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Original article

Bariatric surgery provision in response to the COVID-19 pandemic: retrospective cohort study of a national registry

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Abstract

Background: When surgery resumed following the outbreak of the COVID-19 pandemic, guidelines recommended the prioritization of patients with greater obesity-related co-morbidities and/or higher body mass index.

Objective: The aim of this study was to record the effect of the pandemic on total number, patient demographics, and perioperative outcomes of elective bariatric surgery patients in the United Kingdom.

Setting and Methods: The United Kingdom National Bariatric Surgical Registry was used to identify patients who underwent elective bariatric surgery during the pandemic (1 yr from April 1, 2020). Characteristics of this group were compared with those of a pre-pandemic cohort. Primary outcomes were case volume, case mix, and providers. National Health Service cases were analyzed for baseline health status and perioperative outcomes. Fisher exact, χ^2, and Student *t* tests were used as appropriate.

Results: The total number of cases decreased to one third of pre-pandemic volume (8615 to 2930). The decrease in operating volume varied, with 36 hospitals (45%) experiencing a 75%–100% reduction. Cases performed in the National Health Service fell from 74% to 53% ($P < .0001$). There was no change in baseline body mass index (45.2 ± 8.3 kg/m^2 from 45.5 ± 8.3 kg/m^2; $P = .23$) or prevalence of type 2 diabetes (26% from 26%; $P = .99$). Length of stay (median 2 d) and surgical complication rate (1.4% from 2.0%; relative risk = .71; 95% CI .45–1.12; $P = .13$) were unchanged.

Conclusions: In the context of a dramatic reduction in elective bariatric surgery due to the COVID-19 pandemic, patients with more severe co-morbidities were not prioritized for surgery. These findings should inform preparation for future crises. (Surg Obes Relat Dis 2023;19:1281–1287.)

Keywords: Bariatric surgery; COVID-19 pandemic; Guideline adherence; Type 2 diabetes; Obesity

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At the onset of the COVID-19 pandemic, there was an abrupt and unprecedented cessation of elective surgery services in publicly funded (National Health Service [NHS]) and private settings [1–3]. As services resumed to a growing backlog [4,5], there were multiple ongoing barriers to resumption of normal service, including ringfencing of specialist resources (e.g., intensive care beds) for patients with COVID-19 infection and staff shortages [6]. There also were competing considerations regarding prioritization of elective caseloads both between and within specialisms.

In May 2020, experts from the Diabetes Surgery Summit (DSS) issued guidelines to attempt to assist service providers as they stratified and prioritized elective bariatric surgery cases [6]. These guidelines can be summarized as recommending expedited surgery (within 90 d) for (1) patients with type 2 diabetes (T2D) and poor glycemic control, insulin use, or prolonged duration (>5 yr), (2) patients with cardiovascular disease or 2 or more co-morbidities increasing cardiovascular risk, (3) patients requiring surgery as a bridge to other time-sensitive treatments including organ transplant, and (4) patients with a body mass index (BMI) >60 kg/m^2. Soon after, the Federation of Surgical Specialty Associations (FSSA) (which was commissioned by the NHS at the start of the pandemic to establish relative surgical priorities) also recommended expedited bariatric surgery (within 90 d) for those with significant or multiple end-organ failures, and these findings were endorsed by the Royal College of Surgeons (RCS) of England [7]. The impact of the changes in healthcare policy during the pandemic on patients awaiting bariatric surgery in the United Kingdom (UK) has not been quantified to date; neither has the extent to which contemporaneous guidelines were followed. It is important to analyze and reflect on healthcare policy during the pandemic to assist with the management of future similar crises of resource limitations.

