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Exploring the Patient-Reported Impact of the Pharmacist on Pre-bariatric Surgical Assessment

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Abstract

Background The effects of surgical procedures and the need for life-long nutrient supplementation may impact on medication regimes, requiring changes to dosage and formulation of medicines, which can be difficult for patients following surgery. Our pre-surgical assessment pathway involves a pharmacist with specialist knowledge of bariatric surgery, to help prepare patients for these changes.

Objective To explore the patient-reported impact of the specialist bariatric pharmacist in pre-surgical assessment.

Setting National Health Service Hospital, United Kingdom.

Methods A two phased, retrospective study design using participants recruited from pre-surgical clinic lists. The first phase consisted of confidential, face to face semi-structured interviews. A constant comparative analytic framework informed the construction of the second phase, which consisted of a confidential survey to test the generalizability of the findings with a larger cohort of patients.

Results A total of 40 participants (12 interviews, 28 surveys) were recruited to the study. The majority of participants were female ($n = 33$), mean age 50 years, mean pre-surgical weight 124 kg ($n = 38$). The most common comorbidity was type 2 diabetes. Participants on medication had at least one comorbidity, with the majority of conditions improved or eliminated after surgery.

Conclusions The pre-surgical consultation with the pharmacist was highly valued by the participants, providing information and support which helped prepare for medication changes after bariatric surgery. Many felt that a post-surgical appointment with the pharmacist would provide support and improve compliance with vitamins and medications. Future research into the role of pharmacists in the bariatric multi-disciplinary team and patient support are recommended.

Keywords Bariatric surgery · Patient experience · Pharmacist · Medication compliance · Multi-disciplinary team · Vitamins · Supplementation

Introduction

Many people with obesity who seek bariatric surgery have related comorbidities, necessitating polypharmacy. In the UK, 64% of patients undergoing bariatric procedures have

three or more obesity-related health conditions [1]. The malabsorptive and restrictive effects of bariatric surgical procedures and resultant rapid weight loss necessitate life-long vitamin and mineral supplementation surgery [2]. This often means altered pharmacokinetics of medications, e.g. dose, formulation and timing [3, 4] which vary according to the individual health status of patients. Additionally, there is a need for lifelong follow-up and nutritional supplementation. Bariatric surgery is time of immense physical, social and personal change [5, 6] which requires a period of adjustment for patients.

To prepare for surgery, UK patients attend appointments with members of the bariatric multi-disciplinary team (MDT) to ensure that they meet individualised targets, e.g. weight loss or changes to health behaviours, demonstrating their ability to adapt to post-surgical lifestyle changes [7].

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Once a patient is cleared for surgery, they attend our pre-surgical assessment clinic which has an embedded pharmacist as part of our MDT. During pre-surgical assessment, all patients have an appointment with the pharmacist, who carries out a medication review, integrating changes to current medication post-surgery, discusses compliance with nutritional supplementation after surgery, highlighting issues regarding the timing, duration and interaction with specific medication and vitamins. The pharmacist actively encourages patients to ask questions and discuss their concerns. At the end of the appointment, a written summary is given to the patient, with copies sent to their General Practitioner and incorporated into their hospital records to ensure that information is available to all parties involved in the patients' care.

There is an increasing drive to involve patients in clinical research to ensure that studies are carried out which are relevant to patients and provide opportunities for patients to be included in decisions about research from design to dissemination [8]. In the UK, as part of ethical approval process for research carried out in National Health Services (NHS) settings, applications must demonstrate patient involvement in the research as part of the approval process [9].

Our unit actively carries out patient-focused research, with and for patients. The idea for this study was based on findings from a previous study which explored how patients adjust to life after bariatric surgery [5]. Findings showed that patients reported issues around medication and supplementation compliance which warranted further investigation. Many participants discussed the importance of pre-surgical contact with the bariatric MDT in preparing for and adjusting to life after surgery which we decided to explore further with this study.

The inclusion of a pharmacist in pre-surgical pre-assessment is unique to our service and is not standard practice within UK bariatric surgical units. In order to further engage with patients to co-create research studies which incorporate the views and needs of our patients, the aim of this study was to explore the patient-reported impact of the pharmacist in pre-bariatric surgical assessment.

