Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Projecting COVID-19 disruption to elective surgery

Millions of elective surgical procedures were cancelled worldwide during the first wave of the COVID-19 pandemic.[1] This enabled redistribution of staff and resources to provide care for patients with COVID-19 and addressed evidence that perioperative SARS-CoV-2 infection increases postoperative mortality.[2] Although some hospitals established COVID-19-free surgical pathways to create safe elective surgery capacity,[3] the National Health Service (NHS) in England has not returned to pre-pandemic elective surgery activity levels.

The NHS faces winter pressures every year but enters this winter in a particularly fragile state.[4] The emergence of the omicron SARS-CoV-2 variant raises the possibility of rapid increases in COVID-19 admissions and intensified pressure on elective care. We used NHS England activity data from the period following the end of the first COVID-19 wave (ie, from September, 2020, onwards) to estimate how increases in the number of hospital beds occupied by COVID-19 inpatients at any one time might affect elective surgery activity in England over the coming winter months. We calculated the potential shortfall in projected elective surgery activity from December, 2021, to February, 2022, compared to the same period in 2019 before the COVID-19 pandemic. Full methodology is described in the appendix.

If the number of COVID-19 inpatients in England were to remain at the level seen in the first 2 weeks of October, 2021, when, on average, 5003 patients were receiving treatment for COVID-19, we project that 51 204 (95% CI 44 219–58 343) elective surgical procedures would take place per week (figure). If the average number of COVID-19 inpatients were to increase to 10 000, 47 348 (39 206–56 641) elective surgical procedures would take place per week. If the number of COVID-19 inpatients were to increase to the levels seen in the first COVID-19 wave (in April, 2020, there was an average of 16 090 COVID-19 inpatients in England at any one time), elective surgical procedures would decrease to 43 225 (33 859–54 633) per week.

These data suggest that if the number of COVID-19 inpatients were to reach levels seen in April, 2020, rather than continue at levels seen in October, 2021, 100 273 fewer elective surgical procedures would take place over the next 3 months—a 15·3% reduction.

There are limitations to our analysis. First, we assume that the relationship between the number of COVID-19 inpatients and elective surgery activity this winter will be consistent with previous trends. However, the NHS might develop strategies to maintain elective surgery activity despite increasing COVID-19 admissions; conversely, resilience could be diminished by escalating staff shortages. Second, we did not explore regional variation, which could arise as a result of differences in resource availability, accessibility of COVID-19-free surgical pathways, or baseline surgical case mix. Finally, we have not addressed differences between surgical specialties. Hospitals are likely to prioritise life-saving surgeries, meaning that less time-critical surgeries are more vulnerable to COVID-19-related disruption.

Nevertheless, further disruption to elective surgery seems inevitable unless robust measures are urgently introduced to prevent escalating COVID-19 hospitalisation rates in England. Delayed implementation of COVID-19 mitigation measures risks lockdown, which itself could amplify disruption to urgent surgery.[5]

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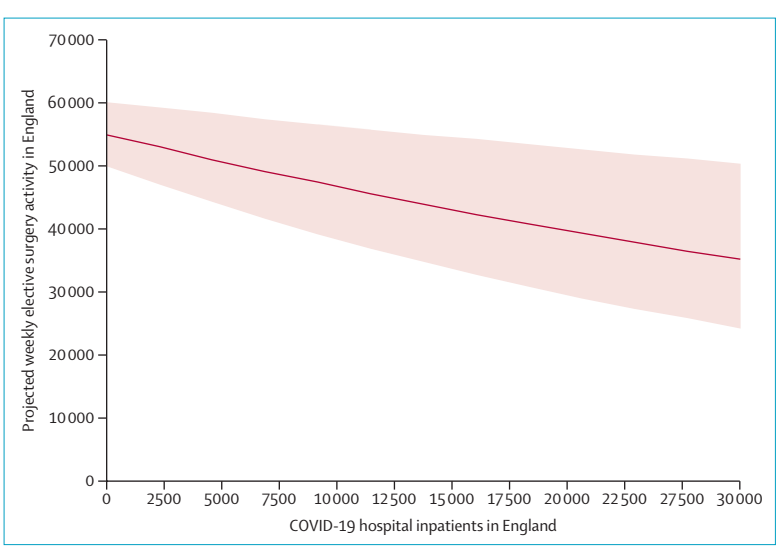

***Figure*: Projected number of weekly elective surgical procedures in England from December, 2021, to February, 2022, based on number of hospital beds occupied by COVID-19 inpatients in England at any one time**
Shaded area indicates 95% CI.