The main aims of this study were therefore to document elective bariatric surgery activity in the UK in 1 year from the outset of the pandemic and compare this with a pre-pandemic "control" period. Specific aims were as follows: (1) to describe the effect of the pandemic on the total number of elective bariatric operations, case mix, and providers in the UK, (2) to examine the demographics of patients undergoing elective bariatric surgery within the NHS during the pandemic and to see how well this corresponded with contemporaneous recommendations, and (3) to record perioperative outcomes for patients undergoing elective bariatric surgery within the NHS during the pandemic in the UK.

Methods

Study design and sample description

This is a nationwide cohort study involving retrospective analysis of prospectively collected data. The study design, including subgroup analysis of NHS patients, was planned at the time of study conception, although no formal prospective analysis plan was recorded. The study has been retrospectively registered on ClinicalTrials.gov with the identifier NCT05532891 and can be accessed at https://clinicaltrials.gov/ct2/show/NCT05532891. The study was conducted in accordance with the principles of the Declaration of Helsinki [8] and has been reported in line with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) criteria [9].

The National Bariatric Surgical Registry (NBSR) is a bespoke database for the prospective collection of data pertaining to all patients undergoing elective bariatric surgery for weight loss in the UK [10]. Emergency cases are not recorded in the NBSR, and neither are revision procedures unless the aim of the surgery is to induce further weight loss (e.g., removal of a gastric band for dysphagia and conversion of sleeve gastrectomy [SG] to bypass for reflux are not recorded). At each visit, demographic, perioperative, and clinical outcome data were recorded by the healthcare provider.

All adult patients who underwent elective bariatric surgery during the pandemic (1 yr from April 1, 2020) or prior to the pandemic (1 yr from September 1, 2018) were included in the study. The pre-pandemic period was chosen to ensure that there would be no cases of COVID-19 in this period nor in the 30 days afterward (during which perioperative complications are recorded). Fully anonymized data were extracted for the purposes of analysis.

Patient consent and ethics statement

Patient consent for NBSR data collection and usage of anonymized data for research purposes is routinely taken as part of the standard process for surgical consent, as per NHS commissioning guidelines. The data holder NBSR complied with local ethics guidelines. Use of this data set for research purposes conformed with UK legislation and was approved by the Health Research Authority (17/CAG/0023).

Study variables

The main predictor variable was the time period during which patients underwent elective bariatric surgery: 1 year from April 1, 2020, or 1 year from September 1, 2018. Outcome variables were case volume, case mix, and providers (NHS or private hospitals). Since FSSA and RCS guidelines were specifically aimed at NHS providers, we then focused on NHS cases to study further outcome variables (comprising demographics and baseline health status of patients) and perioperative variables (e.g., presence of a second consultant during the operation, surgical approach to operation [completed laparoscopically or not], length of hospital stay, surgical complications, reoperation within 30 d, and mortality within 120 d).

Data collection and statistical analysis

Diabetes status was recorded preoperatively and at each follow-up visit as follows: no indication of T2D, impaired glycemia or diet controlled, and oral hypoglycemic agents or insulin treatment (insulin with or without additional hypoglycemic medications). For the purposes of analysis, we grouped the latter 2 categories as "on treatment" and thus have 3 groups for the outcome variable "T2D status": T2D on treatment, pre-T2D, and no T2D.

Where a variable was not recorded, this point was excluded from analysis. For age, sex, procedure type, and providers, the records were 100% complete; for BMI at the time of surgery, 5% of the data were missing; and for other variables, the missing value rate was 2% or lower. Statistical analysis was performed using Prism 9.3.1 for MacOS (GraphPad Software Inc., San Diego, California). Fisher exact, χ^2, and χ^2 for trend tests were used to analyze categorical or ordinal values. The Student *t* test was used for continuous parametric data. Relative risk was calculated for perioperative outcomes, with Koopman asymptotic score for 95% confidence interval. A P value $<.05$ was considered statistically significant.

