Multivitamin and Mineral Supplementation and monitoring following Bariatric Surgery: Guidance for GPs

Introduction

Patients who are morbidly obese will have struggled with their weight for many years before going forward for bariatric surgery. Whilst bariatric surgery is an aid to weight loss, dietary and behavioural changes are essential for achievement of good outcomes including weight maintenance.
All bariatric procedures affect nutritional intake and some procedures may affect the absorption of macronutrients and / or micronutrients. Patients will be required to stay on lifelong nutritional supplements and have lifelong monitoring of their nutritional status.

This guideline assumes that the bariatric centre will provide the first two years of follow up for the patient before discharging back to the care of the General Practitioner[1]. Certain patients such as those who have undergone a complex and severe malabsorptive surgical procedure e.g. duodenal switch/BPD procedure requiring strict monitoring will remain under the care of the specialist bariatric surgery service lifelong.
A re-referral can be made back to the bariatric surgery department at any time if there are any concerns regarding bariatric surgery related complications.[2]

Where follow-up guidance on monitoring and supplementation is provided by the Bariatric Surgery Service, this should be followed.
This WECCG guidance is aimed at providing additional information for GPs and may be used when no follow-up guidance has been provided by the Bariatric Surgery Service.

Pre-operative care

All patients should have a comprehensive nutritional assessment prior to bariatric surgery. This should include a detailed dietary assessment by a trained dietician with specific experience of bariatric nutrition, screening for eating disorders, and psychosocial assessment. Essential preoperative blood tests include screening for diabetes, dyslipidaemia, renal function and nutritional deficiencies.
Nutritional deficiencies identified at this stage should be investigated and corrected as clinically indicated prior to surgery

Weight loss procedures and impact on nutrition

The main bariatric surgery procedures are the gastric band, gastric bypass and sleeve gastrectomy with the duodenal switch being less frequent. In the initial stages after surgery, patients are advised to start on a liquid diet, before progressing onto pureed food, soft food and then more normal textured food. At two years, the patient should be able to manage a wide range of textures of foods but may still report difficulties with some. It should not be assumed that all patients are eating a “well balanced” diet. Hopefully many will be, however some may have maladaptive eating behaviours resulting in a poor nutritional intake.

[1] NICE CG189 Obesity: identification, assessment an management (Nov 2014)
https://www.nice.org.uk/guidance/cg189
[2] Homerton University Hospital Transfer of Care 2 years post-surgery (September 2015)
http://www.homerton.nhs.uk/our-services/services-a-z/o/obesity-surgery-(bariatrics)/transfer-of-care-2-years-post-surgery/

Produced by the WECCG Medicines Optimisation Team;
Approved at MOPB October 2018; Review date October 2020
Updated Sept 2019 in line with West Essex CCG Vitamin and Mineral Decision Document
With Acknowledgements to the British Obesity & Metabolic Surgery Society

Impact of surgery on nutrition:

Surgical procedure	Impact on nutrition
Gastric band	No impact on absorption. Over tight gastric band affects nutritional quality of diet including protein and iron
Sleeve gastrectomy	May be some impact on absorption including iron and vitamin B12
Gastric bypass	Impacts on absorption of iron, vitamin B12, calcium and vitamin D Long limb bypasses may affect absorption of protein, fat, vitamin A and trace elements in addition
Duodenal switch	Impacts on absorption of protein, fat, calcium, fat soluble vitamins A, D, E and K, zinc

Recommended nutritional supplements

As nutrition is compromised with bariatric surgery, it is recommended that patients take nutritional supplements lifelong in addition to having a balanced diet. It is important that compliance with supplements is checked regularly. The table below shows the usual recommended nutritional supplements, but it should be noted that patients may have different requirements. Although patients who have a gastric band should be able to eat a nutritionally balanced diet, many will be advised to routinely take a multivitamin and mineral supplement. The patient's bariatric centre should provide full details of the patient's nutritional requirements and supplements. For further information, please refer to the British Obesity and Metabolic Surgery Society (BOMSS) guidelines (2014).