Methods

A retrospective, two phased, study design with participants randomly recruited from pre-surgical assessment clinic lists by an independent researcher in a large National Health Service (NHS) hospital in the UK. As all patients in our service attend pre-surgical assessment, all patients on the pre-surgical clinic lists were eligible to participate. The first phase involved individual, face to face semi-structured interviews, assisted by a topic guide, which were audio-recorded and transcribed verbatim. Participants were asked to voluntarily take part by discussing their experiences of seeing the pharmacist during pre-surgical assessment. Each interview was carried out by the same independent researcher and took between 30 and 45 min. A constant comparative approach was used, which means that data collection and analysis were undertaken concurrently, with analysis guiding further sampling [10]. This approach allowed researchers to discover areas of interest and to identify concepts of importance to participants and explore these further. Data collection and analysis continued until no new concepts were identified, meaning data was saturated and recruitment to phase 1 ceased. The findings

Table 1 Participant demographics (phase 1—interviews)

Participant (surveys)	Gender	Age	Time since surgery (months)	Type of procedure	Self-reported weight at time of surgery (kg)	Self-reported weight loss at time of interview (kg)	Self-reported weight at time of interview (kg)
A	F	46	8	Roux-en-Y Gastric bypass	140	44	96
B	F	61	13	Roux-en-Y Bypass (conversion from sleeve gastrectomy)	123	12	111
C	F	53	10	One Anastomosis gastric bypass	111	38	73
D	F	63	10	Roux-en-Y Gastric Bypass	138	42	96
E	F	60	10	Roux-en-Y Gastric Bypass	102	31	71
F	M	61	6	One Anastomosis Gastric Bypass	154	21	133
G	F	65	24	Roux-en-Y Gastric Bypass	126	57	69
H	F	56	18	Roux-en-Y Gastric Bypass	120	70	70
I	F	47	12	One Anastomosis Gastric Bypass	120	51	69
J	F	45	8	One Anastomosis Gastric Bypass	118	32	86
K	F	54	24	Roux-en-Y Gastric Bypass	133	57	57
L	F	60	15	Roux-en-Y Gastric Bypass	111	47	64

Table 2 Themes constructed from interviews

Theme	In vivo quotes
Taking pills signifies illness	My Dad died from kidney and liver failure and some of this was down to the medication he was on. Because of this, I did not want to take tablets the rest of my life, and I had side effects from my blood pressure tablets. I have lost weight and I do not have symptoms anymore and I want to come off the pills, I do not want any side-effects long or short term. With the vitamins I am on seven tablets a day and I do not want to take so many (Participant L) I understand that I am taking vitamins for my health and to protect myself in the future. I see it as a priority but it is still taking pills (Participant J)
Feeling empowered by the pharmacist	I wasn't as scared as I thought I would be because she [Pharmacist] talked us [self and partner] through what would happen around the medications after surgery and I think she made me feel more confident in myself (Participant A) The pharmacist told me that I would have to crush to tablets and it might taste bitter, and to have a drink afterwards to take the taste away. When I was on the ward, I got my tablet from the staff, and they just handed it to me whole. I felt good about telling them that the pharmacist told me the tablet needed to be crushed and I would need a drink with it to take the taste away (Participant G)
Preparing to comply with post-surgical recommendations	I had not thought through as to what medication was going to be needed afterwards, so it was good to have the update. If I had not had the appointment, then just been presented with tablets when I left the hospital, I would have been less prepared afterwards (Participant C)
Informing and involving others in their care	With my husband with me at the appointment, he heard everything the pharmacist said and why I needed to take these tablets. So now, he will tell me to make sure I take my tablets on a morning, and reminding me again at night, because I used to be terrible about forgetting to take my pills (Participant A) I had an appointment with my GP and I explained I had met with the pharmacist and I actually took the sheet of paper with me for the GP to have a look at and I went through with her what had been explained to me and the GP asked how I felt about things. I said that I felt a lot better and the information helped my GP to understand what I needed (Participant B) The GP gave me the tablets to stop the gallstones, but he did not give me enough, or the right dosage. I had to go back and back, so when the letter came I went back with it and said to the GP 'this is what I need to have, you are giving me the wrong dosage' (Participant E)
Valuing the expertise of the pharmacist	If I had not seen the pharmacist, I would have probably been more scared waking up the next day after the operation and someone coming up and saying I had to take these tablets. I thought it was quite interesting to speak with the pharmacist about this well before the operation (Participant A) Nobody, except the pharmacist, told me about not being able to take certain medications anymore. She explained why I could not take co-codamol after surgery. She said if I had a migraine, I would need to take paracetamol and that I had to cut codeine out completely. I was worried as I was reliant on it at the time, but I appreciated the time she took to explain everything to me (Participant K) My pharmacist appointment was critical. You need to understand what you are taking and why you are taking it, but also having the structure. It was really clear when I came out of the appointment what I needed to do and when. I think if I had not met with her, I probably would not be as informed as I am (Participant L)
Wanting to help others	When I was in hospital having the operation, I met a man in the next bed who showed me an app for my phone, where I entered all my medication, the time, the quantity etc. and it tells me when to take it and everything else. It's called Medisafe, and it has been so helpful. I'd recommend it to others, as it even tells you when you are running low, so you can order a new prescription (Participant E) After the pharmacist appointment, I bought a pill box, and it helped me to organise myself and my tablets. I would tell everyone to do this, as there is so much to think about after surgery and you need to be prepared (Participant H)

