

## Global burden of postoperative death

National Institute for Health Research Global Health Research Unit on Global Surgery

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## **Deaths within 30 days of surgery in low-, middle-, and high-income countries**

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The Lancet Commission on Global Surgery identified that 313 million surgical procedures are performed each year<sup>1</sup>. Little is known about the quality of surgery globally, as robust postoperative death rates are available for only 29 countries<sup>2</sup>. The rate of postoperative death captures the success of the system of surgical care and improvement in this metric is a priority worldwide.

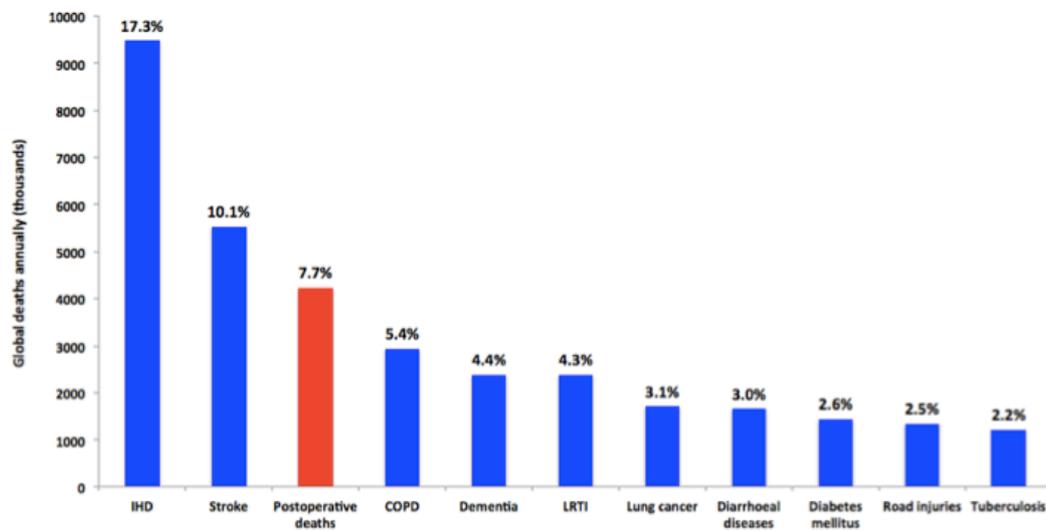
We aimed to estimate how many people around the world die within 30 days of surgery, based on surgical volume, case-mix, and postoperative death rates adjusted for country income. England's Hospital Episode Statistics linked Office of National Statistics dataset (HES-ONS) is one of the world's most comprehensive procedure-specific mortality resources, with national coverage from a universal health care system. We used this dataset as the baseline for our estimations for high income settings, adjusting case-mix and mortality to estimate total postoperative deaths in low- and middle-income countries (LMICs). We estimated likely additional postoperative deaths if surgical volume was expanded to address the annual unmet need for 143 million operations in LMICs<sup>3</sup> (S1 Appendix).

Overall, our analysis suggests that currently at least 4.2 million people around the world die within 30 days of surgery each year, with half of these deaths occurring in LMICs. We project that expanding surgical services to address unmet need would increase total deaths to 6.1 million annually, with an additional 1.9 million occurring in LMICs each year. Based on 4.2 million deaths, 7.7% of all deaths globally occur within 30 days of surgery<sup>4</sup>. This figure is greater than that attributed to any other cause of death globally except ischaemic heart disease and stroke (Figure 1). More people die within 30 days of surgery than the combined 2.97 million deaths attributed to HIV, malaria, and tuberculosis annually<sup>4</sup>.

Our approach is limited by a number of necessary assumptions (S2 Appendix). For example, HES-ONS reports amongst the lowest postoperative death rates in the world. Basing our calculation on higher baseline postoperative death rates from other HIC sources substantially increases our projections of total postoperative deaths.

Whilst there is a pressing need to expand surgical services to currently underserved populations, this must be done in tandem with initiatives to reduce postoperative deaths. Funders and policy makers should prioritise research that aims to make surgery safer, particularly in LMICs. Routine measurement of surgical outcomes is essential to monitoring global progress in addressing the burden of postoperative death.

**Figure 1: Top ten global causes of death in the 2016 Global Burden of Death study, with addition of postoperative death\***



\*Percentages give proportion of total global deaths attributable to that cause based on Global Burden of Disease 2016 data<sup>4</sup>

IHD: ischaemic heart disease; COPD: chronic obstructive pulmonary disease; LRTI: lower respiratory tract infections

## Authors' contributions

DN and AB conducted data analysis and interpretation and had access to all data. DN, JM, BB, AM, AB drafted the manuscript. Collaborators listed in the Appendix critically revised the manuscript and have approved the final draft and the decision to submit the manuscript. AB is the guarantor for this report.

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