NHS
Surrey Heartlands

Guidelines for Micronutrient Monitoring and Supplementation post Bariatric Surgery

Contents

1. Background

Bariatric surgery is recommended by NICE CG189 (Obesity: identification, assessment and management) as a treatment option for obese patients who meet specific criteria. (1)

Following bariatric surgery, patients are at a greater risk of nutritional deficiencies and require annual nutritional monitoring and routine nutritional supplements. These should be continued for life. (2) This Guidance provides a framework for recommendation of micronutrient supplementation for patients post bariatric surgery, including when supplements should be prescribed vs when patients should purchase supplements.

Different bariatric surgery procedures will have different effects on absorption of nutrients depending on the surgery performed (3). Intragastric balloons work by reducing capacity of the stomach while gastric secretions remain unchanged, so nutritional monitoring and supplementation is unnecessary unless there are concerns regarding nutritional intake and clinically identified nutritional deficiencies. Similarly, Laparoscopic Adjustable Gastric Bands (LAGB) have no impact on absorption, but dietary quality may be affected. Additional monitoring and supplementation, detailed in later sections, is required for patients post-surgery that reduces the absorptive capacity of or by-passes the stomach (Laparoscopic Sleeve gastrectomy (LSG), Gastric bypass – either Roux-en-Y-Gastric Bypass, (RYGB)/ One Anastomosis Gastric Bypass (OAGB), Single Anastomosis Duodenal-Illeal Bypass with Sleeve (SADI-S) or Duodenal Switch (DS)

This guidance does not cover other medications post bariatric surgery. The British Obesity & Metabolic Surgery Society (BOMSS) guidance on medications post-bariatric surgery (4) and other resources via their GP Hub and Specialist Pharmacy Service advice Factors to consider when using medicines following bariatric surgery (5) give advice on considerations for medication.

2. Nutritional Monitoring post bariatric surgery

Nutritional monitoring during the first 2 years post bariatric surgery is included in the post-surgery monitoring provided by the tertiary centre where surgery is performed. The table on the next page details the recommended monitoring from 2 years post operation onwards by General Practice. The BOMSS Pre-consultation questionnaire for patients may be helpful for patients to complete ahead of review appointments and can help guide consultations.

Blood tests after all types of bariatric surgery*	
Bloods	**GP Monitoring (from 2 years post-op onwards, lifelong)**
U+E, LFT, FBC	Annually
HbA1c (if diabetic or prediabetic)	Annually
EXTRA MONITORING AFTER SLEEVE GASTRECTOMY, RYGB AND DUODENAL SWITCH	
Ferritin, folate, vitamin D, calcium, parathyroid hormone	Annually
Vitamin B12 (if receiving injections testing not required)	Annually
Zinc, Copper and Selenium – a trace element vacutainer tube will be needed	Annually. Monitor more frequently if unexplained anaemia, hair loss or changes in taste
Vitamins A, E or K1	If symptomatic of deficiency

Table adapted from BOMSS 2020 (British Obesity and Metabolic Surgery Society) Post-bariatric surgery nutritional guidance for GPs (2)

* Except Intra-gastric balloon, where monitoring is only required if there are concerns regarding nutritional intake

3. Micronutrient Supplementation post Bariatric Surgery

Prevention of Deficiency

Laparoscopic gastric band surgery (LAGB) does not result in malabsorption, so supplementation is only required to support the nutritional adequacy of the volume reduced diet, and an A-Z vitamin and mineral supplement should be purchased.

The majority of surgery carried out in the UK are laparoscopic sleeve gastrectomy or Roux-en-Y gastric bypass surgeries, which result in a degree of malabsorption. Patients will have been counselled ahead of surgery that micronutrient supplementation will be required for life post-surgery, with the expectation that supplements will be purchased (with the exception of hydroxocobalamin injections for prevention and/or treatment of vitamin b12 deficiency following surgeries which result in malabsorption.) This is in line with the NHSE Guidance, Conditions for which OTC items should not routinely be prescribed in primary care (6) which states that multivitamins should not routinely be prescribed for prevention of deficiency.

Post Single Anastomosis Duodenal-Illeal Bypass with Sleeve (SADI-S) or Duodenal Switch surgery the degree of malabsorption caused by the surgery requires prescribable supplements as detailed in the table on the next page. These surgeries are performed less frequently.