informed the construction of the second phase, which consisted of a confidential survey to test the generalizability of the findings with a larger cohort of patients. During the interviews and data analysis for phase 1, it was noted that participants preferred to discuss the impact of the pharmacist appointment in terms of preparation for surgery, dealing with changes to health status and medication after surgery. Participants did not routinely discuss amount of weight loss, despite collecting data on this as part of the participant demographics. In order to focus on the aim of the study and to reduce the number of questions to encourage responses, questions around weight loss were not included in the survey. Prior to distributing study information, the survey was pilot tested with a representative group of patients, who confirmed that the emphasis should be on patient experiences and not on clinical outcomes.

For phase 2, participants were also identified from clinic lists, with an information pack containing the study information and a link to an on-line survey using Survey Monkey®, with the option of requesting a printed copy, by post. To protect confidentiality, no reminders were sent. Ethical approvals were granted by the National Health Service, Hospital and University research ethics committees. Data were collected between April 2017 and January 2018.

Results

A total of 40 participants (33 female, 7 male) took part in the study, with 12 being interviewed (phase 1) and 28 filling in on-line and printed surveys (phase 2). Owing to a continuous and varied flow of patients progressing to

Table 3 Participant demographics—phase II (surveys)

Participant (surveys)	Gender	Age	Time since surgery (months)	Type of procedure	Self-reported weight at time of surgery (kg)	Self-reported pre-surgical health conditions	Self-reported changes to health conditions after surgery
1	F	46	6	One Anastomosis Gastric Bypass	103	None reported	None reported
2	M	53	6	Roux-en-Y Gastric Bypass	142	Reflux	Much improved
3	M	48	3	One Anastomosis Gastric Bypass	248	T2D (diet and tablet controlled), pancreatitis, Obstructive Sleep Apnoea, Asthma	No longer diabetic
4	F	42	2	Roux-en-Y Gastric Bypass	121	Irritable Bowel Syndrome, chronic pain, reflux, depression, anxiety, arthritis	No but it is early days
5	F	43	6	Roux-en-Y Gastric Bypass	122	Pain	Reduced doses of tramadol
6	M	33	5	Roux-en-Y Gastric Bypass	133	Obstructive Sleep Apnoea	Obstructive Sleep apnoea improved and I feel 100% better
7	M	63	5	Roux-en-Y Gastric Bypass	107	Obstructive Sleep Apnoea, water retention, high blood pressure,	No Obstructive Sleep Apnoea, no high blood pressure, no water retention in legs, no aches or pains
8	F	64	6	Roux-en-Y Gastric Bypass	No response	No response	I am doing really well and feel so much better since the surgery
9	F	46	2	Roux-en-Y Gastric Bypass	No response	No response	I have lost 13 kg to date
10	F	49	2	Roux-en-Y Gastric Bypass	99	T2D, Para hyperthyroidism	Still early days – I am only two months out
11	F	58	N/R	Roux-en-Y Gastric Bypass	129	Hypothyroidism Fibromyalgia Depression	Post-surgery I suffered my worst fibromyalgia flare up. I was readmitted to hospital as I was presenting with a possible pulmonary embolism. Nothing was found after CT scans. Having spoken to my fibromyalgia group I discovered other had similar flare ups after surgery
12	F	50	7	One Anastomosis Gastric Bypass	119	Back and groin pain	Groin pain has eased and I have more confidence
13	F	41	7	One Anastomosis Gastric Bypass	119	Back, knee and foot pain	I feel better, less pain
14	F	51	2	Sleeve Gastrectomy	91	T2D, high blood pressure	Diabetes reversed almost immediately and I expect the blood pressure and statin tablets to be no longer required
15	F	46	2	One Anastomosis Gastric Bypass	99	Rheumatoid arthritis	I am in less pain as I am carrying less weight
16	F	22	2	Roux-en-Y Gastric Bypass	141	None, just an exceptionally high body mass index (BMI)	No response
17	F	62	19	Roux-en-Y Gastric Bypass	110	Angina, spine and neck spondylosis, irregular heartbeat, unstable blood pressure dropping very low then rising very high	Angina almost gone back, neck and knee problems bearable without medication
18	F	31	1	Roux-en-Y Gastric Bypass	147	T2D, Polycystic ovarian syndrome	No longer need metformin and I am hoping my polycystic ovarian syndrome will improve
19	F	52	N/R	Roux-en-Y Gastric Bypass	119	None reported	

Table 3 (continued)