Results

Case mix and providers

Total number of cases recorded in the NBSR decreased from 8615 in the first reporting period to 2930 in the year from April 1, 2020 (Table 1). Revision cases as a proportion of the total increased (9%–11%; $P = .0006$), and this was driven by an increase in the NHS (9%–13%; $P < .0001$), with no change in the private sector (Table 1). There was a much greater reduction in cases performed in the NHS than in the private sector, with the proportion of private cases increasing from 25% in the pre-pandemic period to 46% during the pandemic (2084 of 8615 to 1356 of 2930; $P < .0001$; Fig. 1A). Elective bariatric surgery began to resume in June 2020 and increased until October 2020. In the NHS it then dropped off over the winter months during the second national lockdown while remaining relatively constant in the private sector (Fig. 1B). In terms of primary surgery caseload, in the pre-pandemic period there was a greater proportion of Roux-en-Y gastric bypasses in the NHS than in private settings [11]. Following the outbreak of the pandemic, changes in primary caseload were most pronounced in the private sector, with a decrease in adjustable gastric bands from 18% to 6% and an increase in SGs from 46% to 53% (Fig. 1C).

Table 1
Total number and number of revisions prior to and during the COVID-19 pandemic

Cases	Pre-pandemic	Pandemic	*P* value
All			
Total	8615	2930	.0006
Revision	746 (9%)	316 (11%)	
NHS			
Total	6384	1566	<.0001
Revision	567 (9%)	202 (13%)	
Private			
Total	2084	1356	.952
Revision	174 (8%)	114 (8%)	

NHS = National Health Service.

Cases performed by "all" National Health Service and private providers are illustrated. Funding category was missing in 147 cases in the pre-pandemic period and 8 cases in the pandemic period. Revisions are expressed as a percentage (%) of total in each category. The χ^2 test was used to compare revision with nonrevision between pre-pandemic and pandemic time periods for each provider type.

Caseload by hospital

There was high variability in the bariatric surgery workload between different hospitals in the UK, with the majority experiencing a profound reduction in bariatric surgeries performed during the COVID-19 pandemic. A small proportion of hospitals experienced no change or an increase in the number of cases, and this was more commonly observed in the private sector (27% versus 6% in the NHS; $P = .005$; Fig. 2).

Demographic of patients undergoing bariatric surgery in the NHS

There was no difference in baseline heath status for patients undergoing bariatric surgery during the pandemic versus pre-pandemic (Table 2). Notably, patients were no more likely to have higher BMIs or T2D or other obesity-related co-morbidities.

Perioperative outcomes for NHS patients

There were no statistically significant differences in perioperative outcomes for patients treated during the pandemic (Table 3). One death was recorded: this occurred in an NHS patient in July 2020, 48 days postoperatively, and cause of death was recorded as chronic multiorgan failure.

Discussion

After a complete cessation of activity during the first lockdown from late March to April 2020, bariatric surgery began to resume in the UK around June–July 2020. Guidelines issued by the DSS and FSSA and endorsed by the RCS clearly stated that patients with more severe obesity-related co-morbidities and greater BMIs ought to be prioritized. This analysis of the NBSR suggests that these guidelines were not followed.

The rationale for such recommendations were twofold. First, there is a dose-dependence in terms of BMI and mortality for patients contracting COVID-19, and patients with poorly controlled T2D are more likely to die than those with

