Operating Under Pressure: A Scoping Review of the Impact of Climate Change on General Surgery

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Background

- Climate change is defined as long-term shifts in global average temperatures and weather patterns.
- The delivery of health care significantly contributes to climate change, and it is estimated to be responsible for roughly 8.5% of greenhouse gas emissions in the U.S.[1]
- Climate change has been shown to have serious implications for human health through both direct and indirect pathways.[2]
- Attempts to characterize the effects of climate change on surgery are complicated by the heterogeneity of the diseases and surgical procedures that span across multiple disparate surgical specialties.

Objective:
To systematically map the available literature to determine the impact of climate change on general surgery

Methods

Identifying Relevant Studies

Four databases were searched without any limiters: Ovid Medline® ALL, Ovid Embase, CINAHL Plus with Full Text (EBSCOhost) and Cochrane via Wiley. This electronic search was then supplemented with manual handsearching.

Search Strategy

Examples of keywords used to capture relevant studies included:

a) Climate change: “climate change”, “greenhouse gases”, “extreme weather”, and “natural disaster”

b) General surgery: “surgery”, “trauma”, “operative”, and “surgical disease”

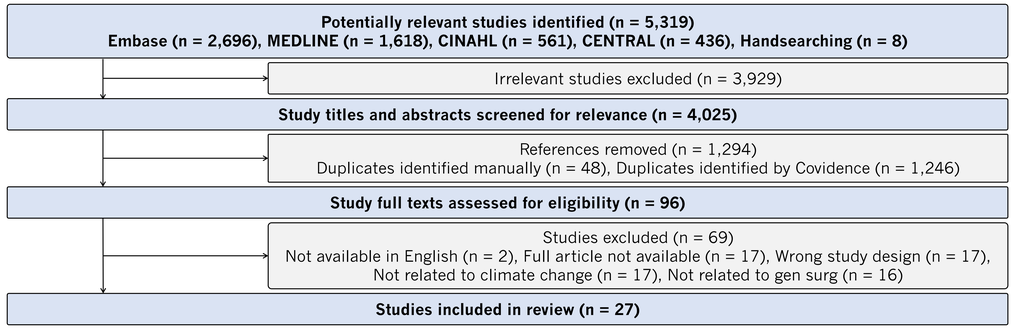
c) Surgical outcomes: “postoperative”, “environmental justice”, “accessibility”, “disparities”, and “demand”

Study Screening and Selection

Study selection was completed by two independent reviewers. Titles and abstracts were first screened to exclude irrelevant articles. This was followed by review of full text for determination of inclusion.

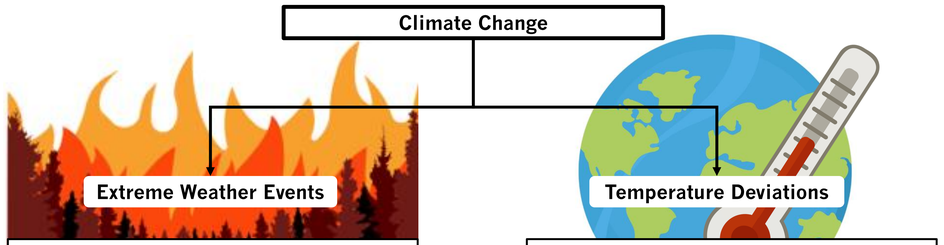
Results

Figure 1. Study Selection Flow Diagram



Results

- Two major climate change themes were identified: extreme weather events and temperature deviations.
- The impacts of each theme were identified and broadly categorized into subthemes



Shifts in Surgical Demand (n = 6)
- *Changes in surgical case volume*
- *Changes in surgical case types*
- *Injuries requiring surgical care resulting from secondary disasters*

Impaired Access to Surgical Care (n = 6)
- *Physical inaccessibility to surgical care*
- *Hospital closures*

Exposure-related Complications (n = 1)
- *Post-operative outcomes*

Surgical Disease Patterns (n = 5)
- *Changes in incidence of surgical disease*
- *Changes in surgical disease severity at presentation*
- *Work-related traumatic injuries*

Surgical Site Infection (SSI) (n = 7)
- *Changes in incidence of SSI*

Post-operative Complications (n = 2)
- *Changes in incidence of complications*

Conclusions

- Literature on the impact of climate change in the field of general surgery is limited and superficial.
- Current evidence seems to suggest that climate change, through extreme weather events and temperature deviations may result in:
  - **Increased demand for surgical care**
  - **Exacerbation of surgical disease burden due to impaired access to care**
  - **Worsening of postoperative outcomes**
- Further research within this space is needed to improve our understanding of the consequences of climate change on the health of our patients.

References

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2. Watts N, Amann M, Ayeb-Karlsson S, et al. The Lancet Countdown on Health and Climate Change: From 25 Years of Inaction to a Global Transformation for Public Health. The Lancet. 2018;391(10120):581-630. doi:10.1016/S0140-6736(17)32464-9