Nutritional Supplements (routine):

Nutritional Supplement	Surgical Procedure		
	Sleeve Gastrectomy	**Gastric bypass**	**Duodenal switch**
Multivitamin and Mineral	Yes	Yes	Yes
Iron	Yes	Yes	Yes
Folate	As part of multivitamin and mineral	As part of multivitamin and mineral	As part of multivitamin and mineral
Vitamin B12	Yes[3]	Yes	Yes[3]
Calcium and Vitamin D	Yes	Yes	Yes
Zinc and copper	As part of multivitamin and mineral	As part of multivitamin and mineral	As part of multivitamin and mineral Additional may be needed
Selenium	As part of multivitamin and mineral	As part of multivitamin and mineral	As part of multivitamin and mineral
Additional fat soluble vitamins	No	No	Yes

Blood tests following surgery

Continued nutritional monitoring is essential following bariatric surgery to ensure that patients do not develop nutritional problems in the longer term. It must be not assumed however that abnormal blood results are always directly related to the surgery itself. The table below shows the recommended blood

[3] May be variation between centres regarding routine supplementation with vitamin B12 following the sleeve gastrectomy or duodenal switch.

tests which should be done annually as a minimum for the sleeve gastrectomy, gastric bypass and duodenal switch.
Following the gastric band, if there is any suspicion that the patient is not adhering to a nutritionally balanced diet, appropriate blood tests should be done.

Annual blood tests following bariatric surgery

<table>
<tr><th>Blood Tests</th><th colspan="5">Surgical Procedure</th></tr>
<tr><th></th><th>Gastric Balloon</th><th>Gastric Band</th><th>Sleeve Gastrectomy</th><th>Gastric bypass</th><th>Duodenal switch</th></tr>
<tr><td>Liver function tests</td><td rowspan="3">Monitor if any concerns regarding nutritional intake.</td><td rowspan="3">Monitor <u>annually</u> and more frequently if any concerns regarding nutritional intake</td><td colspan="3" rowspan="3">3, 6 and 12 months in first year. Monitor <u>annually</u> and more frequently if any concerns regarding nutritional intake</td></tr>
<tr><td>U&Es</td></tr>
<tr><td>Full blood count</td></tr>
<tr><td>HbA1c and/or FBG in patients with preoperative diabetes</td><td>Monitor as appropriate</td><td colspan="4">Monitor as appropriate</td></tr>
<tr><td>Lipid profile</td><td></td><td colspan="4">Monitor in those with dyslipidaemia</td></tr>
<tr><td>Serum 25 hydroxy Vitamin D</td><td rowspan="5"></td><td>Routine monitoring is usually not required unless the patient has symptomatic vitamin D deficiency</td><td colspan="3" rowspan="5">3, 6 and 12 months in first year. Monitor <u>annually</u> and more frequently if any concerns regarding nutritional intake</td></tr>
<tr><td>Ferritin</td><td></td></tr>
<tr><td>Folate</td><td></td></tr>
<tr><td>Calcium</td><td></td></tr>
<tr><td>Parathyroid Hormone</td><td></td></tr>
<tr><td>Thiamine</td><td></td><td></td><td colspan="3">Routine blood monitoring of thiamine is not required but clinicians should be aware that patients with prolonged vomiting can develop acute thiamine deficiency, which requires urgent treatment.</td></tr>
<tr><td>Vitamin B12</td><td></td><td></td><td colspan="3">6 and 12 months in first year.
Then <u>annually</u>. No need to monitor if patient has intramuscular vitamin B12 injections</td></tr>
<tr><td>Vitamin A</td><td></td><td></td><td></td><td>Measure if concerns regarding steatorrhoea or symptoms of vitamin A deficiency e.g. night blindness</td><td><u>Annually</u>. May need to monitor more frequently in pregnancy.</td></tr>
</table>

Blood Tests	Surgical Procedure				
	Gastric Balloon	Gastric Band	Sleeve Gastrectomy	Gastric bypass	Duodenal switch
Vitamin E, K				Measure vitamin E if unexplained anaemia, neuropathy. Consider measuring INR if excessive bruising / coagulopathy as may indicate vitamin K deficiency.	
Zinc, Copper				Annually. Monitor zinc if unexplained anaemia, hair loss or changes in taste acuity. Monitor copper if unexplained anaemia or poor wound healing. Note the zinc levels affect copper levels and vice versa	
Selenium				Monitor if unexplained fatigue, anaemia, metabolic bone disease, chronic diarrhoea or heart failure.	