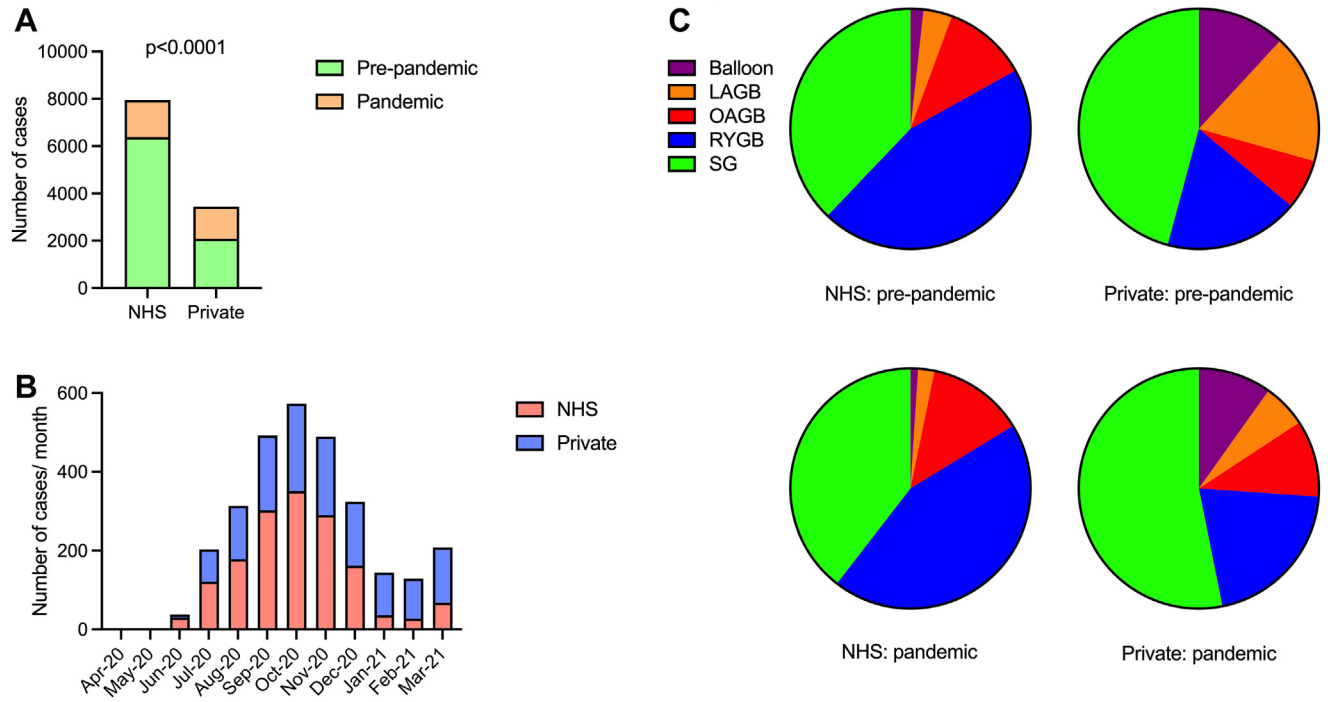
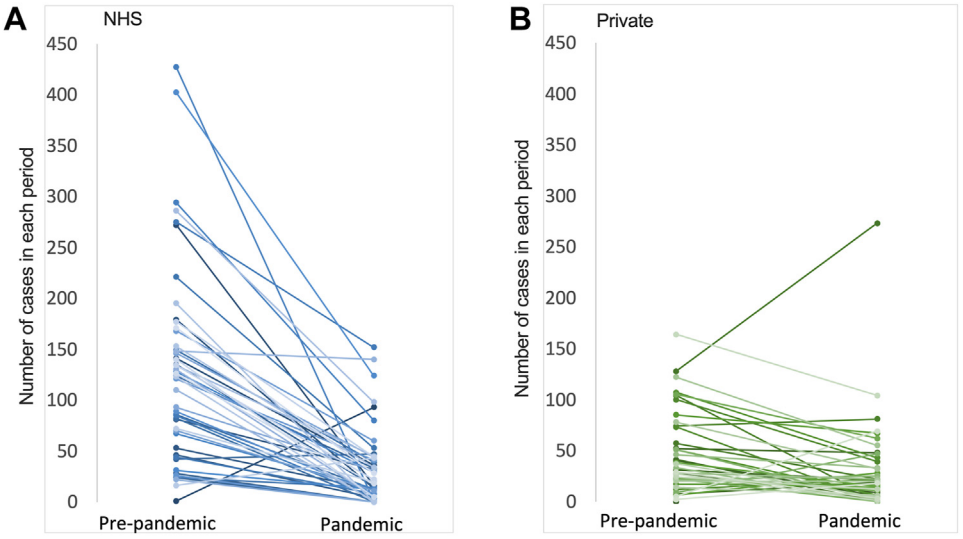


