2019;4(6):e001870. 3. United Nations. United Nations Office of the High Commissioner. 1996 [cited 2023 Feb 20]. Available from: https://www.ohchr.org/en/taxonomy/term/878 4 4. Assmann V H J. A guidance document for medical teams responding to health emergencies in armed conflicts and other insecure environments. World health organisation; 2021 [cited 2023 Feb 15]. Available from: https://apps.who.int/iris/handle/10665/341858. 5. Chu K et al. Rethinking surgical care in conflict. The Lancet. 2010 Jan;375(9711):262–3. 6. Rapaport S et al. Epidemiology of surgery in a protracted humanitarian setting: a 20-year retrospective study of Nyarugusu Refugee Camp, Kigoma, Western Tanzania. BMC Surg. 2021 Oct 29;21(1):381. 7. Nickerson JW et al. Surgical care during humanitarian crises: a systematic review of published surgical caseload data from foreign medical teams. Prehospital Disaster Med. 2012 Apr;27(2):184–9..

Full reference list of articles included in the scoping review is available from the author.

## Acknowledgements

I would like to thank:
- My supervisor, Dr Jane Smith, for her advice and support during this project
- Amy McEwan, information specialist, for her guidance and assistance on the development of information and literature searching