Nutritional deficiencies – what to look for:

Protein malnutrition / protein energy malnutrition

Protein malnutrition can occur for a number of reasons including poor dietary choice, an over tight gastric band, anastomotic stricture or protein malabsorption. It may present several years following surgery. Protein energy malnutrition is accompanied by oedema. In all cases of suspected protein malnutrition the patient must be fast tracked back to the bariatric centre.

Anaemia

Whilst iron deficiency anaemia is relatively common following the gastric bypass, it must not be assumed that this is the only cause. Other causes should also be considered and investigated if appropriate. If additional oral iron does not correct the iron deficiency anaemia, parenteral iron or blood transfusions may be necessary. Ensure that the patient maintains levels with oral iron supplements. These should be taken with meals or drinks containing vitamin C to aid absorption and at a different time to calcium supplements. If the anaemia is not due to iron deficiency or blood loss, other nutritional causes should be considered. These include folate, vitamin B12, zinc, copper and selenium.

Folate and vitamin B12

Low folate levels may be an indication of noncompliance with multivitamin and mineral supplements. However, it could also be an indication of severe malabsorption especially if there are other nutritional deficiencies. Megaloblastic anaemia is caused by folate deficiency or vitamin B12 deficiency. Vitamin B12 deficiency, if untreated, results in irreversible peripheral neuropathy. Therefore it is essential that vitamin B12 deficiency is considered before recommending additional folic acid. Those patients who are vitamin B12 deficient should have levels corrected with intramuscular injections of vitamin B12. Once corrected, three monthly injections of 1mg vitamin B12 will maintain levels.

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Approved at MOPB October 2018; Review date October 2020
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Calcium, vitamin D and parathyroid hormone levels

Vitamin D deficiency may result in secondary hyperparathyroidism to maintain calcium levels.

Vitamin A

Patients who have steatorrhoea or who have had a duodenal switch may be at risk of vitamin A deficiency. Certainly, duodenal switch patients should be on extra fat vitamins. Despite this, vitamin A levels may drop over time. Changes in night vision may be an indication of vitamin A deficiency. If the patient has vitamin A deficiency, oral supplementation with vitamin A is needed.

Trace minerals: Zinc, copper and selenium

Unexplained anaemia, poor wound healing, hair loss, neutropenia, peripheral neuropathy or cardiomyopathy may be symptoms of zinc, copper or selenium deficiency and so levels should be checked if there are any concerns. Zinc and copper share a common pathway so supplementation with zinc can induce copper deficiency and vice versa. Information about any additional over the counter supplements the patient may be taking is essential. If additional zinc supplementation is required, a ratio of 1 mg copper for every 8 to 15 mg zinc must be maintained.

Thiamine

Although routine monitoring of thiamine is not recommended the possibility of deficiency should be seriously considered if there is rapid weight loss, poor dietary intake, vomiting, alcohol abuse, oedema or symptoms of neuropathy. All clinicians involved in the aftercare of bariatric surgery patients should be aware of the potential risk for severe thiamine deficiency.

Steatorrhoea

Patients who have had a duodenal switch or long limbed gastric bypass are at the greatest risk of malabsorption and steatorrhoea. Consequently these patients may develop protein malnutrition and become deficient in fat soluble vitamins and zinc, if there are any concerns regarding the nutritional status of these patients.

When to request specialist biochemical / nutritional advice or to refer your patient:

Diagnosis and management of micronutrient deficiency syndrome can be complex and so when in doubt it is recommended that specialist advice is sought. The following are examples of situations where this is appropriate.