Fig. 1. Caseload in the NHS and private sector prior to and during the COVID-19 pandemic. (A) Total number of cases occurring in the pre-pandemic and pandemic periods under NHS and private providers, compared by χ^2 analysis. (B) Cases per month during the pandemic period, with breakdown between NHS and private providers illustrated. (C) Case mix of primary surgery. AGB = adjustable gastric band; NHS = National Health Service; OAGB = one-anastomosis gastric bypass; RYGB = Roux-en-Y gastric bypass; SG = sleeve gastrectomy.

well-controlled T2D [12,13]. Given the likelihood that more COVID-19 variants would arise, putting more vulnerable people at risk, it was important to prioritize bariatric surgery in patients with highest risk so that they would be protected in future outbreaks. The guidelines issued by DSS and FSSA were consistent with government drives to prioritize weight reduction as one of the few modifiable risk factors for severe COVID-19 infection [14]. Second, patients with more severe co-morbidities or more advanced T2D have increased all-cause mortality and therefore have the most to lose by a delay in their surgery [15,16]. This approach of stratifying bariatric patients and prioritizing those in greatest metabolic need also was supported by UK surgeons (based on evidence from contemporaneous surveys) [3]. Indeed, the original FSSA guidelines for prioritization of elective surgery published in April 2020 did not mention bariatric surgery at all [17]; in response to lobbying by the Bariatric Obesity and Metabolic Surgical Society on behalf of the community of bariatric surgeons, elective bariatric surgery was included from July 2020 onward [7].

It is therefore surprising that our research identifies a startling discrepancy between guidelines and real-world practice. This discrepancy was also seen in the United States, where patients undergoing bariatric surgery during the pandemic had fewer co-morbidities than before the pandemic [18]. One reason for not recommencing surgery on high-risk patients could be to counter the potential deskilling of surgeons following a period of not operating—a rationale that led in part to some countries advocating prioritizing lower-risk patients following recommencement of bariatric surgery [19]. If this were a concern, however, one approach would be to employ 2-consultant operating [20]. Interestingly our study shows that the proportion of 2-consultant operations performed during the pandemic did not change. This could potentially be a strategy for future similar periods of decreased operating to allay any concerns regarding operating on higher-risk patients after a period of inactivity. Another potential rationale for avoiding bariatric surgery in high-risk patients would be fears of high perioperative risk for patients with extensive co-morbidities undergoing bariatric surgery and contracting COVID-19 in the perioperative period. Results from this study and others [18,21,22], however, show good perioperative outcomes for patients undergoing elective bariatric surgery during the pandemic, which would suggest that the DSS and FSSA guidelines were appropriate. Nonetheless, there are likely to be multiple complex obstructions to fulfilling the DSS and FSSA guidelines on prioritization, and these must be examined and addressed in future work [23,24].

The overall reduction of bariatric surgery caseload to around two thirds in the UK was much greater than that seen in the United States, where there was a 12% reduction in total cases during 2020 compared with surgery in



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	NHS	Private
No change or increase	3 (6)	11 (27)
>0 and ≤25% decrease	1 (2)	3 (7)
>25 and ≤50% decrease	2 (4)	5 (12)
>50 and ≤ 75% decrease	14 (29)	11 (27)
>75 and ≤100% decrease	29 (59)	11 (27)

Fig. 2. Elective bariatric surgery volume in individual hospitals prior to and during the pandemic. Trajectories of individual hospital volume for (A) National Health Service and (B) private cases (limited for ease of viewing to hospitals recording 20 cases in total in either of the time periods). (C) Summary table to illustrate number of hospitals (with percentage of total number) experiencing different degrees of change in volume of cases during the pandemic.