Participant (surveys)	Gender	Age	Time since surgery (months)	Type of procedure	Self-reported weight at time of surgery (kg)	Self-reported pre-surgical health conditions	Self-reported changes to health conditions after surgery
20	F	36	3	One Anastomosis Gastric Bypass	107	None reported	I had no illnesses but I am not likely to get any weight related ones now None reported
21	F	67	15	Roux-en-Y Gastric Bypass	121	Back and hip pain, mobility, constant and chronic pain, bladder issues	Less pain in knees and I am more self-confident
22	M	61	14	One Anastomosis Gastric Bypass	140	T2D, arthritis, high blood pressure.	n/r
23	F	61	15	Laparoscopic banding to Roux-en-Y Gastric Bypass	110	Obstructive Sleep Apnoea Hypertension Gastric Reflux Osteoarthritis Chronic Pain Breast Cancer	No longer need high blood pressure medication, I have been told I can stop my CPAP machine. I hope to be able to reduce my pain medication and eventually Diabetes much improved
24	F	72	7	Roux-en-Y Gastric Bypass	110	T2D	Diabetes much improved
25	F	27	6	Sleeve Gastrectomy	144	None reported	None reported
26	F	30	7	Roux-en-Y Gastric Bypass	136	Plantar fasciitis, asthma, depression and anxiety	Plantar fasciitis has healed completely, asthma greatly improved and I have less anxiety and depression
27	M	61	5	Roux-en-Y Gastric Bypass	155	T2D	I am no longer Type 2 diabetic
28	F	31	7	One Anastomosis Gastric Bypass	155	High blood pressure, T2D, Fibromyalgia	I am no longer hypertensive and my diabetes is nearly gone

surgery through the pre-surgical assessment pathway as data was collected, an accurate response rate could not be determined. The nature of qualitative research means that sample sizes are smaller than quantitative studies [11] as the aim of qualitative research is to observe, understand, and explore a phenomena inductively, paying attention to the meaning and actions of participants, as opposed to entering a study with a pre-determined hypothesis and generating large quantities of numerical data [12]. A qualitative approach is therefore helpful in illuminating and understanding individual and collective patient experiences, which can assist in further developing support for individuals who undergo bariatric surgery.

First Phase—Interviews

Twelve participants (11 female, 1 male) consented to be interviewed (see Table 1). All participants had undergone bypass operations, with Roux-n-Y procedures ($n = 7$), one anastomosis gastric bypass ($n = 4$, and a revisional sleeve gastrectomy to Roux-en-gastric bypass). Participants'

ages ranged from 45 to 63 years (mean age 56 years) and the time since surgery ranged from 6 to 24 months (mean time 13 months) at time of interview. The pre-operative weight of participants ranged from 102 to 154 kg (mean pre-operative weight 124 kg) with weight loss since surgery ranging from 12 to 70 kg (mean weight loss 42 kg).

The interviews took place in a location of participants' choice, including place of work, hospital, and their homes. Each participant gave written consent; the interview was audio-recorded and transcribed verbatim. The researcher also took written notes during the interview, to note areas of interest to be explored further, and to clarify any ambiguity to ensure that interpretation of data was veracious to the participants' experience and to minimise researcher bias. Transcripts were compared with earlier transcripts in a process known as constant comparative analysis, allowing researchers to identify concepts of interest. The concepts were discussed with the research team and a core set of emergent themes was identified and agreed (see Table 2) which informed the construction of the general survey questions, for phase 2.

Table 4 Pharmacist appointment

Participant (surveys)	Were you aware you would see a pharmacist as part of pre-surgical assessment?	Length of appointment (minutes)	How did you attend?	Most valuable points made by pharmacist	If you were on medication, did the pharmacist clearly explain reasons for the changes to medication after surgery?	Did pharmacist clearly the importance of taking vitamins and supplements
1	Cannot remember	15	Alone	What medications I would need to take for life after surgery	I was not on any medication so this question does not apply to me	Yes
2	Yes	15	With partner	What I should be eating and what I should avoid	Yes	Yes
3	Cannot Remember	Unsure	With partner	What medication will stop or start and why. Also gave me information on two types of procedures and the effects of these on medications, as I was not sure which operation I would have until the time	Yes	Yes
4	Cannot Remember	20	With partner	New ways of taking my medications after surgery	Yes	Yes
5	Yes	10	Alone	hHelp with weight loss after surgery	Yes	Yes
6	Yes	30	With partner	Awareness of what medication I would need after surgery	I was not on any medication so this question does not apply to me	Yes
7	Cannot Remember	10	Alone	No response	Yes	Yes
8	Yes	30	Alone	The importance of taking medication after surgery	Yes	Yes
9	Yes	10	Alone	Everything	Yes	Yes
10	Cannot Remember	15	Alone	Stopping metformin/postoperative medication	Yes	Yes
11	Yes	15	Alone	To stop taking Naproxen or use Ibuprofen gel so as to not aggravate my stomach. Finding out what other medications I would need.	Yes	Yes
12	Yes	30	Alone	No response	Yes	Yes
13	No	30	With someone else	Better understanding of my medication	Yes	Yes
14	No	20	With partner	Explanation of what the new medicines I had to take were for	Yes	Yes
15	Yes	10	alone	Explaining what would change after surgery	Yes	Yes
16	Yes	10	With someone else	That I have to take certain medications for life and some for just 6 months	I was not on any medication so this question does not apply to me	Yes
17	Yes	15	Alone	Need for vitamins the lady also had a bottle with salt in and explained how much salt was in soluble pain killers also told me not take certain pills at same time, i.e. calcium and iron	Yes	Yes
18	Yes	20	With partner	I was given a list of what I would be taken and for how long all my questions were answered and she noted all information so I left feeling confident	Yes	Yes
19	Yes	30	Alone	How important meds and aftercare are	Yes	Yes
20	Yes	20–30	Alone	the reasons why some medications cannot be taken and why it was important to take others	I was not on any medication so this question does not apply to me	Yes
21	Yes	30			Yes	Yes