1. Newly identified biochemical deficiency, where there is differential diagnosis (there can be causes other than previous bariatric surgery) or its appropriate investigation and treatment are uncertain.
2. Unexplained symptoms that may be indicative of underlying micronutrient / trace element deficiencies.
3. Women who have undergone previous gastric bypass, sleeve gastrectomy or duodenal switch surgery and who are planning to become pregnant or who are pregnant.

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Approved at MOPB October 2018; Review date October 2020
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NHS
West Essex
Clinical Commissioning Group

Vitamin and Mineral Supplementation

West Essex CCG Vitamin and Mineral Decision Document

- NHS West Essex Clinical Commissioning Group **does not** commission Maintenance or Preventative vitamin and mineral supplementation.
  - Patients requiring maintenance or preventative vitamin and mineral supplementation should be advised to purchase an Over the Counter preparation.

Note: if a prescriber has particular concerns that a patient might not be able to, or is unwilling to self-care and treatment with a medication is required, then a prescription (FP10) should be considered.

- NHS West Essex Clinical Commissioning Group **does** commission vitamin and mineral supplementation (in line with local formulary) for **Treatment of Medically diagnosed deficiency** e.g. Vitamin D (treatment doses only).

Recommendation	Gastric balloon	Gastric Band	Sleeve Gastrectomy	Gastric bypass	Duodenal switch
Impact on absorption	No impact on absorption		May be some impact on absorption including iron and vitamin B12	Impacts on absorption of iron, vitamin B12, calcium and vitamin D. Long limb bypasses may affect absorption of protein, fat, vitamin A and trace elements in addition.	Impacts on absorption of protein, fat, calcium, fat soluble vitamins A, D, E and K, zinc
Multivitamin and mineral supplements	Complete 100% A-Z multivitamin and mineral supplement ONE daily	Multivitamin and mineral supplement should include; • iron • selenium • 2 mg copper (minimum) • zinc (ratio of 8 to 15 mg zinc for each 1 mg copper) Complete 100% A-Z multivitamin and mineral supplement TWO daily e.g. Tesco Complete multivitamins and minerals tablets, Lloyds Pharmacy A-Z multivitamins and minerals tablets or equivalent.			

Thiamine	If patient experiences prolonged vomiting always prescribe additional thiamine and urgent referral to bariatric centre. Those patients who are symptomatic or where there is clinical suspicion of acute deficiency should be admitted immediately for administration of IV thiamine.		Sufficient contained within multivitamin and mineral supplement. If patient experiences prolonged vomiting always prescribe additional thiamine and urgent referral to bariatric centre. Those patients who are symptomatic or where there is clinical suspicion of acute deficiency should be admitted immediately for administration of IV thiamine		
Recommendation	**Gastric balloon**	**Gastric Band**	**Sleeve Gastrectomy**	**Gastric bypass**	**Duodenal switch**
Calcium and Vitamin D	Continue with maintenance doses if required		Ensure good oral intake of calcium and vitamin D rich foods Continue with maintenance doses of calcium and vitamin D as identified preoperatively. Treat and adjust vitamin D supplementation in line with local guidance.		
Iron	Continue with maintenance doses if required		45 to 60 mg daily 200 mg ferrous sulphate, 210 mg ferrous fumarate or 300 mg ferrous gluconate daily 100 mg daily for menstruating women 200 mg ferrous sulphate or 210 mg ferrous fumarate twice daily		
	Gastric balloon	**Gastric Band**	**Gastric bypass and sleeve gastrectomy**		**Duodenal switch**
Vitamin B12			Intramuscular injections of 1mg Hydroxocobalamin three monthly N.B. sleeve gastrectomy patients may need less frequent injections		Intramuscular injections of 1mg Hydroxocobalamin three monthly
Folic Acid Contained within multivitamin and mineral supplement			Encourage consumption of folate rich foods If deficient, check compliance with multivitamin and mineral supplement. If compliant, check for vitamin B12 deficiency before recommending additional folic acid supplements. Recheck folate levels after 4 months.		
Fat soluble vitamins A, E and K			Sufficient contained within vitamin and mineral supplement Additional fat soluble vitamins may be needed if patient has steatorrhoea.		Supplement with additional vitamins A, E and K.
Zinc and copper			Sufficient contained within multivitamin and mineral supplement. If additional zinc is needed, ratio of 8 to 15 mg zinc per 1 mg copper must be maintained.		
Selenium			Sufficient contained within multivitamin and mineral supplement. If required, additional selenium may be provided by two to three Brazil nuts a day or by over the counter preparations.		