previous years [18]. Private practice saw a much more modest reduction in bariatric operating than NHS services. Many bariatric cases are performed in private facilities that do not have intensive care units, so one possible explanation for the difference was a lack of competition for these services. However, staff shortages would be expected to impact both sectors to a similar degree. Close examination of the strategies of private bariatric surgery providers in keeping services running will assist NHS managers as they deal with the bariatric surgery backlog. We observed a relative increase in the proportion of revisional surgery and an increase in prevalence of primary SG; however, these findings are both in line with longer-term evolving international trends [25,26].

Our study has some limitations. In terms of data completeness, entry of elective bariatric surgery cases to the NBSR is mandatory for all NHS cases and strongly recommended for private providers. Hospital Episode Statistic data record all NHS episodes and listed 6460 episodes of "primary bariatric surgery" in the year from April 1, 2018

Table 2
Demographics of National Health Service patients undergoing bariatric surgery prior to and during the COVID-19 pandemic

Variable	Pre-pandemic	Pandemic	*P* value
Age (yr), mean ± SD	45.8 ± 11.4	46.3 ± 11.6	.095
Female/male, n (%)	5058 (79), 1326 (21)	1266 (81), 300 (19)	.162
Body mass index at time of surgery (kg/m^2), mean ± SD	45.5 ± 8.3	45.2 ± 8.3	.228
T2D on treatment, pre-T2D, and no T2D, n (%)	1635 (26), 242 (4), 4393 (70)	397 (26), 72 (5), 1077 (70)	.999
Duration of T2D <5 yr, 5–10 yr, and >10 yr, n (%)	904 (57), 314 (20), 364 (23)	202 (53), 83 (22), 100 (26)	.106
On treatment for hypertension, n (%)	2192 (35)	550 (35)	.718
Diagnosed with cardiovascular disease, n (%)	307 (5)	66 (4)	.284
Obstructive sleep apnea treated, untreated, and no indication, n (%)	1402 (22), 358 (6), 4511 (72)	400 (26), 63 (4), 1090 (70)	.953
Liver disease, n (%)	449 (7)	110 (7)	.931

T2D = type 2 diabetes.

Table 3
Perioperative outcomes of National Health Service patients undergoing elective bariatric surgery prior to and during the COVID-19 pandemic

Outcome	Pre-pandemic	Pandemic	*P* value	Relative risk and 95% CI
Presence of second consultant, n (%)	289 (5)	56 (4)	.099	.79 (.60–1.05)
Completed laparoscopically, n (%)	6268 (99.8)	1552 (99.9)	.485	.87 (.81–1.20)
Length of stay (d); mean (SD), median (IQR, range)	2.17 (3.84) 2 (1–2, 0–198)	2.00 (3.43) 2 (1–2, 0–90)	.125 N/A	
Surgical complications, n (%)	126 (2.0)	22 (1.4)	.133	.71 (.45–1.12)
Reoperation within 30 d, n (%)	57 (.9)	8 (.5)	.159	.57 (.27–1.20)
Mortality within 120 d, n	0	1	N/A	

% = percentage of total in each category; N/A = not applicable.

[27]. Although monthly counts are not publicly available, this gives external validity to our figure of 6384 for the year commencing September 1, 2018. Additionally, the NBSR does not have the granularity to identify, for example, patients waiting for time-sensitive treatments, such as transplants, who may have been approximately prioritized in line with recommendations; however, this will have accounted for only a tiny fraction of cases. A further limitation of the NBSR is that some conditions may be investigated to different degrees in different centers, for example, liver disease, which is likely to be diagnosed based on screening liver blood tests and/or ultrasound. Nonetheless, there is no reason to suspect that this would introduce systemic bias when comparing the 2 time periods. It is also worth noting that the surgical complication rate is so low for elective bariatric surgery in the UK that our study may have been unable to detect a statistically significant difference between the 2 time periods.