Table 4 (continued)

Participant (surveys)	Were you aware you would see a pharmacist as part of pre-surgical assessment?	Length of appointment (minutes)	How did you attend?	Most valuable points made by pharmacist	If you were on medication, did the pharmacist clearly explain reasons for the changes to medication after surgery?	Did pharmacist clearly the importance of taking vitamins and supplements
22	Yes	30	With partner	Some medication would change from tablets to liquid form	Yes	Yes
23	Yes	30	With partner	The pharmacist gave me the important information I needed to know about post-surgery so I was aware of what to expect and how important it was to maintain the regime. She was also kind enough to answer the questions I had and arranged my medications for discharge which was very helpful.	Yes	Yes
24	Yes	10–15	Alone	importance of not missing medication	Yes	Yes
25	No	10	Alone	None it was very un-informative	No	No
26	No	10	Alone	The importance of taking lansoprazole to protect my new stomach, that I would only take ursodeoxycholic acid along with lansoprazole for 6 months which was a relief to hear, and that the only medication I would take for life would be a multivitamin and mineral supplement.	Yes	Yes
27	Yes	20	With partner	Helped me understand what I needed to take and at what time of the day	Yes	Yes
28	Yes	20	With someone else	How I was going to take medication, i.e. soluble and why I was taking them	Yes	Yes

Second Phase

A total of 28 (22 females, 6 males) completed the survey (on-line or print) (see Table 3). The types of procedures performed were Roux-n-Y Gastric bypass 64% ($n = 18$), mean pre-surgical weight was 128 kg. The most commonly reported health conditions were type 2 diabetes ($n = 8$), pain ($n = 6$), and hypertension ($n = 6$). Improvements to health conditions were reported by 71% ($n = 20$) of participants, with 7% ($n = 2$) reporting it was too early to notice a change, 3% ($n = 1$) had a chronic disease flare-up post-surgery and 18% ($n = 5$) did not respond (see Table 3).

Most participants were aware they were going to see a pharmacist as part of pre-surgical assessment. Patients attended the appointment alone or with someone else and spent between 10 and 30 min with the pharmacist. The participant-reported experiences of the pharmacist appointment are shown in Table 4.

The pre- and post-surgical changes to medications are outlined in Table 5, with the majority showing a reduction in medications. Although phase 1 identified a dichotomy between prescription medications and nutrient supplementation in the context of taking pills daily, the majority of respondents in phase 2 did not perceive vitamins and minerals as ‘medication’.

The final phase of the survey asked participants to reflect on the role of the pharmacist (see Table 6). Over three quarters felt that the pharmacist input was valuable or extremely valuable, with high levels of confidence in taking medication post-surgically. Over half ($n = 16$) stated the service could be improved with additional appointments with the pharmacist after surgery.

Participants were asked how the pharmacist service could be developed further with in vivo quotes suggested as recommendations:

‘I recommend that all patients are told to buy a pill organiser before surgery’