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Approved at MOPB October 2018; Review date October 2020
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NHS England Conditions for which over the counter items should not routinely be prescribed in primary care: Guidance for CCGs

Recommendation:

- Advise CCGs that vitamins and minerals should not be routinely prescribed in primary care due to limited evidence of clinical effectiveness.

Exceptions:

- Medically diagnosed deficiency, including for those patients who may have a lifelong or chronic condition or have undergone surgery that results in malabsorption. Continuing need should however be reviewed on a regular basis. NB maintenance or preventative treatment is not an exception.
- Calcium and vitamin D for osteoporosis.
- Malnutrition including alcoholism (see NICE guidance)
- Patients suitable to receive Healthy start vitamins for pregnancy or children between the ages 6 months to their fourth birthday. (NB this is not on prescription but commissioned separately)

References

- BOMSS Guidelines on perioperative and postoperative biochemical monitoring and micronutrient replacement for patients undergoing bariatric surgery September 2014 http://www.bomss.org.uk/bomss-nutritional-guidance/
- BOMSS GP Guidance: Management of nutrition following bariatric surgery August 2014 http://www.bomss.org.uk/wp-content/uploads/2014/09/GP_Guidance-Final-version-1Oct141.pdf
- Homerton University Hospital Transfer of Care 2 years post surgery September 2015 http://www.homerton.nhs.uk/our-services/services-a-z/o/obesity-surgery-(bariatrics)/transfer-of-care-2-years-post-surgery/
- NICE CG189 Obesity: identification, assessment an management (Nov 2014) https://www.nice.org.uk/guidance/cg189
- NHS England Conditions for which over the counter items should not routinely be prescribed in primary care: Guidance for CCGs https://www.england.nhs.uk/wp-content/uploads/2018/03/otc-guidance-for-ccgs.pdf

With Acknowledgements to:

- Luton and Dunstable Bariatric Service:
  - Dietary advice following a Laparoscopic Duodenal Switch Gastric Bypass
  - Dietary advice following a Laparoscopic Gastric Bypass
  - Dietary advice following a Laparoscopic Gastric Band
  - Dietary advice following a Laparoscopic Sleeve Gastrectomy

Document History	Consultation Process	Amendments
Produced by West Essex Medicines Management Team	MOPB October 2018	
Updated in line with West Essex CCG Vitamin and Mineral Decision Document	MOPB August 2019	**West Essex CCG Vitamin and Mineral Decision Document** • NHS West Essex Clinical Commissioning Group **does not** commission Maintenance or Preventative vitamin and mineral supplementation. ○ Patients requiring maintenance or preventative vitamin and mineral supplementation should be advised to purchase an Over the Counter preparation. Note: if a prescriber has particular concerns that a patient might not be able to, or is unwilling to self-care and treatment with a medication is required, then a prescription (FP10) should be considered. • NHS West Essex Clinical Commissioning Group **does** commission vitamin and mineral supplementation (in line with local formulary) for **Treatment of Medically diagnosed deficiency** e.g. Vitamin D (treatment doses only).
Updated in line with PrescQIPP Bulletin 224 Bariatric Surgery (August 2019)	MOPB November 2019	Removal of Forceval as ratio of zinc to copper (7.5:1) is not sufficient. Amended guidance for gastric bands to TWO multivitamins daily in line with PrescQIPP. Added e.g. Tesco Complete multivitamins and minerals tablets, Lloyds Pharmacy A-Z multivitamins and minerals tablets or equivalent in line with PrescQIPP.