

Clinicians must carefully balance risk of complications linked to SARS-CoV2 infection with risks of delaying surgery

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A new study highlights the risks of pulmonary complications in patients with SARS-CoV-2 infection who undergo surgery, according to an observational study of 1,128 patients across 24 countries, published in *The Lancet*. The study was conducted between 1 January and 31 March 2020 and included data from hospitals mainly in Europe and America with ongoing SARS-CoV-2 infection outbreaks.

In the study, post-operative pulmonary complications (such as pneumonia, acute respiratory distress syndrome, and/or unexpected postoperative ventilation) occurred in half of patients with SARS-CoV-2 infection who underwent surgery (51.2%, 577/1,128 people). Among patients with SARS-CoV-2 infection who underwent surgery, 23.8% (268/1128) died within 30 days. Of those with pulmonary complications, over two-thirds (38%, 219/577 people) died within 30 days of their surgery.

The study also identified factors associated with worse outcomes. As well as being male or aged 70 years or older, patients with comorbidities and those undergoing cancer surgery, emergency or [major surgery](#) were among the most vulnerable.

Lead author Dr. Aneel Bhangu from the University of Birmingham, UK, says: "Although the risks associated with COVID-19 need to be carefully balanced against the risks of delaying surgery for every individual

patient, our study suggests that the thresholds for surgery should be raised, compared to normal practice. Medical teams should consider postponing non-critical procedures and promoting other treatment options, which may delay the need for surgery or sometimes avoid it altogether."

Dr. Ana Minaya-Bravo, Hospital Universitario del Henares and Universidad Francisco de Vitoria, Spain, says: "When hospitals resume routine surgery, it's likely it will take place in environments that remain exposed to SARS-CoV-2. Hospital-acquired infection will remain a challenge, but strategies are urgently required to minimise it, as well as to minimise the risk of pulmonary complications for infected patients whose surgery cannot be delayed. Future studies should assess the role that preoperative testing could play in deciding which patients are selected for surgery."

Patients undergoing surgery are a vulnerable group at risk of SARS-CoV-2 exposure in hospital and may be particularly susceptible to subsequent pulmonary complications, due to the increased inflammation and immunosuppressive responses to surgery and mechanical ventilation. A number of guidelines have been published for managing surgical patients during the SARS-CoV-2 pandemic, but this is the first study to examine the impact of SARS-CoV-2 infection on pulmonary complications and [death rates](#).

For the current study, researchers analysed outcomes from 1,128 patients across 235 hospitals in 24 countries. Most patients (74%, or 835/1,128) underwent emergency surgery, and 24.8% (280/1,128) had elective surgery, with data missing for 13 patients. The reasons to operate were benign disease (54.5%, or 615/1,128), cancer (24.7%, or 278/1,128) and trauma (20.1%, or 227/1,128), with the reasons missing for eight patients.

The patients included in the study had tested positive for SARS-CoV-2 within seven days leading up to their operation, or 30 days following surgery. The researchers gathered data on 30-day post-surgery death rates and pulmonary complications.

Pulmonary complications occurred in 51.2% (577/1,128) of patients. Of those with pulmonary complications, 38.0% (219/577) died within 30 days of their operation, accounting for 81.7% (219/268) of all deaths in the study. Overall, 23.8% (268/1,128) of patients died within 30 days.

The authors say that these rates for mortality and pulmonary complications are higher than those associated with even the highest risk groups before the pandemic. However, they note that it was not feasible for participating hospitals, many of which were experiencing significant stress due to the pandemic, to collect data on all patients undergoing surgery, so comparisons were not made during the same period against patients not infected with SARS-CoV-2. Instead, the authors provide comparisons to pre-pandemic mortality rates and pulmonary complications, which should be interpreted with caution.

For example, a 2016 study across 58 countries reported 30-day mortality of 14.9% in a high-risk subgroup who underwent emergency, major surgery of the abdomen (midline laparotomy), and a 2019 study across 211 hospitals from 28 European countries found a pulmonary [complication](#) rate of 8%. The death rate of 38% approaches that of the sickest patients with community acquired COVID-19 who are admitted to intensive care.

In the new study, a greater proportion of men died (28.4%, or 172/605) compared to women (18.2%, or 94/517). Of people aged 70 and over, 33.7% (188/558) died, which contrasts to 13.9% (79/567) of patients under 70-years-old. The subgroup with the highest mortality rate were men aged 70 and above. Those with severe comorbidities (ASA grades

3-5) were more likely to develop pulmonary complications than those with mild comorbidities (ASA grades 1-2) (59.4%, 407/685 patients with severe comorbidities vs 39.4%, 153/386 patients with mild comorbidities).

The type of surgery also had an impact on patients' prognosis. Death rates were higher after emergency surgery than after elective surgery (25.6%, or 214/835 versus 18.9%, or 53/280), and after cancer surgery (27.1%, or 68/251) than after surgery related to benign conditions and obstetrics (21.7%, or 133/613).

The authors note that although this is the first multi-country study that reaches across all surgical specialties, it has some limitations. The data were collected at the early stages of the pandemic, when routine testing was not available at all locations, therefore some patients (6%) were included on the basis of clinical diagnosis rather than a laboratory test confirming SARS-CoV-2. Future studies will need to investigate the role of pre-operative testing in patient selection for surgery, and the authors call for longer-term studies to collect data on a wider range of outcomes, to enable surgeons and patients to make evidence-based decisions about whether to go ahead with surgery.

The findings are based on data collected mostly in European and North American hospitals, but are also relevant to countries where large-scale outbreaks are yet to take place.

Writing in a linked Comment, Paul S. Myles, Alfred Hospital and Monash University, Melbourne, Australia (who was not involved in the study) notes some limitations of the study, including the lack of control group and that testing was not standardised, which may lead to uncertainty around COVID-19-attributed mortality and respiratory complications. He adds: "Nevertheless, these results are worrying because the rate of poor outcomes exceeded those seen in most types of

major surgery. Severe COVID-19 is associated with a marked inflammatory and prothrombotic state. These pathological processes are exacerbated by surgery and immobilisation, leading to a perfect storm detrimental to good postoperative outcomes... The study highlights the need for clear perioperative guidelines for emergency and elective surgery during the pandemic. Further research is needed to define what threshold of community prevalence would threaten adequate supplies of PPE and hospital capacity as elective surgery recommences... Most patients in the study came from Italy, Spain, the UK, and the USA—these countries' health systems were all largely overwhelmed in the early stages of the COVID-19 pandemic. Staff training, PPE, intensive care unit (ICU) beds, and ventilators were often scarce or insufficient. Countries vary widely in terms of their capacity to respond to an outbreak of a novel infectious disease... Some elective (eg, cancer surgery or caesarean section) and most non-elective surgery must continue throughout any pandemic, and if the prevalence of COVID-19 is low and hospital resources are coping with demand for ward and ICU beds, more elective surgery can recommence. Globally, many governments and professional bodies are moving from a position of curtailment to reopening of elective [surgery](#). This requires a low prevalence in the community and access to SARS-CoV-2 testing, and ensuring there are sufficient trained staff, hospital and ICU beds, PPE, and all other necessary medical supplies."

More information: Dmitri Nepogodiev et al, Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: an international cohort study, *The Lancet* (2020). [DOI: 10.1016/S0140-6736\(20\)31182-X](https://doi.org/10.1016/S0140-6736(20)31182-X)

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