Treatment of Deficiency

If clinical deficiency of vitamins or minerals is suspects (see. signs and symptoms in section 4, these should be investigated and treated according to recommendations. Supplementation of the required micronutrients can be prescribed until normal levels are maintained.

If deficiencies continue despite compliance with purchased multivitamin and mineral supplementation, prescribing can occur with the necessary supplements for long-term treatment.

<table>
<tr><th colspan="7">Micronutrient Supplementation post Bariatric Surgery</th></tr>
<tr><th></th><th>Gastric band (LAGB)</th><th>Laparoscopic Sleeve gastrectomy (LSG)</th><th>Gastric bypass Roux-en-Y-Gastric Bypass, (RYGB)/ One Anastomosis Gastric Bypass (OAGB)</th><th>Single Anastomosis Duodenal-Illeal Bypass with Sleeve (SADI-S) or Duodenal Switch</th><th>Notes</th><th>Purchased by patient</th><th>Prescribed by GP</th></tr>
<tr><td rowspan="3">Multivitamin and Mineral</td><td colspan="3">A compete (A-Z) multivitamin and mineral supplement containing suitable amounts of thiamine, iron, selenium, zinc and copper should be taken daily.</td><td></td><td rowspan="2">Double the usual daily dosage of an A-Z multivitamin and mineral is required e.g., take twice a day after all surgeries except gastric band.</td><td>✓</td><td>✘</td></tr>
<tr><td></td><td colspan="2">Minimum recommended daily supplementation:
2mg copper, 15mg zinc
400-800micrograms folic acid
65-75 micrograms Selenium
A complete (A-Z) multivitamin and mineral supplement should be taken TWICE DAILY</td><td></td><td>✓</td><td>✘</td></tr>
<tr><td colspan="3"></td><td>To meet nutritional requirements post-malabsorptive surgery Forceval multivitamin and mineral should be prescribed once a day with DEKAs plus soft gel to provide additional fat soluble vitamins – see next page</td><td></td><td>✘</td><td>✓</td></tr>
<tr><td colspan="8">Additional Daily supplements (required in addition to Multivitamin and Mineral supplement after some surgeries)</td></tr>
<tr><td>Iron</td><td>No additional supplement required</td><td colspan="2">Daily supplementation required: 200mg ferrous sulphate, 210mg ferrous fumarate or 300mg ferrous gluconate per day.
People who have periods require 400mg ferrous sulphate, 420mg ferrous fumarate or 600mg ferrous gluconate per day.</td><td>Advise people to take calcium and iron two hours apart as one may inhibit absorption of the other.</td><td>✓</td><td>✘</td></tr>
<tr><td>Vitamin B12</td><td>No additional supplement required as standard</td><td colspan="2">Routine supplementation with three monthly intramuscular Hydroxocobalamin 1 mg/mL</td><td>IM supplementation is the preferred route, patients prescribed cyanocobalamin orally should be changed to 3 monthly IM injections</td><td>✘</td><td>✓</td></tr>
<tr><td>Vitamin B Compound</td><td colspan="4">There is no indication for prescription of a Vitamin B compound supplement (either Vitamin B Compound or Vitamin B Compound Strong) post bariatric surgery outside of acute treatment for refeeding syndrome.</td><td>✘</td><td>✘</td></tr>
</table>