Table 5 Pre- and post-operative medications and medical equipment

Participant	Type of procedure	Self-reported pre-surgical medications	Self-reported post-surgical medications	Self-reported difference in medications/equipment post-operatively	Self-reported vitamin and mineral supplementation	Did participant feel that vitamins and minerals were medications?
1	One Anastomosis Gastric Bypass	None	None	n/a	No response	No
2	Roux-en-Y Gastric Bypass	Lansoprazole	Lansoprazole	No medication changes Added: Vitamins	B12	Yes
3	One Anastomosis Gastric Bypass	Metformin, Ventolin® Buscopan®	Buscopan® Lansoprazole, Ursodeoxycholic acid	No metformin Added: Lansoprazole Ursodeoxycholic acid	Iron, Vitamin D B12	Yes
4	Roux-en-Y Gastric Bypass	Amlodipine Oramorph® Paracetamol Sertraline Tapentadol Lansoprazole Methotrexate Folic acid	Same as before surgery	No change	No response	No
5	Roux-en-Y Gastric Bypass	Tramadol	Tramadol	No change	No response	No
6	Roux-en-Y Gastric Bypass	None	Lansoprazole Ursodeoxycholic acid	Added: Lansoprazole, Ursodeoxycholic acid	Accrete® D3 Ferrous Fumarate Multivitamins	Yes
7	Roux-en-Y Gastric Bypass	Amlodipine Doxazosin Omeprazole Allopurinol	None	All medication stopped	No response	No
8	Roux-en-Y Gastric Bypass	None	Lansoprazole Ursodeoxycholic acid	Added: Lansoprazole Ursodeoxycholic acid	B12 injection Ferrous Fumarate Multivitamin Calcium Carbonate	Yes
9	Roux-en-Y Gastric Bypass	None	Lansoprazole	Added: Lansoprazole	Multivitamin, Ferrous Fumarate Adcal® D3 Multivitamin	Yes
10	Roux-en-Y Gastric Bypass	Metformin Vit D Statin	Metformin Vitamin D,	- 1 (statin)		Yes
11	Roux-en-Y Gastric Bypass	Omeprazole Naproxen Amitriptyline Levothyroxine Sertraline, Atorvastatin Pregabalin Paracetamol, Tramadol	Omeprazole Amitriptyline Levothyroxine Sertraline Atorvastatin Pregabalin Paracetamol Tramadol	- 1 (Naproxen)	Vitamin B12 injection	Yes
12	One Anastomosis Gastric Bypass	Fultium® D3 Gabapentin Amitriptyline Nefopam Sertraline	Adcal® D3 Same as before	No change	No response	No response
13	One Anastomosis Gastric Bypass	None	Multivitamin	n/a	Multivitamin	Yes
14		Lisinopril		- 3		Yes

Table 5 (continued)

Participant	Type of procedure	Self-reported pre-surgical medications	Self-reported post-surgical medications	Self-reported difference in medications/equipment post-operatively	Self-reported vitamin and mineral supplementation	Did participant feel that vitamins and minerals were medications?
	Sleeve Gastrectomy	Vitamin D Amlodipine Atorvastatin Liraglutide Metformin	Colecalciferol Lisinopril, Amlodipine Atorvastatin	Added: Lansoprazole (6 months only) Ursofalk® (6 months)	Ferrous fumarate Multivitamins	
15	One Anastomosis Gastric Bypass	Sulfasalazine, Hydroxychloroquine Tramadol Methotrexate Folic Acid, Amitriptyline, Rituximab infusion (6 monthly)	Methotrexate, Hydroxychloroquine, Amitriptyline Tramadol (but not as many)	– 3 and reduced Tramadol	Multivitamin with minerals	Yes
16	Roux-en-Y Gastric Bypass	None	<i>‘Just the ones that are necessary for post op patients’</i>	None Added: (Assumed to be Lansaprazole and Ursodeoxycholic acid)	No response	No
17	Roux-en-Y Gastric Bypass	Atorvastatin Digoxin Codeine Phosphate Tramadol Paracetamol	Lansoprazole Bisoprolol (2.5 mg am and 1.5 mg pm) Atorvastatin	– 4 Added: Lansaprazole	Adcal® Ferrous Fumarate Calcium Vitamin B12 injection every 12 weeks	Yes
18	Roux-en-Y Gastric Bypass	Metformin	<i>‘Only ones prescribed from operation’</i>	No metformin Added: (Assumed to be Lansaprazole and Ursodeoxycholic acid)	No response	No
19	Roux-en-Y Gastric Bypass	None	Acarbose	+ 1	Vitamins	Yes
20	One Anastomosis Gastric Bypass	None	Lansoprazole (6 months)	Added: Lansoprazole (6 months)	Multivitamin, Iron, Calcium,	Yes
21	Roux-en-Y Gastric Bypass	Amitriptyline Bendroflumethiazide Felodipine Paracetamol Loratadine Carbomer Estriol Uriplan® Carbamazepine Pregabalin Zomorph® Lansoprazole	Medications have stayed the same, but doses have been reduced with some (not stated)			No
22	One Anastomosis Gastric Bypass	Simvastatin, Doxazosin, Paracetamol Losartan Losec®	None	– 5	Ferrous fumarate Accrete	Yes
23	Laparoscopic banding to Roux-en-Y Gastric Bypass	Omeprazole Tramadol Paracetamol Fluoxetine Metoprolol	Omeprazole Loperamide Paracetamol Tramadol	– 1	Multivitamin Vitamin B12, Adcal® Iron supplement	Yes
24		Diabetes medication × 3 (not stated)	Amitriptyline, Cetirizine Spironolactone	– 4	Ferrous fumarate	Yes