Conclusion

Our data demonstrate that not only was there a dramatic reduction in bariatric surgery in the UK during the pandemic but that patients were not prioritized for the available surgery slots as recommended. More studies are warranted to better understand the reasons for this failure to appropriately prioritize patients. This is essential to guide policymakers and stakeholders in future periods of severe resource limitation so that as surgeons we protect our most vulnerable patients.

Disclosures

The authors have no commercial associations that might be a conflict of interest in relation to this article.

References

[1] Moussa O, Zakeri R, Arhi C, et al. Impact of COVID-19 on obesity management services in the United Kingdom (the COMS-UK study). Obes Surg 2021;31(2):904–8.

[2] NHS England and NHS Improvement [Internet]. London: NHS England; 2020 [cited 2022 Jun 28]. Next steps on NHS response to COVID-19; [about 17 screens]. Available from: https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/urgent-next-steps-on-nhs-response-to-covid-19-letter-simon-stevens.pdf.

[3] Ghanem A, Emile S, Cousins J, Kerrigan D, Ahmed AR. Bariatric surgery during COVID-19 in the UK: a British Obesity and Metabolic Surgery Society (BOMSS) survey. Surg Endosc 2022;36(1):533–43.

[4] British Medical Association [Internet]. London: British Medical Association; c2023 [updated 2023 May; cited 2022 June 28]. NHS backlog data analysis; [about 11 screens]. Available from: https://www.bma.org.uk/advice-and-support/nhs-delivery-and-workforce/pressures/nhs-backlog-data-analysis.

[5] COVIDSurg Collaborative. Elective surgery cancellations due to the COVID-19 pandemic: global predictive modelling to inform surgical recovery plans. Br J Surg 2020;107(11):1440–9.

[6] Rubino F, Cohen RV, Mingrone G, et al. Bariatric and metabolic surgery during and after the COVID-19 pandemic: DSS recommendations for management of surgical candidates and postoperative patients and prioritisation of access to surgery. Lancet Diabetes Endocrinol 2020;8(7):640–8.

[7] Federation of Surgical Specialty Associations (FSSA) [Internet]. Glasgow: FSSA; [cited 2022 Aug 17]. Clinical guide to surgical prioritisation in the recovery from the coronavirus pandemic; [about 6 screens]. Available from: https://fssa.org.uk/_userfiles/pages/files/covid19/prioritisation_master_240720.pdf.

[8] World Medical Association. Declaration of Helsinki: ethical principles for medical research involving human subjects. Bull World Health Organ 2001;79(4):373–4.

[9] von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet 2007;370(9596):1453–7.

[10] British Obesity and Metabolic Surgery Society [Internet]. Reading (UK): Dendrite Clinical Systems; 2020 [cited 2022 Feb 1]. The United Kingdom NBSR 3rd report (2020); [about 5 screens]. Available from: https://www.e-dendrite.com/NBSR2020.

[11] Bolckmans R, Askari A, Currie A, et al. Clinical characteristics of patients undergoing primary bariatric surgery in the United Kingdom based on the National Bariatric Surgery Registry. Clin Obes 2023;13(3):e12585.

[12] Gao M, Piernas C, Astbury NM, et al. Associations between body-mass index and COVID-19 severity in 6.9 million people in England: a prospective, community-based, cohort study. Lancet Diabetes Endocrinol 2021;9(6):350–9.

[13] Williamson EJ, Walker AJ, Bhaskaran K, et al. Factors associated with COVID-19-related death using OpenSAFELY. Nature 2020;584(7821):430–6.

[14] Department of Health and Social Care [Internet]. UK: GOV.UK; [cited 2022 Aug 17]. Tackling obesity: empowering adults and children to live healthier lives; [about 15 screens]. Available from: https://www.

gov.uk/government/publications/tackling-obesity-government-strategy/tackling-obesity-empowering-adults-and-children-to-live-healthier-lives#covid-19-and-obesity.