<table>
<tr><th></th><th>Gastric band (LAGB)</th><th>Laparoscopic Sleeve gastrectomy (LSG)</th><th>Gastric bypass Roux-en-Y-Gastric Bypass, (RYGB)/ One Anastomosis Gastric Bypass (OAGB)</th><th>Single Anastomosis Duodenal-Illeal Bypass with Sleeve (SADI-S) or Duodenal Switch</th><th>Notes</th><th>Purchased by patient</th><th>Prescribed by GP</th></tr>
<tr><td rowspan="2">Vitamin D</td><td rowspan="2">No additional supplement required as standard</td><td colspan="2">Maintenance dosage of 2000-4000units oral vitamin D3 recommended with adjustments made depending on results</td><td rowspan="2">Maintenance dosage of 2000-4000units oral vitamin D3 recommended with adjustments made depending on results. Higher doses of vitamin D3 supplementation may be required due to malabsorptive surgery. Prescribe via 1 x DEKAs plus soft gel capsule per day</td><td>Aim for serum vitamin D >75nmol/l.</td><td>✓</td><td>✘</td></tr>
<tr><td colspan="2"></td><td rowspan="4">Post SADI-S or Duodenal switch surgery prescribe as DEKAs plus soft gel x 1 capsule per day, providing 3000units vitamin D 18167units Vitamin A, 101units Vitamin E 1000micrograms Vitamin K</td><td rowspan="4">✘</td><td rowspan="4">✓</td></tr>
<tr><td>Vitamin A</td><td colspan="3">No additional supplement required as standard</td><td>Recommended starting with 10,000units per day and adjusting depending on blood results. Prescribe via 1 x DEKAs plus soft gel capsule per day</td></tr>
<tr><td>Vitamin E</td><td colspan="3">No additional supplement required as standard</td><td>Recommended start at 100units daily. Prescribe via 1 x DEKAs plus soft gel capsule per day</td></tr>
<tr><td>Vitamin K</td><td colspan="3">No additional supplement required as standard</td><td>Recommended 300micrograms daily Prescribe via 1 x DEKAs plus soft gel capsule per day</td></tr>
<tr><td>Calcium</td><td colspan="4">Good dietary calcium intake should be encouraged as it is more bioavailable than supplemental calcium.
Requirement 1200-1500mg calcium per day from food and supplements. Encourage people to check their calcium intake via a calcium calculator.</td><td>If supplementation required calcium citrate is preferred supplement for people at risk of kidney stones</td><td>✓</td><td>✘</td></tr>
<tr><td>Thiamine</td><td colspan="4">If people present with symptoms such as prolonged vomiting, dysphagia, poor dietary intake or fast weight loss prescribe 200-300mg oral thiamine per day to prevent the development of Wernicke's encephalopathy alongside urgent advice from bariatric centre.
If there are concerns post-surgery that thiamine provided via multivitamin and mineral is insufficient consideration should be given to prescribing additional thiamine for the first 3-4 postoperative months</td><td>This should be decided on an individual patient basis and the rationale clearly communicated to prescribers</td><td>✘</td><td>✓ (only if required in first 3-4 months post op - see narrative)</td></tr>
</table>

Table adapted from PresQIPP Bariatric Surgery bulletin (7) and BOMSS Post Bariatric Surgery Nutritional Guidance to GPs (2)

4. Signs and symptoms of Nutritional Deficiencies

Nutritional deficiencies can manifest in a variety of ways. Symptoms of the more commonly encountered nutritional deficiencies are listed in the table below and on the next 2 pages (2).

Key points to note:

- Vomiting, dysphagia or regurgitation are not normal consequences of bariatric surgery and should always be investigated and may occur with any procedure.
- If patients have one deficiency, they often have others, so it is recommended that if one is identified full screening bloods are requested.
- In addition to the suggest actions in the table it is important to always consider other diagnoses not related to bariatric surgery and instigate appropriate investigations and management

Notes on Copper and Zinc:

- Check which vitamin and mineral supplements the person is taking. Some people may have stopped taking their supplements or may be taking ones containing high doses of zinc or copper (zinc:copper ratio in supplementation should be 8-15mg:1mg (minimum 2mg copper))
- During acute infection /high CRP, zinc level can drop – avoid supplementing zinc in this scenario.
- For patients with borderline low zinc or copper levels, consider prescribing two Forceval/day to maintain the correct ratio of zinc to copper. Recheck levels after three months.
- For severe zinc deficiency, with normal copper levels, treat with high dose zinc supplement for 3 months and recheck zinc and copper levels. If additional zinc or copper supplements are needed, **both should be monitored as they share a reciprocal relationship**. Refer back to the bariatric surgery unit for advice as required.