Table 5 (continued)

Participant	Type of procedure	Self-reported pre-surgical medications	Self-reported post-surgical medications	Self-reported difference in medications/equipment post-operatively	Self-reported vitamin and mineral supplementation	Did participant feel that vitamins and minerals were medications?
25	Roux-en-Y Gastric Bypass Sleeve Gastrectomy	Amitriptyline Cetirizine Pantoprazole Statin Omeprazole	Omeprazole	0	Calcium Vitamin D Vitamin D Iron tablet Vitamin B12 injection	Yes
26	Roux-en-Y Gastric Bypass	Citalopram, Ventolin® inhaler	Citalopram Ursodeoxycholic acid Lansoprazole	- 1 Added: Ursodeoxycholic acid Lansoprazole	Multivitamin and mineral supplement,	Yes
27	Roux-en-Y Gastric Bypass	Metformin	No response	No response	No response	No response
28	One Anastomosis Gastric Bypass	Metformin Pregabalin Lisinopril	Pregabalin Metformin Lansoprazole	Same Added: Lansoprazole	Calcium, Iron, Multivitamin and B12 injection	Yes

‘Having a pharmacist available for patients who are discharged on a weekend’

‘A more detailed leaflet which describes all the vitamins and what to take and when’

‘It was all explained very well to me, but listening to the other patients on the ward after surgery I feel that some people just don’t listen carefully to the pharmacist, who explained everything to me without being patronising’

‘It would be great to have an on-line Question and Answer session so that if your General Practitioner leaves you hanging, as mine did, you can get answers to your questions without needing a hospital appointment’

‘More information on being aware of how hard it is to take tablets after surgery’

‘I firmly believe that the pharmacists’ involvement in bariatric surgery is crucial. Patients such as myself need a lot of support pre- and post-operatively, and the information regarding medication and how/when to take them and why they are being taken is important to keeping us patients healthy and consistent in our progress’

their long-term care and follow-up, reporting that general practitioners were often not aware of the need to both alter medication regimes, or the necessity of lifelong vitamin supplementation.

The act of taking pills was important for participants. For those on multiple medications for comorbidities, a reduction in the number of pills taken each day signified a positive improvement in their post-surgical lives. However, the need for additional pills in the form of vitamins and temporary (6 month) medications added a layer of complexity to the adjustment after surgery in terms of expectations. Participants felt that although medications were ‘bad’ and vitamins were ‘good’ in terms of complying with post-surgical advice and being healthy, the act of taking pills itself was difficult. Additionally, there were reported side effects of vitamins and supplements (e.g. constipation with ferrous fumarate), and timing of vitamins to avoid interactions with medications was difficult to deal with and affected compliance. For some participants, it was difficult to separate pills in terms of medication and vitamins, for others, the dichotomy between good (vitamins) and bad (medications), despite the number of tablets taken increased after surgery, was not as much of an issue and was accepted as part of the post-surgical lifestyle. It was noted in Table 5 that there were inconsistencies in the patient-reported medicines after surgery, in that some patients did not mention the post-operative medications, or did not mention vitamins.

The discussion with the pharmacist was also thought to be an important step in self-care and empowerment following surgery. Patients reported downloading medication reminder apps

Discussion

Many participants felt they had become experts in their medicines management and acted as an intermediary between the bariatric unit and the primary care team responsible for

Table 6 Post-surgical reflections on the role of the pharmacist (phase 2)