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See **Online** for appendix

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See Online for appendix

1 COVIDSurg Collaborative. Elective surgery cancellations due to the COVID-19 pandemic: global predictive modelling to inform surgical recovery plans. *Br J Surg* 2020; **107:** 1440–49.
2 COVIDSurg Collaborative. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: an international cohort study. *Lancet* 2020; **396:** 27–38.
3 Glasbey JC, Nepogodiev D, Simoes JFF, et al. Elective cancer surgery in COVID-19-free surgical pathways during the SARS-CoV-2 pandemic: an international, multicenter, comparative cohort study. *J Clin Oncol* 2021; **39:** 66–78.
4 Ham C. There is still time to save the NHS, but time is running out. *BMJ* 2021; **375:** n2587.
5 COVIDSurg Collaborative. Effect of COVID-19 pandemic lockdowns on planned cancer surgery for 15 tumour types in 61 countries: an international, prospective, cohort study. *Lancet Oncol* 2021; **22:** 1507–11.

Reduced neutralisation of SARS-CoV-2 omicron B.1.1.529 variant by post-immunisation serum

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For **WHO's COVID dashboard on infections and deaths** see https://covid19.who.int

According to WHO, SARS-CoV-2 is estimated to have caused 265 million infections and more than 5 million deaths over the past 2 years. Current vaccines are based on the original SARS-CoV-2 strain and are designed primarily to raise an antibody response against the spike protein (S), although elicited T-cell responses can also contribute to protection from severe disease.

The SARS-CoV-2 RNA polymerase is intrinsically error prone, which results in mutation to the viral genome. In the past year, several variants containing multiple mutations in S have been reported: alpha (B.1.1.7), beta (B.1.351), gamma (P.1), and delta (B.1.617.2). These variants contain mutations in the receptor binding motif, a small 25 amino acid patch at the tip of S that mediates interaction with the ACE2 receptor (one mutation in alpha, three in beta and gamma, and two in delta). These changes can lead to increased transmissibility by increasing affinity to ACE2 (by seven times for alpha, 19 times for both beta and gamma, and double for delta)[1] or lead to immune escape. First alpha and then delta variants spread globally causing successive waves of infection, while large localised outbreaks were caused in southern Africa by the beta variant and in South America by the gamma variant.

At present, delta is estimated to have caused more than 99% of infections worldwide; however, a new variant of concern, omicron (B.1.1.529), was reported first in South Africa on Nov 24, 2021,[2] but has since been reported in multiple countries. Early reports from South Africa suggest that omicron is highly transmissible, in a population where 60–80% already show serological evidence of previous infection or vaccination, suggesting that omicron is able to break through natural and vaccine-induced immunity; although early reports do not indicate more severe disease.

Omicron contains a large number of mutations in S compared with previous variants of concern, mostly concentrated around the receptor binding motif: 30 amino acid substitutions, deletion of six residues, and insertion of three residues.[1] Mutations are also present at other sites (receptor binding domain and N-terminal domain) which might affect neutralising antibodies. There is concern that omicron will lead to increased propensity to infect individuals who have received vaccines, whose antigens are based on the original S sequence.

Here, we report the results of neutralisation assays using an isolate of omicron obtained from an infected case in the UK. Neutralisation assays were done on sera from individuals from the immunology cohort of the Com-COV2 study,[3] who were seronegative at enrolment (defined by anti-nucleocapsid IgG). Participants were vaccinated with two doses of Oxford–AstraZeneca's ChAdOx1 nCoV-19 (ChAd; n=22), or two doses of Pfizer–BioNTech's BNT162b2 (BNT; n=21) with a priming interval of 8–11 (median 9) weeks. Samples were obtained 28 days (range 25–32) following the second immunisation (appendix p 1).[3]

Live virus neutralisation titres against omicron are compared with titres against Victoria, an early pandemic SARS-CoV-2 strain, together with titres against beta and delta variants.

Neutralising titres on sera from participants who had received homologous ChAd dropped to below the detectable threshold in all but one participant (figure A, B). Median neutralising titres on sera from participants who had received homologous BNT reduced by 29·8 fold from 1609 (Victoria strain) to 54 (omicron variant), with one participant dropping below the detection threshold. In most cases, samples that did not neutralise with 50% focus reduction neutralisation titres at a dilution of less than 1/20 showed some residual neutralising activity (figure C).

In summary, there was a substantial decrease in neutralisation titre in recipients of both homologous ChAd and BNT primary courses, with evidence of some recipients not neutralising at all. This reduction in neutralisation titre will probably be more pronounced at later timepoints. These data, although derived from a relatively small sample size, are consistent with published data from datasets of similar size.[4-6] Together, the findings suggest that omicron is more antigenically distant from the original SARS-CoV-2 vaccine strain than the previously most distant strains, beta and delta. Preliminary data from the UK Health Security Agency[7] have shown reduced effectiveness against symptomatic infection after two doses of ChAd or BNT, suggesting a result of increased breakthrough infections in previously infected or double vaccinated individuals, which could drive a further wave of infection. The effect on disease severity is unknown, although there is currently no evidence of increased