Sign/Symptom	Potential Cause related to Bariatric Surgery and nutrients to check	Suggested actions
Anaemia (symptoms of)**	Iron deficiency, copper deficiency, vitamin B12 deficiency, folate deficiency.	For iron, vitamin B12 or folate deficiencies, manage as per BNF. NICE guidance on folate and vitamin B12 deficiencies can be found here and on iron deficiency anaemia here. For copper deficiency, see notes above this table and refer to bariatric surgery unit for advice.
Blood disorders such as leucopenia, thrombocytopenia	Copper deficiency.	Ensure both copper and zinc have been checked. See notes above this table and refer to bariatric surgery unit for advice, and if appropriate to haematology.
Cardiomyopathy, unexplained cardiac symptoms	Selenium deficiency and vitamin B12 deficiency.	Refer to cardiology and highlight the history of bariatric surgery.
Confusion (unexplained by routine check ups)	Thiamine deficiency, vitamin B12 deficiency.	Refer to medical/neurology team as appropriate.
Constipation**	Often the result of a low fibre and / or insufficient fluid intake.	Give advice on dietary sources of fibre and increased fluid intake, laxatives may be required. May be due to an overtight band and patient is unable to manage adequate fluid and fibre intake, in which case refer back to bariatric surgery unit.

Sign/Symptom	Potential Cause related to Bariatric Surgery and nutrients to check	Suggested actions
Diarrhoea**	Diarrhoea and steatorrhoea may occur after gastric bypass, for example this can be caused by small intestinal bacterial overgrowth.	Recalcitrant diarrhoea should be investigated as can contribute to protein malabsorption and vitamin and mineral deficiencies, refer to bariatric surgery unit.
Glossitis	Zinc deficiency, iron deficiency.	For iron deficiency manage as per BNF. NICE guidance on iron deficiency anaemia can be found here. For zinc deficiency see notes above this table and refer to bariatric surgery unit for advice.
Hair loss	Zinc deficiency, iron deficiency, poor protein intake.	Obtain a detailed nutritional assessment to exclude/identify causes. For iron deficiency manage as per BNF. NICE guidance on iron deficiency anaemia can be found here. For zinc deficiency see notes above this table and refer to bariatric surgery unit for advice. For concerns about protein intake, refer to community dietitian for assessment and review.
Hypoglycaemia (symptoms of) after eating (sweating, shaking, feeing unwell, blackouts)	Post Prandial Hypoglycaemia (PPH) - most often seen following a gastric bypass (however it may occur with other procedures).	Referral to a bariatric surgery unit dietetics initially (urgency depends on severity of the symptoms). If dietary education fails to resolve the symptoms, refer for further investigation by a bariatric physician or endocrinologist (urgency depends on severity of the symptoms).
Memory issues	Vitamin B12 deficiency, iron deficiency, thiamine deficiency.	Treat any relevant nutritional deficiencies and if symptoms persist, refer to neurology.
Metabolic bone disease	Calcium deficiency, vitamin D deficiency, selenium deficiency.	For vitamin D deficiency, check PTH as it can cause secondary hyperparathyroidism. Follow NOGG guidance. If poor response to vitamin D supplementation, refer to bone clinic.
Neuropathy/ neuromuscular disorders	Folate deficiency (can cause indirect cellular thiamine deficiency as well), vitamin B12 deficiency, copper deficiency, thiamine deficiency.	For folate and/or vitamin B12 deficiencies manage as per BNF. NICE guidance on folate and vitamin B12 can also be found here. Consider referral to neurology if symptomatic. For copper or thiamine deficiency see notes above this table and refer to bariatric surgery unit for advice.
Night blindness	Vitamin A deficiency (for example, after gastric bypass).	If suspected refer urgently to bariatric surgery unit for vitamin A blood test and advise the patient to get a routine eye test conducted by an optician.
Peripheral oedema	Protein malnutrition.	Refer to bariatric surgery unit as requires further investigation.
Poor wound healing	Zinc deficiency, copper deficiency, iron deficiency, protein malnutrition.	For iron deficiency manage as per BNF. NICE guidance on iron deficiency anaemia is available here. For zinc and/or copper deficiency, see notes above this table and refer to bariatric surgery unit for advice.