[15] Kuk JL, Ardern CI, Church TS, et al. Edmonton Obesity Staging System: association with weight history and mortality risk. Appl Physiol Nutr Metab 2011;36(4):570–6.

[16] McEwen LN, Karter AJ, Waitzfelder BE, et al. Predictors of mortality over 8 years in type 2 diabetic patients: Translating Research Into Action for Diabetes (TRIAD). Diabetes Care 2012;35(6):1301–9.

[17] Federation of Surgical Specialty Associations [Internet]. Glasgow: FSSA; 2020 [cited 2022 Aug 17]. Clinical guide to surgical prioritisation during the coronavirus pandemic; [about 9 screens]. Available from: https://www.rcsed.ac.uk/media/681113/clinical-guidance-to-surgical-prioritisation-during-covid-19.pdf.

[18] Verhoeff K, Mocanu V, Dang J, et al. Effect of the COVID-19 pandemic on bariatric surgery in North America: a retrospective analysis of 834,647 patients. Surg Obes Relat Dis 2022;18(6):803–11.

[19] Kassir R, Rebibo L, Genser L, et al. SOFFCO-MM guidelines for the resumption of bariatric and metabolic surgery during and after the COVID-19 pandemic. J Visc Surg 2020;157(4):317–27.

[20] Ellis R, Hardie JA, Summerton DJ, Brennan PA. Dual surgeon operating to improve patient safety. Br J Oral Maxillofac Surg 2021;59(7):752–6.

[21] Singhal R, Tahrani AA, Ludwig C, Mahawar K. GENEVA Collaborators. Global 30-day outcomes after bariatric surgery during the COVID-19 pandemic (GENEVA): an international cohort study. Lancet Diabetes Endocrinol 2021;9(1):7–9.

[22] Messiah SE, Xie L, Mathew MS, et al. Impact of the COVID-19 pandemic on metabolic and bariatric surgery utilization and safety in the United States. Obes Surg 2022;32(7):2289–98.

[23] Royal College of Surgeons of England. Protecting surgery through a second wave [monograph on the Internet]. London: Royal College of Surgeons; 2020 [cited 2022 Aug 17]. Available from: https://www.rcseng.ac.uk/-/media/files/rcs/coronavirus/report-protecting-surgery-through-a-second-wave–6-oct.pdf.

[24] Royal College of Anaesthetists [Internet]. London: Royal College of Anaesthetists, Association of Anesthetists, Intensive Care Society, and Faculty of Intensive Care Medicine; 2020 [cited 2022 Aug 17]. Restarting planned surgery in the context of the COVID-19 pandemic; [about 7 screens]. Available from: https://static1.squarespace.com/static/5e6613a1dc75b87df82b78e1/t/5eac2a173d65cd27933fca88/1588341272367/Restarting-Planned-Surgery.pdf.

[25] Clapp B, Harper B, Dodoo C, et al. Trends in revisional bariatric surgery using the MBSAQIP database 2015–2017. Surg Obes Relat Dis 2020;16(7):908–15.

[26] American Society for Metabolic and Bariatric Surgery (ASMBS) [Internet]. Newberry (FL): ASMBS; 2022 [cited 2022 Sept 20]. Estimate of bariatric surgery numbers, 2011–2019 [about 2 screens]. Available from: https://asmbs.org/resources/estimate-of-bariatric-surgery-numbers.

[27] NHS Digital [Internet]. West Yorkshire (UK): NHS Digital; 2020 [cited 2022 Aug 17]. Statistics on obesity, physical activity and diet 2020: data tables [about 2 screens]. Available from: https://digital.nhs.uk/data-and-information/publications/statistical/statistics-on-obesity-physical-activity-and-diet/england-2020/data-tables.