Participant	If you were on any medication, how did you feel about taking your medication when after surgery?	Overall, how did you use the information you learned from the pharmacist after surgery	Should there be a follow-up appointment with the pharmacist after surgery?	If you said yes, when would be the best time(s) up to 24 months after surgery?	How valuable was the pharmacist involvement in your pre-surgical assessment?
1	Confident	No response	Yes	6 months	Extremely valuable
2	Very confident	Amended my diet	Yes	6/12/24 months	Valuable
3	Confident	Helped to understand what to expect and what to do	No	Not needed	Extremely valuable
4	Confident	Helped me to understand what effect the medications would have on me	Yes	3 months	Valuable
5	Confident	No response	Yes	6 months	Valuable
6	Very confident	Implemented advice into my routine, bought a pill organiser which has really helped me to keep on top of what medication I need to take	Yes	6 months	Extremely valuable
7	Very confident	No response	No	Not needed	Fairly valuable
8	Very confident	Helped me to take my medication	Do not know	12/24 months	Extremely valuable
9	Very confident	Overall the information was helpful	Do not know	3/6 months	Extremely valuable
10	Unsure	I was more aware of what was needed after surgery	No	Not needed	Extremely valuable
11	Confident	I made sure my General Practitioner altered my medication	Do not know	Not needed	Extremely valuable
12	Very confident	No response	Yes	6 months	Valuable
13	Very confident	Helped me to understand about the vitamins	N	6/18/24 months	Valuable
14	Very confident	I was more aware of what I needed the medication and vitamins for	N	12 months	Extremely valuable
15	Very confident	I was more prepared for what would happen after surgery	N	Not needed	Valuable
16	Very confident	I took it all in but found it all a little confusing	Y	Not needed	Fairly valuable
17	Fairly confident	I do as I am told, but I am still having severe constipation, if I miss the iron tablets it is easier	N	Not needed	Extremely valuable
18	Very confident	Helped me to organise my tablets so I have certain ones accessible at home for the morning, some at work and some in my bag so I am always covered	Y	6/18/24 months	Extremely valuable
19	No response	Put advice into practice	N	Not needed	Fairly valuable
20	Very confident	To accurately take my medication	N	6 months	Extremely valuable
21	Very confident	I have the list of medications to hand when I take my tablets	Y	3/6/12/18 months	Extremely valuable
22	Very confident	No response	Y	3/12 months	Extremely valuable
23	Confident	I followed the advice on the sheet and made sure I took the medications as prescribed	Y	3/6/9/12/18 months	Extremely valuable
24	Fairly confident	I knew what to take but was unsure of the length to take some medications	Y	3/12/24 months	Valuable
25	Fairly confident	Did not really get any information to use	Y	6/9/12/18/24 months	Not Valuable
26	Very confident	I used it to prepare myself for the changes to come and bought an am/pm pill sorter to ensure I stuck to my prescription post-op	Y	6/12/24 months	Extremely valuable
27	Very confident	I knew what vitamins to buy and when to take my medication	Y	6/12 months	Extremely valuable
28	Fairly confident	I booked an appointment with my General Practitioner to discuss everything after the pharmacist appointment	Y	6 months	Fairly valuable

on their mobile phones, carrying their medication list with them, and having pills in certain locations (home, work, handbags) to be accessible during the day and improve compliance.

Participants also reported using the information gained from the pharmacist to initiate discussions with others involved in their care, notably their general practitioners. Some participants

reported using the information sheet supplied by the pharmacist in pre-surgical assessment as a tool to initiate discussion with their GPs around what was needed after surgery.

Conclusions

Overall, the pharmacist role in the pre-surgical assessment was largely perceived by all participants as positive. The findings are limited to a small sample size of patients in one bariatric surgical unit in the UK and may not be generalizable to other bariatric surgical populations. Additionally, it is noted that it was more difficult to recruit participants to take part in the surveys. It is accepted that there is a high rate of patients who do not attend for follow-up appointments after surgery, so they may also not wish to take part in research; therefore, it cannot be excluded that the participants recruited for this study may not reflect the opinions of the total patient population within our service. Owing to the underpinning interpretivist framework which focuses on participants' experiences using self-reported information, many participants were not able to give specific information about the doses they were on and often expressed changes colloquially, e.g. 'two tablets instead of four', making it difficult to provide statistically valid information; however, the aim of the study was to understand the patient-reported impact of the role of the pharmacist and not provide a quantitative measurement of compliance.

The themes of self-care and patient empowerment can be framed under an overall concept of gaining control, which has been identified as important within the bariatric surgical population. Pre-surgically, many people feel out of control, and afterwards regain a sense of control over their lives [13, 14].

The pharmacist is a valued resource by patients as part of their pre-surgical assessment, but consideration should be given to further appointments post-surgically to address medication issues following weight loss and changes to health status, to reinforce the importance of life-long vitamin supplementation and management of potential side effects. Currently, the pharmacist role is limited to pre-surgical assessment, but there is potential for pharmacists to become more involved in the management of patients following surgery, particularly in the management of long-term chronic diseases [15]. Further research into the role of pharmacist as an integral part of the MDT in bariatric patient care is recommended, along with ascertaining education and training for this specialist role in practice.

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Compliance with Ethical Standards

Ethical Approval Ethical approvals were granted by the National Health Service, Hospital and University research ethics committees. Data were collected between April 2017 and January 2018.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Conflict of Interest Author 1 has received a research grant from Roche Diagnostics. Author 4 has received speaker honorariums from Ethicon, Gore, Olympus and Medtronic, and is on the Editorial Board of Obesity Surgery. All other authors have no conflicts of interest to declare.

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