Sign/Symptom	Potential Cause related to Bariatric Surgery and nutrients to check	Suggested actions
Poor wound healing (cont.)		For protein malnutrition, refer to bariatric surgery unit as requires further investigation.
Pregnancy (1,2)	Women are advised to avoid getting pregnant until around 12 to 18 months after bariatric surgery. Preconception planning is important.	Recommend that women have 5 mg/day folic acid, starting before conception and continuing for the first trimester. Vitamin supplements containing vitamin A in the retinol form should be avoided, however, vitamin A in the beta carotene form (e.g. Forceval capsules (BUT NOT the soluble form)) are acceptable (correct as of 23.01.23). Women who become pregnant post-bariatric surgery need urgent referral for consultant-led care.
Weight loss (excessive) **	Multiple potential causes - greatly reduced appetite, inadequate intake, malabsorption, stricture, overtight band, psychological factors including fear of weight gain or diet progression.	Patients with continued, excessive, weight loss require further investigations and referral back to bariatric surgery unit.

Table adapted from BOMSS 2020 (British Obesity and Metabolic Surgery Society) Post-bariatric surgery nutritional guidance for GPs (2)

5. Privately funded bariatric surgery (including overseas surgery)

The PrescQIPP bariatric surgery bulletin states:

"Some people who do not meet the NICE or Scottish Health Board bariatric surgery criteria choose to fund their bariatric surgery privately. Not all private bariatric centres offer a complete service, and this could cause difficulties for patients and their care. People who do not meet the NICE or Scottish Health Board bariatric surgery criteria and choose to fund their bariatric surgery privately will not receive multivitamin and mineral supplements on NHS prescription or NHS funded follow-up care." (7)

Some people are choosing to self-fund bariatric surgery abroad. BOMSS have issued a statement on going abroad for weight loss surgery, highlighting concerns about patients presenting with complications of surgical procedures performed outside of the UK and the poor or non-existent access to routine post operative follow up care. (8) Prior to choosing a private provider of bariatric surgery patients should consider if the private provider provides sufficient pre and post-surgery care to ensure both psychological support and physical and biochemical assessment are provided. The post-surgery follow up should be provided for a minimum of the first 2 years post-surgery, with subsequent follow up provided at least annually. If the surgery causes malabsorption the bariatric centre should provide care for longer than 2 years. (7) Once patients have reached the end of their 2 year private follow up patients will have access to the same monitoring and treatment support as patients treated in the NHS.

A-Z multivitamin and mineral supplementation required post private surgery, whether overseas or in the UK, should be purchased by the patient in line with the table in section 3 of this guidance (7). To prevent clinical deficiency and complications hydroxocobalamin injections can be provided by general practice in Surrey Heartlands to patients post malabsorptive surgery.

6. References

1. **NICE CKS.** Obesity . [Online] https://cks.nice.org.uk/topics/obesity/management/management/#basis-for-recommendation-e36.

2. **British Obesity and Metabolic Surgery Society.** BOMSS Post-bariatric surgery nutritional guidance for GPs. [Online] 03 06, 2023. https://bomss.org/bomss-post-bariatric-surgery-nutritional-guidance-for-gps/.

3. **NHS .** Weight loss surgery. [Online] 04 14, 2020. https://www.nhs.uk/conditions/weight-loss-surgery/types/.

4. **British Obesity and Metabolic Surgery Society.** BOMSS Guidance on medications post-bariatric surgery for GPs. [Online] 03 16, 2023. https://bomss.org/bomss-guidance-on-medications-post-bariatric-surgery-for-gps/.

5. **Specialist Pharmacy Services.** Factors to consider when using medicines following bariatric surgery (gastric bypass). [Online] 04 06, 2022. https://www.sps.nhs.uk/articles/factors-to-consider-when-using-medicines-following-bariatric-surgery-gastric-bypass/.

6. **NHS England.** Conditions for which over the counter items should not routinely be prescribed in primary care: Guidance for CCGs. [Online] 03 2018. https://www.england.nhs.uk/wp-content/uploads/2018/03/otc-guidance-for-ccgs.pdf.

7. **PrescQIPP.** Bariatric Surgery. [Online] 07 2023. https://www.prescqipp.info/umbraco/surface/authorisedmediasurface/index?url=%2fmedia%2f6685%2f323-bariatric-surgery-20.pdf.

8. **British Obesity and Metabolic Surgery Society.** BMOSs statement on going abroad for weight loss surgery. [Online] 09 06, 2023. https://bomss.org/bomss-statement-on-going-abroad-for-weight-loss-surgery/.